

Water Levels and Artesian Pressure in Observation Wells in the United States in 1946

Part 6. Southwestern States and Territory
of Hawaii

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1076

*Prepared in cooperation with the States
of Arizona, California, and New Mex-
ico, the Territory of Hawaii, and other
agencies*



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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 :

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WATER LEVELS AND ARTESIAN PRESSURE IN OBSERVATION WELLS
IN THE UNITED STATES IN 1946

Part 6. SOUTHWESTERN STATES

INTRODUCTION

By A. N. Sayre and others

Significance of records of water level and artesian pressure

The rock formations of the earth are great natural reservoirs in which a part of the water derived from rain and snow is stored to supply wells and springs and to maintain the flow of streams during periods of fair weather. Water levels in wells register the stages of these natural reservoirs; they show the extent to which water supplies are depleted by drought or by heavy pumping, whether for public waterworks, irrigation, or industrial uses, and the extent to which they are replenished in seasons of abundant rainfall or melting snow. The changes in pressure recorded on flowing wells indicate depletion or replenishment of the artesian reservoirs.

Annual publication of records by Geological Survey

The regular publication of records of water level and artesian pressure in the United States was begun by the Geological Survey in 1935 and has continued yearly since. The records for the entire country were published in a single volume each year through 1939. 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. (See fig. 1.) The following table gives the numbers of these reports. This series of water-supply papers is in a sense an inventory, year by year, of the ground-water supplies of such parts of the country as have been covered.

Water-supply papers on water levels and artesian pressure in observation wells in the United States

Year	North-eastern States	South-eastern States	North-central States	South-central States	North-western States	South-western States and Hawaii
1935	777	777	777	777	777	777
1936	817	817	817	817	817	817
1937	840	840	840	840	840	840
1938	845	845	845	845	845	845
1939	886	886	886	886	886	886
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

Scope of present volume

The present volume covers the southwestern States and gives records of water level and artesian pressure in about 1,970 observation wells of the Geological Survey and cooperating agencies in Arizona, California, Hawaii, and New Mexico. Of these wells, 38 are equipped with automatic water-stage recorders. For some wells not previously reported complete records of water level are given in this volume, including those of the years before 1946. For wells whose previous records have been published this volume gives only the current records. If a complete description of a well has been published in a previous report, only the well number or the well number and a brief identifying description are given in this report. The numbers in parentheses immediately following a well number are those of the water-supply papers in which earlier records of that well are given and the pages on which they appear. An asterisk indicates that a description of the well is given in the paper whose number is so marked. This report includes about 10,000 individual determinations of water level and artesian pressure.

Land-surface datum

Before 1943, in Geological Survey reports, 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. It had been considered inadvisable to adopt a standard procedure in expressing water levels and artesian heads until after a period of trial with datum planes of different kinds. In 1943, however, it was decided that uniform practice should be adopted.

Accordingly, precise datum planes were established approximating the land surface at each well. The water levels and artesian heads for all wells listed in this report are given in reference to land-surface datum planes. If the water levels or artesian heads are referred to land-surface datum for the first time, a conversion factor is given in the descriptive matter

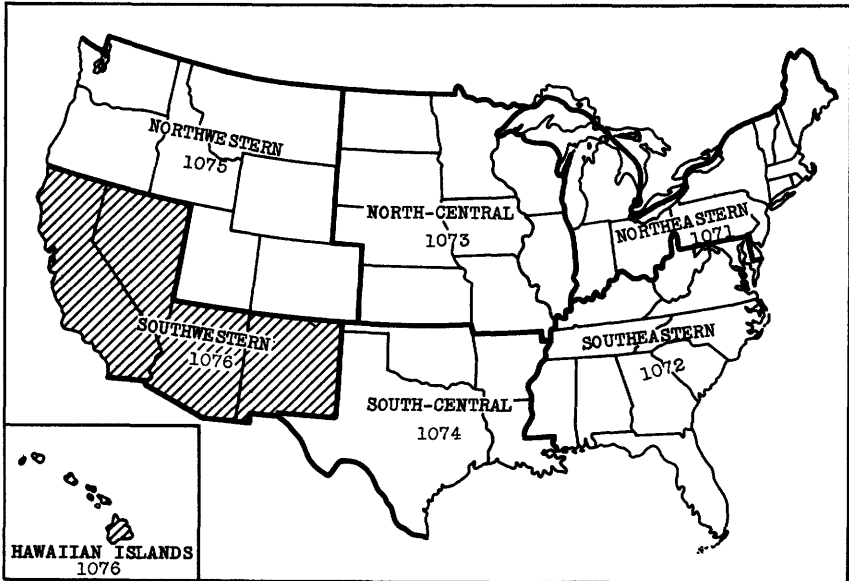


Figure 1.--Outline map of the United States showing sections of the country covered by the six water-supply papers on water levels and artesian pressure in observation wells in 1946. The shaded section represents the part of the country covered by this volume.

preceding them in order to facilitate comparison of the older and newer records. Wherever the conversion factor is given in earlier reports it is not repeated in this report. New data as to the positions of the measuring point and of the bench marks, in feet above or below land-surface datum planes, will be published in succeeding annual reports.

Network of key observation wells

During 1942 the Geological Survey established a network of key observation wells in order to make available current information on general ground-water conditions over the country. These wells were selected because the fluctuations of water level in them are believed to be typical and they represent the general fluctuations that occur in the parts of the

country in which the wells are situated. At the end of 1946 the network included about 160 wells in 45 States. About 40 of the wells were established expressly for the network in 1942 and about 20 were established in 1943; the other 100 were selected from wells measured regularly in connection with cooperative ground-water investigations. The coverage of the country is still far from adequate, and it is expected that some wells not included will be added to the network from time to time.

Changes in ground-water level in 1946 in the southwestern part of the
United States

The average precipitation in all of the States in the southwestern section of the country and in the Territory of Hawaii was below normal for the year. The fluctuations of both water level and artesian pressure in wells depend, however, on many factors besides the amount of precipitation. In certain of the observation wells there are fluctuations caused by differences in the rate of pumping or artesian flow from other wells in the area, but most of the observation wells are not noticeably affected by pumping or artesian flow. A summary of the changes in ground-water level is given in the chapter for each State.

Acknowledgments

Acknowledgments for effective services in the preparation of this water-supply paper are due Mrs. Frances Dowell and Mrs. Nauvoo Ragland, Miss Dorothy M. Ireland, and Rodney Hart. Miss Ireland had general charge of the assembling of the several reports and did the editing; Mr. Hart prepared the illustrations; and Mrs. Dowell and Mrs. Ragland did the offset typing.

ARIZONA

PROGRAM OF WORK

By S. F. Turner and L. C. Halpenny

Studies of the ground-water resources of Arizona were continued in 1946 in cooperation with the State Land Department.

The State-wide investigation was expanded in the latter part of 1945 in order to gather more detailed information on the geology, ground-water resources, and quality of ground water in each important ground-water basin in the State. The expanded program will continue until July 1, 1947. The information obtained is being compiled into reports, two of which have already been released. Reports are in preparation for about 10 other ground-water basins, and these reports will be issued in 1947. In addition, reconnaissance field work is being done and water-level measurements are being made in other areas where more detailed work may be required in the future. A total of 2,441 measurements of water level was made in 1946 by the Geological Survey and more than 500 measurements were made by irrigation districts.

PUMPAGE

About 4 million acre-feet of water was used for irrigation in Arizona in 1946. Of this, 61 percent was pumped from the ground-water reservoirs and the remaining 39 percent was diverted from surface streams. In 1945, 3,950,000 acre-feet of water was used for irrigation, of which 53 percent was ground water. Part of the increased use of ground water in 1946 was caused by drought conditions and the resulting deficient stream flow, and part by an increase in the amount of land irrigated solely from wells.

The following table shows pumpage from wells in the basins of the Gila and Salt Rivers:

Pumpage from wells in basins of Gila and Salt Rivers, in acre-feet				
Area	1940	1941	1942	1943
Cochise County:				
San Simon Basin	3,100	(a)	(a)	(a)
Willcox Basin	(a)	(a)	(a)	(a)
Douglas Basin	(a)	(a)	(a)	(a)
Graham County:				
Cactus Flat-Artesia area	(a)	(a)	(a)	(a)
Safford Valley	24,600	8,685	18,900	35,000
Greenlee County: ^{b/}				
Duncan-Virden Valley	2,436	1,348	1,900	7,100
Pima County:				
Part of Santa Cruz River	(a)	68,500	85,500	100,000
Pinal County:				
Part of Santa Cruz and Gila River Basins	372,000	351,000	500,000	515,000
Maricopa County:				
Salt River Valley area ^{c/}	943,000	444,000	1,004,000	1,104,000
Gila Bend area	(a)	(a)	(a)	(a)
Santa Cruz County:				
Part of Santa Cruz River basin	(a)	11,500	14,500	15,000
Yuma County:				
Dateland area	(a)	(a)	(a)	(a)
Wellton-Mohawk area	(a)	(a)	(a)	(a)
South Gila Valley	(a)	(a)	(a)	(a)

Area	1944	1945	1946
Cochise County:			
San Simon Basin	(a)	(a)	5,800
Willcox Basin	(a)	9,000	15,500
Douglas Basin	(a)	8,000	12,500
Graham County:			
Cactus Flat-Artesia area	(a)	(a)	5,600
Safford Valley	52,000	35,200	115,000
Greenlee County: ^{b/}			
Duncan-Virden Valley	9,500	8,300	21,000
Pima County:			
Part of Santa Cruz River	106,000	111,000	108,000
Pinal County:			
Part of Santa Cruz and Gila River basins	530,000	610,000	660,000
Maricopa County: ^{c/}			
Salt River Valley area	1,017,000	1,143,000	1,360,000
Gila Bend area	(a)	(a)	33,300

* See footnotes at end of table.

Pumpage from wells in basins of Gila and Salt Rivers, in acre-feet--Cont.

Area	1944	1945	1946
Santa Cruz County:			
Part of Santa Cruz River basin	12,500	18,500	24,000
Yuma County:			
Dateland area	4,000	4,000	4,000
Wellton-Mohawk area	37,000	35,000	38,000
South Gila Valley	20,000	22,000	32,000
Total, 1946			2,434,700

a Pumpage not determined.

b Partly in Hidalgo County, N. Mex.

c Includes Queen Creek area, Maricopa, and Pinal Counties.

The foregoing table clearly shows that ground water is becoming more and more important in the agricultural economy of Arizona. Water levels are declining each year, however, because the safe yield of many of the ground-water reservoirs is being exceeded. In some areas studied, particularly the areas irrigated solely with ground water, water levels in wells are declining at an alarming rate.

OTHER PROJECTS

The investigation of the ground-water resources of the Verde River Valley from Camp Creek to the confluence with the Salt River was continued in 1946, in cooperation with the city of Phoenix. A report was issued entitled: "Further investigations of the ground-water resources of the Verde River Valley, near Fort McDowell, Arizona", by H. R. McDonald and F. I. Bluhm.

The investigation of the upper Pinal Creek area, Gila County, was continued in cooperation with the city of Globe, and a report was released entitled: "Geology and ground-water resources of the Upper Pinal Creek area, Arizona", by S. F. Turner and G. E. Hazen.

An investigation of the geology and ground-water resources of the Prescott area was begun in 1945 and continued in 1946. The work was undertaken to locate additional water for the city of Prescott and was done with the financial cooperation of the city.

Cooperation with the Bureau of Reclamation, United States Department of the Interior, continued in 1946. The safe yield of the ground-water reservoirs in the drainage basins of the Gila and Salt Rivers was studied, using existing data, and preliminary estimates were given to the Bureau of Reclamation.

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, and Office of Indian Affairs, U. S. Department of the Interior.

APACHE COUNTY

By H. M. Eabcock

An intensive investigation of the ground-water resources of the St. Johns area, in Apache County, was started in 1946, under the State cooperative program. Occasional water-level measurements have been made in selected observation wells since 1944. A total of 58 measurements in 8 wells are listed.

Well descriptions and water-level measurements

3152. Petrified Forest National Monument. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 5, T. 19 N., R. 24 E., in the Petrified Forest National Monument, in wash, 5 miles northwest of entrance to Petrified Forest from U. S. Highway 66, 32 miles northeast of Holbrook. Drilled domestic well, diameter 8 inches, depth 40 feet. Measuring point, top of casing, 0.5 foot above land-surface datum. Equipped with pump and gasoline engine.

Water level, in feet below land-surface datum, 1945-46

Date	Water level	Date	Water level	Date	Water level
June 2, 1945	8.15	Jan. 21, 1946	10.67	July 10, 1946	10.90
July 7	8.70	Feb. 16	11.06	Aug. 12	11.25
Aug. 20	8.36	Mar. 14	10.29	Sept. 1	9.19
Sept. 11	7.94	Apr. 14	3.56	Oct. 16	10.66
Oct. 15	8.47	May 15	10.50	Nov. 27	10.50
Nov. 20	10.67	June 18	8.85	Dec. 20	9.45
Dec. 18	10.78				

6601. L. M. Farr. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 26, T. 13 N., R. 27 E., at rear of house, 0.25 mile west of trail, 0.15 mile south of U. S. Highway 260, 4.5 miles west of St. Johns. Drilled domestic well, diameter 6 inches, depth 190 feet. Measuring point, top of casing, 3.37 feet above land-surface datum. Equipped with rope and bucket.

Water level, in feet below land-surface datum, 1939, 1944-46

Sept. 7, 1939	24.14	May 31, 1945	27.75	June 10, 1946	27.35
Aug. 10, 1944	27.57	Sept. 26	26.74	Aug. 28	26.79

6709. Jacob Barth. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 27, T. 13 N., R. 28 E., in St. Johns, behind Barth Hotel. Drilled domestic well, diameter 8 inches, depth 162 feet. Measuring point, top of tee, 2.3 feet above land-surface datum. Equipped with windmill and cylinder pump.

Water level, in feet above or below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 7, 1944	-1.57	May 30, 1945	-0.06	June 10, 1946	+0.88
Aug. 9	+0.09	Sept. 26	-.59	Aug. 28	+1.60

6716. E. L. Johns. SW $\frac{1}{4}$ sec. 30, T. 13 N., R. 28 E., 0.2 mile south of U. S. Highway 260, 2.0 miles west of St. Johns. Drilled domestic well, diameter 12 inches, depth 50 feet. Measuring point, top of casing, 1.6 feet above land-surface datum. Equipped with windmill and cylinder pump.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 7, 1944	12.05	May 30, 1945	16.23	June 11, 1946	21.69
Aug. 9	12.60	Sept. 26	17.06	Aug. 28	22.79

7414. B. Y. Peterson. NE $\frac{1}{4}$ NW $\frac{1}{4}$ 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. Measuring point, top of casing, north side, 1.0 foot above land-surface datum. Equipped with windmill and cylinder pump. Water levels, in feet below land-surface datum, 1944: June 6, 41.66; Aug. 9, 42.43.

7415. Max Romel. SE $\frac{1}{4}$ sec. 18, T. 12 N., R. 28 E., 150 feet west of U. S. Highway 666, 6.0 miles south of St. Johns. Dug domestic well, diameter 4 feet, depth unknown. Measuring point, top of well crib, southwest corner, 3.0 feet above land-surface datum. Equipped with rope and bucket.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
Aug. 9, 1944	15.30	Sept. 25, 1945	17.11	Aug. 28, 1946	16.68
May 30, 1945	16.54	June 6, 1946	17.04		

9007. E. C. Becker. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 33, T. 9 N., R. 29 E., at Springer-ville, behind shed, half a block south and half a block east of monument on U. S. Highway 60. Drilled domestic and irrigation well, diameter 6 inches, depth 125 feet. Measuring point, top of casing, 4.3 feet below land-surface datum. Equipped with electric motor and jet pump.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 3, 1944	9.07	May 30, 1945	10.20	June 18, 1946	11.53
Aug. 8	8.99	Sept. 25	9.11	Aug. 28	10.61

10001. C. Traweek. NW $\frac{1}{4}$ sec. 33, T. 9 N., R. 29 E., in a narrow valley, 0.3 mile north of U. S. Highway 60, 11.7 miles east of Springer-ville. Dug stock well, diameter 4 feet, depth unknown. Measuring point, top of well cover, 0.5 foot above land-surface datum. Equipped with windmill and cylinder pump.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 3, 1944	31.50	Sept. 25, 1945	30.49	July 12, 1946	32.18
Aug. 9	30.98	June 18, 1946	31.90	Aug. 28	31.38
May 30, 1945	30.25				

COCHISE COUNTY

By R. L. Cushmar

Studies of the ground-water resources of Cochise County were continued during 1946 in cooperation with the Arizona State Land Department. Work in the San Pedro River Basin consisted of making water-level measurements in selected wells in the St. David-Benson-Pomerene area and in the Fort

Huachuca-Charleston area. In the Sulphur Springs Valley and the San Simon Valley of Cochise County more detailed investigations of the ground-water resources were made. A total of 339 water-level measurements was made in 59 selected wells in Cochise County during 1946.

ST. DAVID-BENSON-POMERENE AREA

There was no general decline in water levels in the six artesian wells measured as four wells had no net decline in water level during 1946, and the water levels in two wells declined about 1 foot during the year. One of the wells in which the water level declined is in the town of Benson and the decline probably was caused by local pumping from nearby artesian wells. The reason for the decline of the water level in the other well is not apparent.

The water levels in shallow (nonartesian) wells near the San Pedro River rose from a fraction of a foot to about 2 feet. In the pumped areas, the water levels in shallow wells declined during the pumping season and partially recovered after pumping ceased. In areas away from the river and away from the pumped areas the water levels declined in wells as the ground water moved from storage in these outlying areas to fill the depressions in the pumped areas.

CHARLESTON AREA

Water levels in a few wells in the Fort Huachuca-Charleston area declined as much as 1.5 feet and in other wells the water level rose as much as 3.0 feet during 1946. Water levels in wells near the San Pedro River and near major washes rose in response to recharge from the runoff from the summer rains. Water levels declined in wells farther from these areas of recharge.

SULPHUR SPRINGS VALLEY

In 1946, the ground-water resources of the Sulphur Springs Valley were studied in some detail. The geology in parts of the valley was mapped, the depth to water was measured in wells, and an inventory of the amount of water pumped for irrigation was made. The limits of two ground-water basins in Sulphur Springs Valley were outlined. The two basins are separated by a series of low, partially buried rock barriers that form a drainage divide in the vicinity of the town of Pearce. The ground-water basin north of these hills is called the "Wilcox Basin" and the ground-water basin to the south is called the "Douglas Basin." A report on the ground-water

resources of the Willcox Basin is in preparation and will be released in 1947. Field work is being continued in the Douglas Basin.

Figure 2 shows graphs of water-level fluctuations in two selected wells in each basin, the quantity of water pumped monthly in each basin, and the monthly precipitation at the town of Willcox.

Well 1527 is in the Willcox Basin, about 9 miles northwest of the town of Willcox, in an area where ground water is pumped for irrigation. Pumping for irrigation between March and June 1946 withdrew water from aquifers in the vicinity of well 1527, causing the water level to decline. The rate of decline decreased during the summer months when pumping was reduced as a result of the summer rains. After October, pumping was further reduced and the water level partially, but not entirely, recovered to the stage reached at the end of the previous year.

Well 1700 is in the Willcox Basin, about 8 miles southwest of Willcox and 2 miles northwest of the "Willcox Playa". No ground water is pumped for irrigation in the vicinity of this well, but the use of ground water by mesquite near the well and the evaporation of ground water from the playa cause seasonal fluctuations of the water level.

Well 2701 is an irrigation well in the Douglas Basin, 3 miles northeast of Elfrida. In 1946, the decline of the water level in this well was caused by pumping water in the vicinity for irrigation during the spring and summer. After the pumping season, the water level rose, but not to the stage reached at the end of the previous year.

Well 3350 is an irrigation well in the Douglas Basin, 13 miles northwest of Douglas. The water level in this well fluctuates in response to seasonal changes in the rate of pumping.

Approximately 15,500 acre-feet of ground water was pumped in the Willcox Basin during 1946, or about 6,500 acre-feet greater than the amount pumped during 1945. In the Douglas Basin 8,000 and 12,500 acre-feet was pumped in 1945 and 1946, respectively. The increased pumpage in both basins during 1946 was caused by an increase in the amount of land being cultivated, with a proportionate increase in the number of wells.

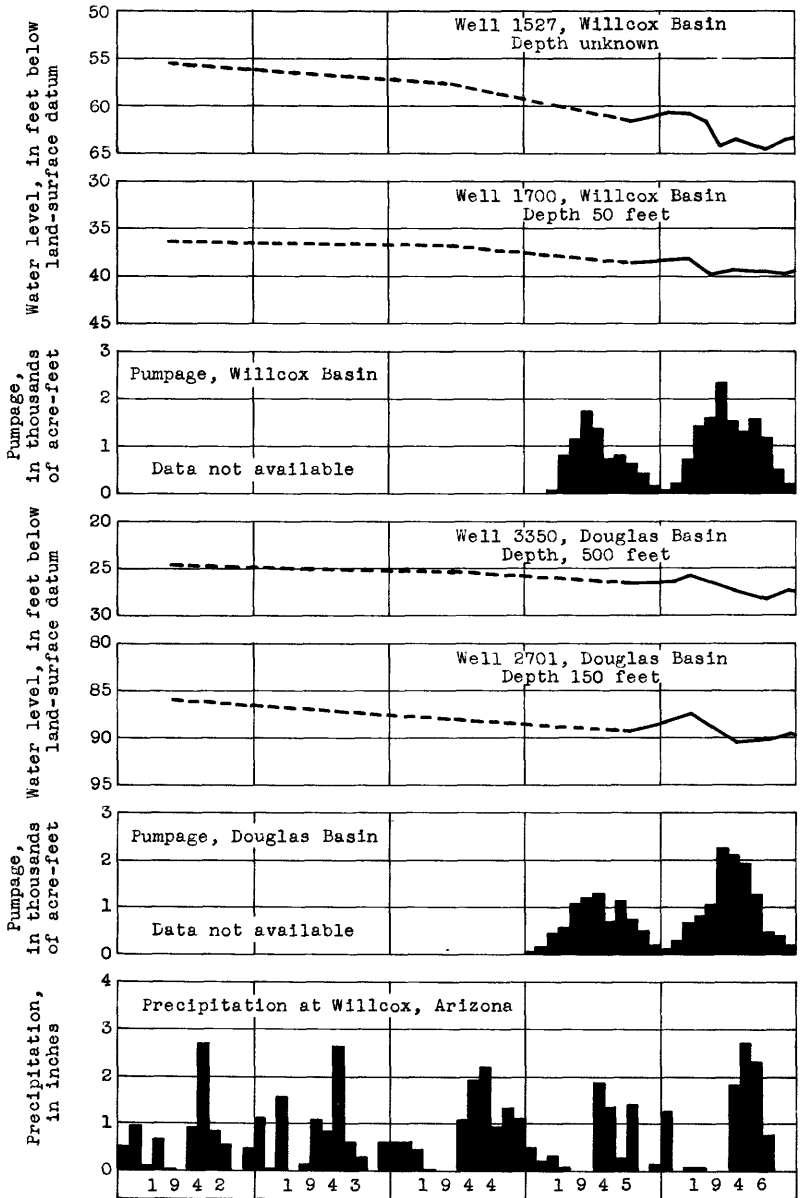


Figure *2.--Graphs showing fluctuations of water level in observation wells in Willcox and Douglas Basins, Cochise County, Arizona.

SAN SIMON VALLEY

The geology and ground-water resources of the San Simon Valley were studied during 1946 in cooperation with the Arizona State Land Department. Water levels and pressure heads in wells have been measured periodically since 1940. A report is in preparation which will present the information obtained.

Ground water under artesian pressure occurs in San Simon Valley in lenses of permeable sand and gravel, interbedded with clay, sandstone, and conglomerate. In the vicinity of the town of San Simon, the artesian pressure is sufficient to cause wells to flow. The pressure head has declined since the first artesian well was completed in 1910, and the head is now below the tops of many wells which formerly flowed. Several artesian wells are now pumped to obtain water for irrigation. About 5,600 acre-feet of water flowed or was pumped from artesian wells in the San Simon Valley, in Cochise County, during 1946.

The pressure head in the artesian aquifers declines in the summer, during the pumping season, and recovers at least partially during the winter. In the irrigated area southeast of the town of San Simon, the pressure reduction was as much as 8 feet during the 1946 pumping season. The pressure reduction diminished in magnitude away from the pumped area. Fluctuations in water levels or in pressure heads in wells 5 miles or more from the pumped area amounted to less than 1 foot during 1946. A slight net decline in water levels or pressure heads in artesian wells in the San Simon Valley was noted during 1946.

Ground water is also obtained near the town of San Simon from shallow wells that tap aquifers in which the water is not confined under pressure. Water levels in these shallow wells have risen about 0.6 foot between 1940 and 1946. This rise may be the result of water leaking into the non-artesian aquifers through faulty well casings of artesian wells in the same area.

Well descriptions and water-level measurements

St. David-Benson-Pomerene area

302 (*1028, p. 9). W. N. East. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 16 S., R. 20 E. Water levels, in feet below land-surface datum, 1946: Mar. 30, 45.03; Sept. 25, 45.12; Dec. 9, 44.60.

305 (*1028, p. 9). L. A. Scott. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 34, T. 16 S., R. 20 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	75.16	June 10	76.14	Dec. 9	76.30
Mar. 30	75.66	Sept. 25	78.16		

475 (*1028, p. 9). Earl M. Brown. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 12, T. 17 S., R. 20 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	56.60	June 10	56.58	Dec. 9	55.85
Mar. 30	56.97	Sept. 25	55.99		

477 (*1028, p. 9). City of Benson. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 10, T. 17 S., R. 20 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	9.60	June 10	17.34	Dec. 9	10.86
Mar. 30	13.20	Sept. 25	12.88		

583 (*1028, p. 10) Will Campbell. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 31, T. 17 S., R. 21 E. Water levels, in feet below land-surface datum, 1946: Mar. 30, 16.33; June 10, 23.43; Sept. 25, 22.63; Dec. 9, 21.15.594 (*1028, p. 10). H. W. Busby. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 31, T. 17 S., R. 21 E., 0.75 mile north of U. S. Highway 80, 0.05 mile west of St. David High School, in St. David.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	49.00	June 10	49.74	Dec. 9	50.74
Mar. 30	49.44	Sept. 25	50.33		

599 (*1028, p. 10). Boquillas Cattle Co. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 17 S., R. 21 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	16.95	June 10	17.26	Dec. 9	16.92
Mar. 30	17.31	Sept. 25	17.27		

600 (*1028, p. 10). Mrs. E. M. Miller. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 32, T. 17 S., R. 21 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	4.50	June 10	6.14	Dec. 9	4.52
Mar. 30	7.27	Sept. 25	5.50		

601 (*1028, p. 10). Mrs. Parley McRae. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 32, T. 17 S., R. 21 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	1.58	June 10	2.05	Dec. 9	1.23
Mar. 30	1.43	Sept. 25	1.70		

701 (*1028, p. 10). Leo Westfield. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 1, T. 18 S., R. 20 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	5.19	June 10	6.87	Dec. 9	6.57
Mar. 30	5.15	Sept. 25	7.12		

745 (*1028, p. 10). Walter Haymore. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 6, T. 18 S., R. 21 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	28.25	June 10	27.94	Dec. 9	29.55
Mar. 30	25.62	Sept. 25	29.77		

748 (*1028, p. 10). F. J. Miller. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 6, T. 18 S., R. 21 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	27.18	June 10	27.82	Dec. 9	26.78
Mar. 30	26.67	Sept. 25	27.42		

749 (*1028, p. 11). A. L. Owens. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 5, T. 18 S., R. 21 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	56.90	June 10	56.04	Dec. 9	57.30
Mar. 30	56.03	Sept. 25	56.00		

752 (*1028, p. 11). E. W. McCommas. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 28, T. 18 S., R. 21 E. Water levels, in feet below land-surface datum, 1946: Jan. 11, 51.10; Mar. 30, 50.79. Measurements discontinued after June 10, 1946; well sealed.

753 (*1028, p. 11). Milton Curtis. SE $\frac{1}{4}$ sec. 34, T. 18 S., R. 21 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 11	24.50	June 10	24.77	Dec. 9	24.48
Mar. 30	24.42	Sept. 25	24.45		

Charleston area

950 (*1028, p. 11). Lon Hunt. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 32, T. 20 S., R. 20 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 4	90.34	July 22	89.49	Dec. 10	89.00
Apr. 2	89.59	Nov. 4	89.72		

951 (*1028, p. 11). Lon Hunt. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 32, T. 20 S., R. 20 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 4	83.18	July 22	82.45	Dec. 10	81.75
Apr. 2	81.93	Nov. 4	82.14		

1070 (*1028, p. 11). Cochise County. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 31, T. 21 S., R. 21 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 4	284.90	July 22	285.00	Dec. 10	285.73
Apr. 2	285.63	Nov. 4	285.65		

1071 (*1028, p. 11). E. Fry. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 21 S., R. 21 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 4	197.47	July 22	197.20	Dec. 10	197.56
Apr. 2	197.02	Nov. 4	196.84		

1126 (*1028, p. 12). War Department. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 3, T. 22 S., R. 20 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 4	475.00	July 22	482.80	Dec. 10	488.74
Apr. 3	486.27	Nov. 4	489.50		

Sulphur Springs Valley

1500 (*1028, p. 12). Frank R. Harris. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 13, T. 12 S., R. 23 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	66.64	May 3	68.02	July 26	67.04	Dec. 11	67.48
Mar. 26	66.80	June 10	66.92	Oct. 15	67.22		

1527 (*1028, p. 12). Owner unknown. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 28, T. 12 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	60.34	May 3	61.76	July 26	63.57	Dec. 11	63.85
Mar. 26	62.72	June 10	64.11	Oct. 15	64.88		

1528 (*1028, p. 12). Mrs. A. W. Towne. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 12 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	53.25	May 3	56.19	July 26	(a)	Oct. 15	(a)
Mar. 26	52.94	June 10	60.99				

a Dry.

1576 (*1028, p. 12). J. D. Rutledge. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, T. 13 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	54.64	May 3	59.71	July 26	57.64	Dec. 11	58.17
Mar. 26	55.82	June 10	60.54	Oct. 15	60.33		

1578 (*1028, p. 12). Mrs. Theirman. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 7, T. 13 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 42.90; Mar. 26, 42.76. Measurements discontinued after Mar. 26, 1946; well destroyed.

1582 (*1028, p. 12). State of Arizona. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 16, T. 13 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	32.07	May 3	32.23	July 26	32.68	Dec. 11	32.55
Mar. 26	32.09	June 10	32.44	Oct. 15	32.22		

1583 (*1028, p. 12). Bruce Wilson. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 21, T. 13 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 24, 35.50; Mar. 26, 36.78; May 3, pumping. Measurements discontinued after May 3, 1946; well sealed.

1584 (*1028, p. 12). J. J. Meyer. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 23, T. 13 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	36.00	May 3	39.41	July 26	39.20	Dec. 12	39.34
Mar. 26	37.48	June 10	43.70	Oct. 15	39.53		

1585 (*1028, p. 13). W. A. Hines. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T. 13 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	24.07	May 3	24.10	July 26	24.60	Dec. 12	25.30
Mar. 26	24.05	June 10	24.59	Oct. 15	25.00		

1588 (*1028, p. 13). P. H. Pregonzer. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 35, T. 13 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	22.06	May 3	23.08	July 26	23.47	Dec. 12	22.98
Mar. 26	22.92	June 10	23.08	Oct. 15	24.21		

1700 (*1028, p. 13). Fay Proctor. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 36, T. 14 S., R. 23 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 23	(a)	Mar. 26	37.95	July 26	39.16	Dec. 11	39.73
28	38.01	May 20	39.70	Oct. 17	39.42		

a Mill running.

1725 (*1028, p. 13). C. A. Williamson. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 14 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 29	12.88	May 3	13.93	Oct. 15	14.20
Mar. 26	12.84	July 26	(a)	Dec. 11	(b)

a Obstruction at 13.8 feet.

b Pumping.

1726 (*1028, p. 13). W. L. Woodrow. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 14, T. 14 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 23	13.72	May 21	14.19	Dec. 11	14.32
Mar. 26	(a)	Oct. 17	14.10		

a Pumping.

1728 (*1028, p. 13). Fay Proctor. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T. 14 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 23	22.00	May 20	21.91	Oct. 17	a 24.01
Mar. 26	21.89	July 26	(a)	Dec. 11	(a)

a Pumping.

1776 (*1028, p. 13). Dunlap Auto Court. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 6, T. 14 S., R. 25 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 23	13.78	May 3	13.58	Oct. 15	14.13
Mar. 26	13.61	July 26	14.02	Dec. 11	14.13

1953 (*1028, p. 13). B. B. Gibbons. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 11, T. 16 S., R. 25 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	43.50	May 10	43.83	July 26	45.18	Dec. 12	43.90
Mar. 27	43.45	June 19	44.92	Oct. 16	44.72		

1954 (*1028, p. 13). Henry Gibbons. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 13, T. 16 S., R. 25 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	45.68	May 10	(a)	July 26	46.67	Dec. 12	47.45
Mar. 27	45.47	June 19	46.03	Oct. 16	47.53		

a Mill running.

1956 (*1028, p. 14). State of Arizona. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 16, T. 16 S., R. 25 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 24	35.32	May 10	(a)	Oct. 16	a 44.55
Mar. 27	34.74	July 26	(a)	Dec. 12	35.05

a Mill running.

2701 (*1028, p. 14). W. H. Seaver. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 12, T. 20 S., R. 26 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 25	88.17	July 25	90.50	Dec. 11	89.52
Mar. 27	87.42	Oct. 15	90.10		

2702 (*1028, p. 14). Gilbert Thompson. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 11, T. 20 S., R. 26 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 25	69.24	May 2	(a)	Oct. 15	73.45
Mar. 27	69.02	July 25	75.71	Dec. 11	71.94

a Pumping.

2709 (*1028, p. 14). F. O. Mackey. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, T. 20 S., R. 26 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 25	26.15	May 2	27.67	Dec. 11	24.85
Mar. 28	26.32	Oct. 15	28.20		

3350 (*1028, p. 14). J. E. Brophy. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 21, T. 22 S., R. 26 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	26.40	May 2	26.50	Oct. 15	28.13
Mar. 28	25.97	July 25	27.29	Dec. 11	27.60

3650 (*1028, p. 14). W. E. Mason. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 19, T. 23 S., R. 27 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	31.04	May 2	35.34	Oct. 14	29.90
Mar. 28	28.88	July 24	29.06	Dec. 11	29.97

3800 (*1028, p. 14). Walter Holland. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 1, T. 24 S., R. 26 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	105.91	May 2	109.59	Oct. 14	105.42
Mar. 28	107.54	July 24	106.98	Dec. 11	105.83

3803 (*1028, p. 14). Cochise County Hospital. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 3, T. 24 S., R. 27 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 5	66.89	May 2	70.29	July 24	69.91	Dec. 10	68.38
Mar. 28	65.99	June 18	70.70	Oct. 14	68.71		

3804 (*1028, p. 14). L. L. Keith. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 5, T. 24 S., R. 27 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	56.21	May 2	55.88	Oct. 14	56.15
Mar. 28	55.97	July 24	56.35	Dec. 11	56.61

3810 (*1028, p. 15). Victor Nelson. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 17, T. 24 S., R. 27 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	51.01	May 2	50.94	Oct. 14	52.30
Mar. 28	51.36	July 24	51.58	Dec. 11	51.55

San Simon Valley

4200. A. R. Spikes. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 6, T. 13 S., R. 29 E., 0.5 mile north of State Highway 86, 3 miles east of Bowie. Used drilled stock well, diameter 6 $\frac{1}{2}$ inches, depth 835 feet. Measuring point, top of casing, 0.2 foot above land-surface datum. Equipped with windmill.

4200--Continued.

Water level, in feet below land-surface datum, 1941-42, 1944, 1946

Date	Water level	Date	Water level	Date	Water level
May 2, 1941	9.49	Feb. 6, 1946	11.64	Oct. 31, 1946	12.40
Apr. 23, 1942	9.96	Apr. 8	11.42	Dec. 31	11.58
June 30, 1944	11.05	June 12	12.73		

4201. U. S. Dept. of Agriculture. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 13 S., R. 29 E., at north end of dug pit, 500 feet north of Southern Pacific railroad siding of Holt, 4 miles east of Bowie. Unused drilled well, diameter 4 inches, depth 482 feet. Measuring point, bottom of 1 $\frac{1}{2}$ -inch hole 6 inches below top of casing, at land-surface datum.

Water level, in feet below land-surface datum, 1942, 1944, 1946

Date	Water level	Date	Water level	Date	Water level
Apr. 23, 1942	0.65	Apr. 8, 1946	2.13	Oct. 31, 1946	2.32
June 30, 1944	1.84	June 12	2.26	Dec. 31	2.26
Feb. 6, 1946	2.07				

4250. U. S. Dept. of Agriculture. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 3, T. 13 S., R. 30 E., at west side of pond, 75 feet east of house, at headquarters of Soil Conservation Service, 2.5 miles west and 4.5 miles north of San Simon. Used drilled stock well, diameter 4 inches, depth 860 feet. Measuring point, top of casing, 1.0 foot above land-surface datum.

Water level, in feet above land-surface datum, 1940, 1942, 1944, 1946

Date	Water level	Date	Water level	Date	Water level
Nov. 19, 1940	4.8	Feb. 8, 1946	4.3	June 19, 1946	4.1
Apr. 22, 1942	4.5	Apr. 8	4.3	Oct. 31	3.9
June 26, 1944	5.0				

4252. T. P. Garrett. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 9, T. 13 S., R. 30 E., 30 feet south of concrete stock tank, 3 miles west and 3.5 miles north of San Simon. Unused drilled well, diameter 14 inches, depth 92 feet. Measuring point, top of casing, at land-surface datum.

Water level, in feet below land-surface datum, 1940-42, 1946

Date	Water level	Date	Water level	Date	Water level
Nov. 19, 1940	23.29	Feb. 6, 1946	25.95	Oct. 31, 1946	24.66
Apr. 29, 1941	23.42	Apr. 8	26.62	Dec. 31	26.72
22, 1942	29.42	June 12	26.79		

4261. Woolston. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 25, T. 13 S., R. 30 E., 600 feet southwest of Yucca Auto Court, 300 feet south of State Highway 86, in San Simon. Unused drilled well, diameter 4 inches, depth 68 feet. Measuring point, top of casing, at land-surface datum. Equipped with windmill.

Water level, in feet below land-surface datum, 1940-42, 1944, 1946

Date	Water level	Date	Water level	Date	Water level
Dec. 10, 1940	60.39	Apr. 22, 1942	60.08	Oct. 31, 1946	59.78
Apr. 30, 1941	60.45	June 28, 1944	59.93	Dec. 31	59.45
May 2	60.19	Feb. 8, 1946	59.67		

4262. W. F. Lewis. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 30, T. 13 S., R. 31 E., at rear of house, 200 feet northwest of Southern Pacific railroad station, at San Simon. Unused drilled well, diameter 4 inches, depth 64 feet. Measuring point, top of wooden pipe clamp, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1940-42, 1946

Date	Water level	Date	Water level	Date	Water level
Dec. 10, 1940	60.96	Feb. 6, 1946	59.97	Oct. 31, 1946	59.93
May 2, 1941	60.57	Apr. 8	59.84	Dec. 31	60.10
Apr. 22, 1942	60.64	June 12	62.44		

4366. Elmer Franklin. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 32, T. 13 S., R. 31 E., at rear of abandoned store, 200 feet south of State Highway 86, 0.1 mile east of San Simon. Unused drilled well, diameter 4 inches, depth 72 feet. Measuring point, top of casing, 1.7 feet above land-surface datum.

Water level, in feet below land-surface datum, 1940-42, 1944, 1946

Date	Water level	Date	Water level	Date	Water level
Dec. 10, 1940	60.74	June 28, 1944	60.53	June 12, 1946	60.58
May 2, 1941	60.48	Feb. 7, 1946	60.76	Oct. 31	61.01
Apr. 22, 1942	60.32	Apr. 9	60.55	Dec. 31	60.93

4500. U. S. Dept. of Agriculture. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 1, T. 14 S., R. 30 E., 100 feet west of county road, 2 miles south of San Simon. Unused dug well, diameter 60 inches, depth 74 feet. Measuring point, top of concrete curb on east side, 0.8 foot above land-surface datum.

Water level, in feet below land-surface datum, 1940-42, 1944, 1946

Date	Water level	Date	Water level	Date	Water level
Dec. 11, 1940	69.24	June 27, 1944	69.35	June 12, 1946	69.34
May 2, 1941	68.79	Feb. 7, 1946	69.49	Oct. 31	70.00
Apr. 23, 1942	68.58	Mar. 9	69.32	Dec. 31	70.20

4600. Otto Malone. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 3, T. 14 S., R. 31 E., at northwest corner of irrigation tank, 0.2 mile east of county road, 3 miles east and 1.5 miles south of San Simon. Unused drilled well, diameter 5 inches, depth 626 feet. Measuring point, top of casing, 1.5 feet above land-surface datum.

Water level, in feet above or below land-surface datum, 1941-42, 1946

Date	Water level	Date	Water level	Date	Water level
Apr. 30, 1941	+0.40	Apr. 9, 1946	0.00	Oct. 31, 1946	-8.31
22, 1942	-.75	June 12	-6.88	Dec. 31	-5.70
Feb. 7, 1946	-.01				

4606. Unknown. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 3, T. 14 S., R. 31 E., 50 feet northeast of unused schoolhouse, 150 feet north of county road, 4 miles east and 2 miles south of San Simon. Unused drilled well, diameter 8 inches, depth unknown. Measuring point, top of casing, 1.6 feet above land-surface datum. Equipped with pitcher pump.

Water level, in feet below land-surface datum, 1941-42, 1946

Date	Water level	Date	Water level	Date	Water level
Apr. 30, 1941	17.57	Apr. 9, 1946	20.73	Oct. 31, 1946	23.15
24, 1942	17.20	June 12	23.27	Dec. 31	21.14
7, 1946	18.02				

4633. Marshall Barnes. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 14, T. 14 S., R. 31 E., 50 feet southwest of house, 500 feet north of San Simon Creek, 3.5 miles south and 4.5 miles east of San Simon. Used drilled well, diameter 4 inches, depth 690 feet. Measuring point, top of casing, 4.0 feet above land-surface datum.

Water level, in feet above land-surface datum, 1940, 1942, 1944, 1946

Date	Water level	Date	Water level	Date	Water level
Dec. 11, 1940	21.5	June 28, 1944	19.1	Oct. 31, 1946	15.1
Apr. 24, 1942	20.0	19, 1946	13.8		

4661. M. Calloway. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 25, T. 14 S., R. 31 E., at southwest corner of earth tank, 300 feet east of curve in county road, 5.5 miles south and 5.8 miles east of San Simon. Unused drilled well, diameter 5-5/8 inches, depth 660 feet. Measuring point, top of casing at west side, 1.0 foot above land-surface datum.

Water level, in feet above or below land-surface datum, 1940-42, 1944, 1946

Date	Water level	Date	Water level	Date	Water level
Dec. 9, 1940	+0.10	June 27, 1944	-2.33	June 12, 1946	-3.39
May 2, 1941	-.60	Feb. 7, 1946	-.41	Oct. 31	-2.19
Apr. 23, 1942	-.30	Mar. 9	-1.63	Dec. 31	-1.60

GRAHAM COUNTY

By R. L. Cushman

Investigations of the ground-water resources in parts of Graham County were continued during 1946 in cooperation with the Arizona State Land Department. A report on the ground-water resources of the Safford Valley portion of Graham County entitled "Ground-water resources and problems of the Safford Basin, Arizona" was released in December 1946. This report

was based on information obtained from 1939 through 1946. Information about the ground-water resources in other parts of Graham County will be contained in the following reports, to be issued in 1947: "Ground-water resources and problems of the Cactus Flat-Artesia area, San Simon Basin, Arizona; Geology and ground-water resources of the San Simon Basin, Cochise and Graham Counties, Arizona; and Geology and ground-water resources of the Willcox Basin, Cochise and Graham Counties, Arizona."

The U. S. Geological Survey has made an inventory each year since 1939 of the amount of water pumped from wells in the Safford Valley. Most of the irrigation wells are used to supplement surface-water diversions from the Gila River, and, therefore, the amount of water pumped depends on the amount of surface water available. The following table shows the amount of surface water diverted annually, the amount of ground water pumped annually, and the total annual supply of irrigation water available from surface diversions and wells, for the years 1940-46. The information on surface water was obtained from annual reports of the Gila Water Commissioner.

Year	Surface water, acre-feet	Pumped water, acre-feet	Total, acre-feet
1940	99,693	24,600	124,293
1941	151,300	8,685	159,985
1942	172,005	18,900	190,905
1943	121,569	35,000	156,569
1944	128,027	52,000	180,027
1945	148,675	35,200	183,875
1946	69,909	115,000	184,909

Figure 3 shows water-level fluctuations in selected wells, pumpage of ground water by months, and monthly precipitation at Safford. Precipitation, amounting to 8.13 inches at Safford during 1946, was 1.68 inches less than normal.

Well 662 is in the eastern part of the Safford Valley near the Gila River. The water level in this well fluctuates in response to the gain or loss in ground-water storage. The gain or loss in storage is partially regulated by the stage of the Gila River.

Well 597 is in a heavily pumped area. The water level in this well declined during the pumping season and rose slightly after pumping was reduced.

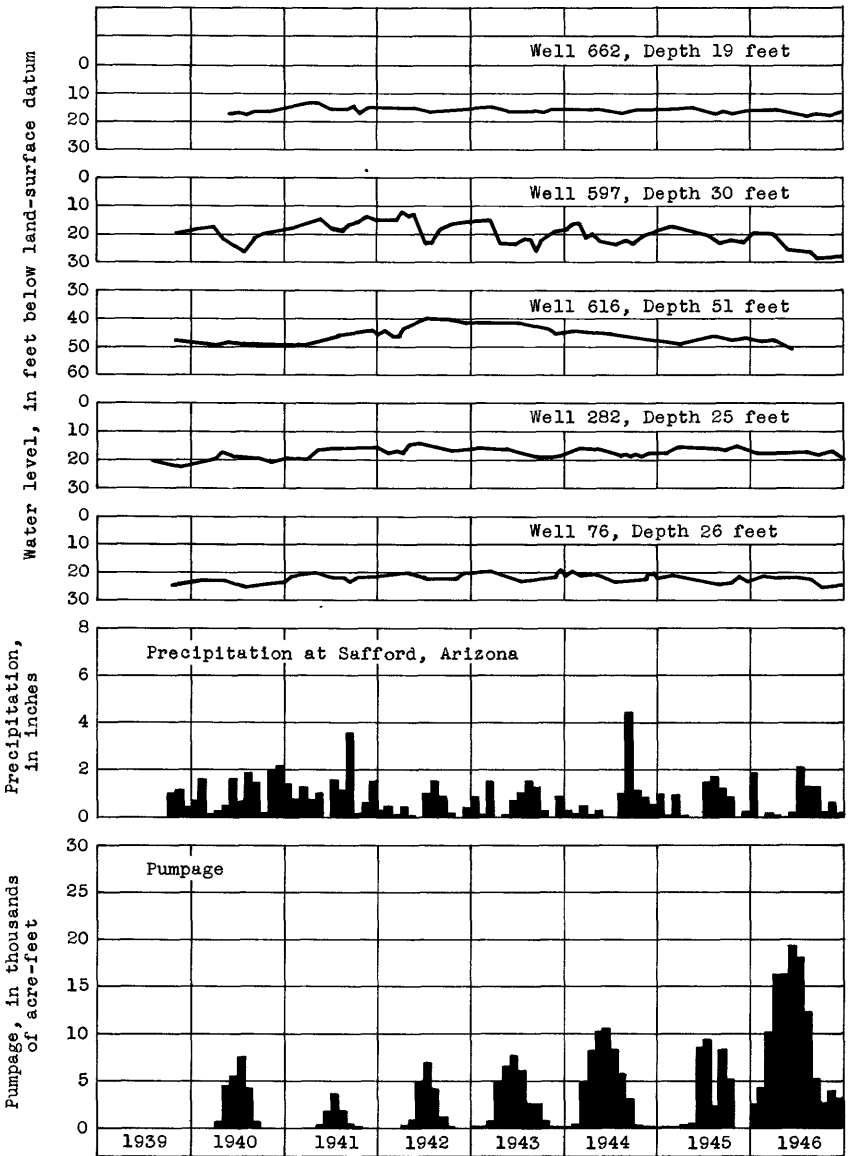


Figure 3.--Graphs showing fluctuations of water level in observation wells in the Safford Valley, Graham County, Arizona.

Well 616 is in an irrigated area and is about half a mile from the nearest irrigation well. Unusually heavy pumping in the Safford Valley lowered the water table beneath the area near well 616, causing the well to go dry. The depth to which the water table declined below the bottom of well 616 is not known. However, the water level in a nearby well declined about 4.5 feet during 1946.

Well 282 is near a canal in an irrigated area. The rises in water level were caused by recharge occurring as seepage from the canal or from nearby irrigated fields.

During the first half of 1946, recharge occurring as seepage losses from irrigation water applied to a field in the vicinity of well 76 offset the usual summer decline of the water level caused by transpiration in the surrounding mesquite growth. Increased drainage of ground water into the river channel, caused by a protracted period of low flow in the river, removed ground water from storage near well 76 and resulted in a lower water level between July and December.

In all, 587 tape measurements of water level were made in 124 selected wells in Graham County during 1946, and a water-stage recorder was maintained on one well.

Well descriptions and water-level measurements

8 (*911, p. 13; *941, p. 11; 949, p. 11; *991, p. 12; 1021, p. 10; 1028, p. 17). U. S. Indian Service. Water levels, in feet below land-surface datum, 1946: Jan. 19, well buried, could not locate; May 24, well buried, could not locate; Dec. 29, 8.70.

9 (*911, p. 13; *941, p. 11; 949, p. 11; *991, p. 12; 1021, p. 11; 1028, p. 17). U. S. Indian Service. Water levels, in feet below land-surface datum, 1946: Jan. 19, well buried, could not locate; May 24, 7.69; Dec. 29, 7.60.

11 (*911, p. 14; *941, p. 11; 949, p. 11; *991, p. 12; 1021, p. 11; 1028, p. 17). U. S. Indian Service. Water levels, in feet below land-surface datum, 1946: Jan. 19, well buried, could not locate; May 24, 5.47; Dec. 29, 6.19.

12 (*911, p. 14; *941, p. 11; 949, p. 11; *991, p. 12; 1021, p. 11; 1028, p. 17). U. S. Indian Service. Water levels, in feet below land-surface datum, 1946: Jan. 19, 4.70; May 24, 4.97; Dec. 29, 6.43.

13 (*911, p. 14; *941, p. 12; 949, p. 12; *991, p. 13; 1021, p. 11; 1028, p. 17). U. S. Indian Service. Water levels, in feet below land-surface datum, 1946: Jan. 19, 9.77; May 24, 9.97; Dec. 29, 10.64.

14 (*911, p. 14; *941, p. 12; 949, p. 12; *991, p. 13; 1021, p. 12; 1028, p. 17). U. S. Indian Service. Water levels, in feet below land-surface datum, 1946: Jan. 19, 10.52; May 24, 10.75; Dec. 29, 11.60.

17 (*911, p. 15; *941, p. 12; 949, p. 12; *991, p. 13; 1021, p. 12; 1028, p. 17). U. S. Indian Service. Water levels, in feet below land-surface datum, 1946: Jan. 19, 6.99; May 24, 7.45; Dec. 29, 7.40.

18 (*911, p. 15; *941, p. 12; 949, p. 12; *991, p. 13; 1021, p. 12; 1028, p. 17). U. S. Indian Service. Water levels, in feet below land-surface datum, 1946: Jan. 19, 7.81; May 24, 8.64; Dec. 29, 8.62.

19 (*911, p. 15; 941, p. 12; 949, p. 12; *991, p. 13; 1021, p. 12; 1028, p. 17). U. S. Indian Service. No measurements made in 1946.

20 (*911, p. 16; *941, p. 13; 949, p. 13; *991, p. 13; 1021, p. 13; 1028, p. 17). U. S. Indian Service. Water levels, in feet below land-surface datum, 1946: Jan. 19, 8.50; May 24, 9.10; Dec. 29, 9.24.

51 (*911, p. 16; 941, p. 13; 949, p. 13; *991, p. 14; 1021, p. 13; 1028, p. 18). Bert Hinton. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 13, T. 4 S., R. 22 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	19.31	Apr. 14	19.61	July 23	(a)	Oct. 27	21.38
Feb. 23	23.80	May 20	(a)	Aug. 26	20.84	Nov. 24	20.69
Mar. 23	19.54	June 21	(a)	Sept. 25	21.20	Dec. 30	20.77

a Pumping.

52 (*911, p. 17; 941, p. 13; 949, p. 13; *991, p. 14; 1021, p. 13; 1028, p. 18). Bert Hinton. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 13, T. 4 S., R. 22 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 18.01; May 24, 19.67; Sept. 13, 20.08; Dec. 29, 19.80.

55A (*1021, p. 13; 1028, p. 18). J. G. Willis. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 19, T. 4 S., R. 23 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	(a)	Apr. 14	(a)	July 23	34.19	Oct. 27	33.87
Feb. 23	(a)	May 20	32.89	Aug. 26	(a)	Nov. 24	33.61
Mar. 23	(a)	June 21	34.02	Sept. 25	(a)	Dec. 30	(a)

a Pumping.

56 (*911, p. 17; 941, p. 13; 949, p. 13; *991, p. 14; 1021, p. 14; 1028, p. 18). Eliza Allen. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 24, T. 4 S., R. 22 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 36.88; May 22, 27.40; Sept. 13, 20.68; Dec. 29, 36.52.

60 (*941, p. 13; 949, p. 13; *991, p. 15; 1021, p. 14; 1028, p. 18). Pat Hinton. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 35, T. 4 S., R. 22 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 22.34; May 24, 23.70; Dec. 29, 24.67.

71 (*911, p. 18; *941, p. 14; 949, p. 13; *991, p. 15; 1021, p. 14; 1028, p. 18). Ed McEuen. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 18.11; May 24, 18.32; Dec. 29, 17.65.

72 (*911, p. 18; *941, p. 14; 949, p. 13; *991, p. 15; 1021, p. 14; 1028, p. 18). Ed McEuen. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 4.30; May 24, 4.36; Dec. 29, 5.73.

76 (*911, p. 19; 941, p. 15; *949, p. 14; *991, p. 15; 1021, p. 14; 1028, p. 18). E. W. Black. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 18, T. 4 S., R. 23 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	22.70	Apr. 14	21.18	July 23	21.31	Oct. 27	25.03
Feb. 23	20.96	May 20	21.08	Aug. 26	22.91	Nov. 24	24.92
Mar. 23	21.09	June 21	21.20	Sept. 25	25.10	Dec. 30	25.01

77 (*911, p. 20; 941, p. 15; 949, p. 14; *991, p. 16; 1021, p. 15; 1028, p. 18). E. M. Claridge. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 18, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 37.80; May 22, 38.05; Sept. 13, 39.93; Dec. 29, 38.70.

80 (*911, p. 20; 941, p. 15; 949, p. 14; *991, p. 16; 1021, p. 15; 1028, p. 18). Fay Rabb. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 17, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 16.02; May 22, 17.24; Sept. 13, 17.19; Dec. 29, 16.23.

81 (*911, p. 20; 941, p. 15; 949, p. 14; *991, p. 16; 1021, p. 15; 1028, p. 18). Mrs. J. B. Blessing. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 19, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 30.12; May 22, pumping; Sept. 13, 33.90; Dec. 29, 30.05.

82A (*1021, p. 16; 1028, p. 18). Fay Rabb. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 35, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 17.84; May 22, 21.00; Sept. 13, 21.77; Dec. 28, 20.71.

91 (*911, p. 21; 941, p. 15; 949, p. 14; *991, p. 17; 1021, p. 16; 1028, p. 18). Ben Montierth. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 29, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 51.48; May 22, pumping; Sept. 13, 56.70; Dec. 29, 54.40.

92 (*911, p. 21; 941, p. 15; 949, p. 14; *991, p. 17; 1021, p. 16; 1028, p. 19). Wendell Montierth. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 28, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 60.72; May 22, pumping; Sept. 13, 65.30; Dec. 29, 63.53.

93 (*911, p. 21; 941, p. 16; 949, p. 14; *991, p. 17; 1021, p. 16; 1028, p. 19). Graham County. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 15.37; May 22, 17.50; Dec. 29, 13.62.

94 (*911, p. 21; 941, p. 16; 949, p. 15; *991, p. 17; 1021, p. 17; 1028, p. 19). Graham County. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 10.49; May 22, 12.03; Dec. 29, 12.02.

95 (*911, p. 22; 941, p. 16; 949, p. 15; *991, p. 18; 1021, p. 17; 1028, p. 19). Graham County. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 10.67; May 22, 11.90; Dec. 29, 11.20.

98 (*911, p. 23; 941, p. 16; 949, p. 15; *991, p. 18; 1021, p. 17; 1028, p. 19). Graham County. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 35, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 5.06; May 22, 6.02; Sept. 13, 6.90; Dec. 29, 5.72.

100 (*911, p. 23; 941, p. 17; 949, p. 15; *991, p. 18; 1021, p. 17; 1028, p. 19). C. N. Higgins. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 34, T. 4 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 12.09; May 22, windmill running; Sept. 13, 13.95; Dec. 28, 12.84.

105 (*911, p. 24; *941, p. 17; 949, p. 15; *991, p. 18; 1021, p. 17; 1028, p. 19). Edward McEuen. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 35, T. 4 S., R. 23 E. Measurements discontinued after Aug. 7, 1945.

107 (*911, p. 24; 941, p. 17; 949, p. 15; *991, p. 19; 1021, p. 18; 1028, p. 19). Port McEuen. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 35, T. 4 S., R. 23 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	43.92	Apr. 14	44.23	July 23	45.47	Oct. 27	45.46
Feb. 23	44.03	May 20	44.79	Aug. 26	45.58	Nov. 24	45.22
Mar. 23	44.00	June 21	45.32	Sept. 25	45.54	Dec. 30	45.17

108 (*911, p. 25; 941, p. 17; 949, p. 15; *991, p. 19; 1021, p. 18; 1028, p. 19). W. O. Tyler. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, T. 5 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 17.14; May 22, 18.55; Dec. 28, 17.35.

122A (*1021, p. 18; 1028, p. 19). Elliot Montierth. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 28, T. 4 S., R. 23 E.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	33.90	Apr. 4	(a)	July 23	(a)	Oct. 27	36.88
Feb. 23	33.61	May 20	(a)	Aug. 26	39.28	Nov. 24	36.76
Mar. 23	35.81	June 21	38.34	Sept. 25	39.46	Dec. 30	36.84

a Pumping.

124A (*991, p. 19; 1021, p. 18; 1028, p. 19). Willis. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 27, T. 4 S., R. 23 E.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	35.70	Apr. 14	(a)	July 23	37.33	Oct. 27	38.08
Feb. 23	(a)	May 20	36.99	Aug. 26	37.41	Nov. 24	37.86
Mar. 23	(a)	June 21	37.19	Sept. 25	(a)	Dec. 30	(a)

a Pumping.

126 (*911, p. 25; 941, p. 17; 949, p. 15; *991, p. 19; 1021, p. 18; 1028, p. 20). YL Ranch. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 24, T. 5 S., R. 21 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 54.00; May 24, 54.74; Dec. 29, 56.32.

143 (*911, p. 25; 941, p. 18; 949, p. 16; *991, p. 19; 1021, p. 18; 1028, p. 20). R. S. Snedigar. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T. 5 S., R. 22 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 37.65; May 22, 41.14; Dec. 28, 46.20.

156 (*911, p. 25; 941, p. 18; 949, p. 16; *991, p. 20; 1021, p. 18; 1028, p. 20). Roy Layton. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 1, T. 5 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 12.44; May 22, 13.49; Sept. 13, 13.84; Dec. 28, 12.74.

157 (*991, p. 20; 1021, p. 19; 1028, p. 20). M. J. Ferguson. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 2, T. 5 S., R. 23 E.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	16.14	Apr. 14	16.31	July 23	17.94	Oct. 27	17.64
Feb. 23	15.97	May 20	17.45	Aug. 26	17.97	Nov. 24	17.31
Mar. 23	15.84	June 21	17.82	Sept. 25	17.78	Dec. 30	17.51

158 (*911, p. 26; 941, p. 18; 949, p. 16; *991, p. 20; 1021, p. 19; 1028, p. 20). W. C. Rhodes. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 2, T. 5 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 49.63; May 22, 56.70; Sept. 13, 51.84; Dec. 28, 48.90.

160 (*911, p. 26; *941, p. 18; 949, p. 16; *991, p. 20; 1021, p. 19; 1028, p. 20). W. O. Tyler. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 5 S., R. 23 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 31.24; May 22, 31.84; Sept. 13, 32.74; Dec. 28, 31.00.

194A (*1028, p. 20). Ed and Port McEuen. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 18, T. 5 S., R. 24 E. No measurements made in 1946.

198A (*991, p. 21; 1021, p. 20; 1028, p. 20). C. J. Farrington. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 19, T. 5 S., R. 24 E.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	22.03	Apr. 14	22.27	July 23	24.21	Oct. 27	23.57
Feb. 23	21.77	May 20	23.47	Aug. 26	24.33	Nov. 24	22.77
Mar. 23	22.59	June 21	23.79	Sept. 25	23.72	Dec. 30	22.83

199 (*991, p. 21; 1021, p. 20; 1028, p. 20). Joe Morgan. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 20, T. 5 S., R. 24 E. Measurements discontinued after Jan. 24, 1945.

205 (*911, p. 27; 941, p. 19; 949, p. 16; *991, p. 22; 1021, p. 21; 1028, p. 20). W. B. Marshall. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 28, T. 5 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 27.11; May 21, 28.10; Sept. 12, 28.30; Dec. 29, dry. Measurements discontinued.

206 (*911, p. 28; 941, p. 19; 949, p. 16; *991, p. 22; 1021, p. 21; 1028, p. 21). J. D. Colvin. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 29, T. 5 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	21.10	Apr. 15	21.67	July 24	22.14	Oct. 27	23.38
Feb. 23	22.19	May 22	21.80	Aug. 27	22.65	Nov. 27	22.91
Mar. 23	22.21	June 20	22.08	Sept. 26	22.87	Dec. 30	23.01

208 (*911, p. 28; 941, p. 19; 949, p. 16; *991, p. 22; 1021, p. 21; 1028, p. 21). L. W. Farrington. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T. 5 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 23.27; May 22, 24.55; Sept. 13, 24.90; Dec. 28, 24.02.

210 (*911, p. 28; *941, p. 19; 949, p. 16; *991, p. 23; 1021, p. 21; 1028, p. 21). Boyd Hawkins. SW $\frac{1}{4}$ NL $\frac{1}{4}$ sec. 31, T. 5 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 33.97; May 21, 35.93; Sept. 13, 35.78; Dec. 28, 33.55.

211 (*911, p. 28; 941, p. 19; 949, p. 16; *991, p. 23; 1021, p. 21; 1028, p. 21). Producers Ginning Co. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 31, T. 5 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Jan. 19	22.90	Apr. 14	23.61	July 23	25.10	Oct. 27	25.69
Feb. 23	22.71	May 20	24.34	Aug. 26	25.21	Nov. 24	25.55
Mar. 23	23.34	June 21	24.69	Sept. 25	25.81	Dec. 30	25.63

214 (*911, p. 29; 941, p. 20; 949, p. 17; *991, p. 23; 1021, p. 22; 1028, p. 21). Graham County. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 31, T. 5 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 13.21; May 21, 14.52; Dec. 28, 13.96.

217 (*911, p. 30; 941, p. 20; 949, p. 17; *991, p. 24; 1021, p. 22; 1028, p. 21). Graham County. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 5 S., R. 24 E. Water level, in feet below land-surface datum, 1946: Jan. 17, 3.50. Measurements discontinued after May 21, 1946; well destroyed.

220 (*911, p. 30; 941, p. 21; 949, p. 17; *991, p. 24; 1021, p. 22; 1028, p. 21). Lionel Hancock. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 33, T. 5 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Jan. 17	14.35	Apr. 15	15.89	July 23	16.61	Oct. 27	15.36
Feb. 23	(a)	May 22	16.10	Aug. 27	15.57	Nov. 25	15.09
Mar. 23	(a)	June 20	16.65	Sept. 26	15.12	Dec. 30	15.21

a Obstruction in well; could not measure.

222 (*911, p. 31; 941, p. 21; 949, p. 17; *991, p. 24; 1021, p. 22; 1028, p. 21). Dave Hawkins. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 33, T. 5 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 25.55; May 21, 25.90; Sept. 12, 27.05; Dec. 29, dry. Measurements discontinued.

223A (*1021, p. 23; 1028, p. 21). Ira Hancock. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 33, T. 5 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, pumping; May 21, 33.10; Sept. 12, 33.44; Dec. 29, 33.30.

259 (*1028, p. 21). Jess Udall. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 1, T. 6 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Jan. 17	26.04	Apr. 15	28.05	July 24	(a)	Oct. 27	28.46
Feb. 23	26.23	May 22	(a)	Aug. 27	30.18	Nov. 25	28.37
Mar. 23	26.71	June 20	30.29	Sept. 26	(a)	Dec. 30	28.51

a Pumping.

264 (*911, p. 31; 941, p. 21; *949, p. 18; *991, p. 25; 1021, p. 23; 1028, p. 22). J. Hancock. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 3, T. 6 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 13.41; May 21, 14.53; Sept. 12, 14.50; Dec. 29, 14.58.

267 (*911, p. 32; 941, p. 21; 949, p. 18; *991, p. 25; 1021, p. 24; 1028, p. 22). Wm. Carpenter. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 4, T. 6 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	25.44	Apr. 15	25.59	July 24	27.99	Oct. 27	25.19
Feb. 23	25.51	May 22	27.48	Aug. 27	25.82	Nov. 25	25.99
Mar. 23	25.70	June 20	27.71	Sept. 26	26.97	Dec. 30	26.01

269A (*991, p. 25; 1021, p. 24; 1028, p. 22). Silas Jarvis. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 10, T. 6 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	24.33	Apr. 13	24.08	June 21	24.27	Aug. 26	24.70
Feb. 23	24.19	May 20	24.10	July 23	24.59	Sept. 24	(a)
Mar. 23	23.86						

a Dry.

270A (*991, p. 26; 1021, p. 24; 1028, p. 22). M. J. Ferguson. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 9, T. 6 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 51.37; May 21, 51.93; Sept. 13, 53.80; Dec. 28, 51.50.

273 (*911, p. 32; *941, p. 22; 949, p. 18; *991, p. 26; 1021, p. 24; 1028, p. 22). Eldon Palmer. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 5, T. 6 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	41.77	Apr. 14	41.91	July 23	42.71	Oct. 27	42.61
Feb. 23	41.81	May 20	(a)	Aug. 26	42.87	Nov. 24	42.51
Mar. 23	41.84	June 21	42.52	Sept. 24	43.36	Dec. 29	42.71

a Pumping.

275 (*911, p. 33; 941, p. 22; 949, p. 18; *991, p. 26; 1021, p. 25; 1028, p. 22). Lamar Bellman. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 10, T. 6 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 22.26; May 21, pumping; Sept. 13, pumping; Dec. 28, 24.07.

276A (*991, p. 26; 1021, p. 25; 1028, p. 22). M. J. Ferguson. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 11, T. 6 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	34.40	Apr. 14	34.86	July 23	35.36	Oct. 27	37.31
Feb. 23	34.31	May 20	35.12	Aug. 26	35.42	Nov. 24	37.23
Mar. 23	35.24	June 21	35.24	Sept. 24	37.21	Dec. 30	37.65

279 (*911, p. 33; 941, p. 22; 949, p. 18; *991, p. 26; 1021, p. 25; 1028, p. 22). Howard McBride. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 12, T. 6 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 4.37; May 21, 5.80; Sept. 13, 6.74; Dec. 28, 5.68.

282 (*911, p. 33; 941, p. 22; 949, p. 18; *991, p. 27; 1021, p. 25; 1028, p. 22). Guy Anderson. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 13, T. 6 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	18.00	Apr. 17	17.37	July 23	17.43	Oct. 27	17.27
Feb. 23	18.02	May 20	17.12	Aug. 26	17.57	Nov. 24	17.20
Mar. 23	17.18	June 21	17.22	Sept. 24	18.16	Dec. 30	20.00

285 (*911, p. 33; 941, p. 22; 949, p. 18; *991, p. 27; 1021, p. 25; 1028, p. 22). Guy Anderson. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 13, T. 6 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 30.50; May 21, pumping; Sept. 13, 37.50; Dec. 28, 33.95.

289 (*949, p. 18; *991, p. 27; 1021, p. 25; 1028, p. 22). W. J. Preston. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 6 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 35.35; May 21, 35.80; Sept. 13, 39.70; Dec. 28, 39.47.

298 (*911, p. 34; 941, p. 23; 949, p. 18; *991, p. 27; 1021, p. 26; 1028, p. 23). Joe Rogers. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 25, T. 6 S., R. 24 E. Water levels, in feet below land-surface datum, 1946: Jan. 19, 14.18; May 21, mill running; Sept. 13, 15.00.

302A (*991, p. 28; 1021, p. 26; 1028, p. 23). Mattice Bros. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 23, T. 6 S., R. 24 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 19	45.64	Apr. 17	47.86	July 23	49.19	Oct. 27	49.41
Feb. 23	45.51	May 20	48.19	Aug. 26	49.27	Nov. 24	49.22
Mar. 23	45.41	June 21	49.00	Sept. 24	49.81	Dec. 30	48.98

313 (*911, p. 34; 941, p. 23; 949, p. 19; *991, p. 28; 1021, p. 26; 1028, p. 23). Jack Bryce. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 7, T. 6 S., R. 25 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	59.45	Apr. 15	68.94	July 24	70.59	Oct. 27	64.59
Feb. 23	59.56	May 22	(a)	Aug. 27	70.97	Nov. 25	64.36
Mar. 23	59.69	June 20	(a)	Sept. 26	68.82	Dec. 30	64.57

a Pumping.

318 (*941, p. 23; 949, p. 19; *991, p. 28; 1021, p. 26; 1028, p. 23). Vance Marshall. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 17, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 20.81; May 21, pumping; Sept. 12, 24.40; Dec. 29, 23.70.

320 (*911, p. 35; 941, p. 23; 949, p. 19; *991, p. 28; 1021, p. 26; 1028, p. 23). Vance Marshall. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 17, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 14.60; May 21, pumping; Sept. 12, 17.42; Dec. 29, 15.48.

321 (*911, p. 35; 941, p. 23; 949, p. 19; *991, p. 29; 1021, p. 27; 1028, p. 23). Graham County. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 7, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 8.95; May 21, 9.48; Dec. 29, 9.27.

322 (*911, p. 35; *941, p. 24; 949, p. 19; *991, p. 29; 1021, p. 27; 1028, p. 23). Bryce Bros. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 18, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 7.49; May 21, 8.84; Dec. 29, 7.66.

323 (*911, p. 35; 941, p. 24; 949, p. 19; *991, p. 29; 1021, p. 27; 1028, p. 23). Graham County. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 18, T. 6 S., R. 25 E. Well destroyed; measurements discontinued.

324 (*911, p. 36; 941, p. 24; 949, p. 19; *991, p. 29; 1021, p. 27; 1028, p. 23). Graham County. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 18, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 4.76; May 21, 6.42; Dec. 26, 5.21.

325 (*911, p. 36; 941, p. 24; 949, p. 19; *991, p. 30; 1021, p. 27; 1028, p. 23). Graham County. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 18, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 5.34; May 21, 7.56; Dec. 29, 6.17.

326 (*911, p. 36; 941, p. 24; 949, p. 19; *991, p. 30; 1021, p. 27; 1028, p. 23). Graham County. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 18, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 5.30; May 21, 8.75; Dec. 29, 6.43.

342 (*911, p. 37; 941, p. 25; 949, p. 20; *991, p. 31; 1021, p. 28; 1028, p. 23). Ed Howard. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 23, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 24.84; May 21, 28.00; Sept. 12, 30.57; Dec. 29, 25.65.

346 (*911, p. 37; 941, p. 25; 949, p. 20; *991, p. 31; 1021, p. 28; 1028, p. 23). Graham County. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 27, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 6.20; May 21, 7.83; Sept. 12, 8.86; Dec. 29, 6.77.

347 (*911, p. 38; 941, p. 26; 949, p. 20; *991, p. 31; 1021, p. 28; 1028, p. 24). Graham County. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 27, T. 6 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 6.80; May 21, 8.34; Sept. 12, 9.06; Dec. 29, 7.29.

350 (*911, p. 38; 941, p. 26; 949, p. 20; *991, p. 32; 1021, p. 28; 1028, p. 24). Graham County. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 6 S., R. 25 E. Measurements discontinued after Jan. 17, 1946; well destroyed.

352 (*911, p. 39; 941, p. 27; 949, p. 20; *991, p. 32; 1021, p. 29; 1028, p. 24). Graham County. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 6 S., R. 25 E. Measurements discontinued; well destroyed.

354 (*911, p. 40; *941, p. 27; 949, p. 20; *991, p. 32; 1021, p. 29; 1028, p. 24). Ned Daley. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 6 S., R. 25 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	6.44	Apr. 17	12.24	July 23	12.90	Oct. 27	11.61
Feb. 23	6.28	May 22	12.28	Aug. 26	12.80	Nov. 24	11.23
Mar. 23	8.37	June 22	12.34	Sept. 23	11.86	Dec. 29	8.18

366 (*911, p. 40; 941, p. 27; 949, p. 21; *991, p. 32; 1021, p. 29; 1028, p. 24). Charles M. Beals. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T. 6 S., R. 25 E. Measuring point beginning Dec. 28, 1946, top of concrete curb, 0.5 foot above old measuring point and 0.5 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Jan. 17, 17.63; May 21, 18.93; Sept. 13, 21.00; Dec. 28, 18.99.

408 (*991, p. 33; 1021, p. 29; 1028, p. 24). Roy Saline. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 30, T. 6 S., R. 25 E.

Water level, in feet below land-surface datum, 1946

Jan. 19	51.81	Apr. 17	50.57	July 23	59.90	Oct. 27	60.66
Feb. 23	51.86	May 22	50.96	Aug. 26	59.97	Nov. 24	60.31
Mar. 23	50.86	June 22	60.01	Sept. 24	61.03	Dec. 29	62.64

409 (*991, p. 33; 1021, p. 29; 1028, p. 24). Joe Alder. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 6 S., R. 25 E.

Water level, in feet below land-surface datum, 1946

Jan. 19	4.07	Apr. 17	2.59	July 23	5.41	Oct. 27	5.98
Feb. 23	4.57 <td>May 22</td> <td>5.18 <td>Aug. 26</td> <td>5.07 <td>Nov. 24</td> <td>6.21</td> </td></td>	May 22	5.18 <td>Aug. 26</td> <td>5.07 <td>Nov. 24</td> <td>6.21</td> </td>	Aug. 26	5.07 <td>Nov. 24</td> <td>6.21</td>	Nov. 24	6.21
Mar. 23	4.44	June 22	5.61	Sept. 23	6.55	Dec. 29	5.13

410 (*991, p. 33; 1021, p. 30; 1028, p. 24). Smithville Canal Co. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 28, T. 6 S., R. 25 E. Measurements discontinued after Jan. 30, 1945.

430 (*911, p. 42; 941, p. 28; 949, p. 21; *991, p. 34; 1021, p. 30; 1028, p. 24). Graham County. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 35, T. 6 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 8.77; May 21, 9.54; Dec. 30, 9.70.

431 (*911, p. 42; *941, p. 28; 949, p. 21; *991, p. 34; 1021, p. 30; 1028, p. 24). Jesse Tyler. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 35, T. 6 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 4.48; May 21, 4.88; Dec. 30, 5.20.

434 (*911, p. 43; 941, p. 29; 949, p. 22; *991, p. 34; 1021, p. 30; 1028, p. 24). Abel Sanchez. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 36, T. 6 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: May 21, 21.39; Dec. 30, 20.97.

452 (*911, p. 43; *941, p. 29; 949, p. 22; *991, p. 34; 1021, p. 30; 1028, p. 24). S. A. Clontz. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 31, T. 6 S., R. 28 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 22.20; May 21, 23.60; Dec. 30, 24.46.

454 (*911, p. 43; 941, p. 29; 949, p. 22; *991, p. 34; 1021, p. 30; 1028, p. 25). Brown Canal Co. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 31, T. 6 S., R. 28 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 22.10; May 21, pumping; Dec. 30, 24.08.

506 (*991, p. 34; 1021, p. 30; 1028, p. 25). Roy Layton. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 7 S., R. 25 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	25.90	Apr. 17	28.49	July 22	28.99	Oct. 27	30.77
Feb. 23	25.81	May 22	28.77	Aug. 26	29.03	Nov. 24	30.31
Mar. 23	25.99	June 22	28.89	Sept. 23	30.81	Dec. 29	33.48

508 (*911, p. 44; 941, p. 29; 949, p. 22; *991, p. 35; 1021, p. 30; 1028, p. 25). Graham County. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 34, T. 6 S., R. 25 E. Measurements discontinued after Jan. 17, 1946; well destroyed.

509 (*911, p. 44; 941, p. 30; 949, p. 22; *991, p. 35; 1021, p. 31; 1028, p. 25). Ellis Welker and Eldon Palmer. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 3, T. 7 S., R. 25 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 32.90; May 21, 39.17; Sept. 13, 44.65; Dec. 28, 44.25.

565A (*941, p. 31; 949, p. 22; *991, p. 35; 1021, p. 31; 1028, p. 25). Z. C. Prina. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T. 7 S., R. 26 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 17	10.50	Mar. 23	10.39	May 21	(a)
Feb. 23	10.54	Apr. 16	11.17		

a Dry.

566A (*941, p. 31; 949, p. 22; *991, p. 36; 1021, p. 31; 1028, p. 25). Z. C. Prina. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 8.32; May 20, 11.15; Dec. 29, dry.

567A (*941, p. 32; 949, p. 22; *991, p. 36; 1021, p. 31; 1028, p. 25). Z. C. Prina. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 6.40; May 20, 9.70; Dec. 29, 11.53.

568A (*941, p. 32; 949, p. 23; *991, p. 36; 1021, p. 31; 1028, p. 25). Z. C. Prina. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 6.40; May 20, 9.13; Dec. 29, 11.15.

569A (*941, p. 33; 949, p. 23; *991, p. 36; 1021, p. 31; 1028, p. 25). Graham County. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 7 S., R. 26 E. Water level, in feet below land-surface datum, 1946: Jan. 17, 5.90.

574 (*911, p. 48; *941, p. 33; 949, p. 23; *991, p. 37; 1021, p. 32; 1028, p. 25). Z. C. Prina. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 5.50; May 20, 7.40; Dec. 29, dry.

575 (*911, p. 49; *941, p. 34; 949, p. 23; *991, p. 37; 1021, p. 32; 1028, p. 25). Z. C. Prina. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 7.65; May 20, 9.59; Dec. 29, 10.20.

580 (*911, p. 51; *941, p. 35; 949, p. 24; *991, p. 37; 1021, p. 33; 1028, p. 26). City of Safford. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 12.43; May 20, 18.40; Dec. 29, 18.70.

585 (*911, p. 51; *941, p. 36; 949, p. 24; *991, p. 37; 1021, p. 33; 1028, p. 26). Graham Canal Co. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 9, T. 7 S., R. 26 E. Measurements discontinued; well dry.

586 (*911, p. 51; 941, p. 36; 949, p. 24; *991, p. 38; 1021, p. 33; 1028, p. 26). Ted Tidwell. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 12, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 18.70; May 21, mill running; Dec. 30, 24.60.

592 (*911, p. 52; 941, p. 37; 949, p. 24; *991, p. 38; 1021, p. 33; 1028, p. 26). E. M. Claridge. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 13, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 16.68; May 20, pumping; Sept. 12, 40.23; Dec. 31, 29.26.

593 (*911, p. 53; 941, p. 37; 949, p. 24; *991, p. 38; 1021, p. 33; 1028, p. 26). E. M. Claridge. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 18.10; May 20, pumping; Sept. 12, 36.15; Dec. 31, 30.27.

594 (*911, p. 53; 941, p. 37; 949, p. 25; *991, p. 38; 1021, p. 33; 1028, p. 26). E. M. Claridge. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 14, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 11.04; May 20, 13.70; Sept. 12, 16.60; Dec. 31, 17.12.

597 (*911, p. 53; 941, p. 37; 949, p. 25; *991, p. 38; 1021, p. 33; 1028, p. 26). C. M. Pursley. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 15, T. 7 S., R. 26 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	19.47	Apr. 16	20.79	July 22	26.01	Oct. 27	28.01
Feb. 23	19.51	May 21	25.45	Aug. 27	26.29	Nov. 24	27.98
Mar. 23	19.53	June 20	25.85	Sept. 23	28.31	Dec. 29	27.81

598 (*911, p. 53; 941, p. 37; 949, p. 25; *991, p. 38; 1021, p. 33; 1028, p. 26). Union Canal Co. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 15, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 17.67; May 20, pumping; Sept. 12, 27.18; Dec. 29, 25.95.

603 (*911, p. 53; 941, p. 37; 949, p. 25; *991, p. 38; 1021, p. 33; 1028, p. 26). L. A. Nelson. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 16, T. 7 S., R. 26 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	35.09	Apr. 16	35.39	July 22	48.90	Oct. 27	47.91
Feb. 23	34.61	May 21	47.90	Aug. 27	49.11	Nov. 24	49.85
Mar. 23	34.51	June 20	48.84	Sept. 23	48.20	Dec. 29	49.27

609 (*911, p. 54; *941, p. 37; 949, p. 25; *991, p. 39; 1021, p. 33; 1028, p. 26). Mrs. Annie Collins. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 17, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 27.03; May 20, 27.52; Sept. 12, dry; Dec. 29, dry. Measurements discontinued.

610 (*911, p. 54; 941, p. 38; 949, p. 25; *991, p. 38; 1021, p. 33; 1028, p. 26). Bert Hatch. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 17, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 50.04; May 20, 51.71; Sept. 12, 53.50; Dec. 29, 54.50.

616 (*911, p. 55; *941, p. 38; 949, p. 25; *991, p. 39; 1021, p. 33; 1028, p. 26). Kimball & Greenhalgh. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 20, T. 7 S., R. 26 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 19	47.84	Mar. 23	47.94	May 21	(a)
Feb. 23	48.00	Apr. 16	48.50		

a Nearly dry; could not measure.

621 (*941, p. 39; 949, p. 25; *991, p. 39; 1021, p. 34; 1028, p. 27). Lee Johns. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 22, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 34.86; May 20, pumping; Dec. 29, casing sealed. Measurements discontinued.

623 (*911, p. 56; 941, p. 39; 949, p. 25; *991, p. 39; 1021, p. 34; 1028, p. 27). Lee Johns. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 22, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 28.64; May 20, pumping; Dec. 29, 40.37.

625 (*911, p. 56; 941, p. 39; 949, p. 26; *991, p. 40; 1021, p. 34; 1028, p. 27). Willard Welker. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 22, T. 7 S., R. 26 E.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	32.38	Apr. 16	33.69	July 22	39.41	Oct. 27	42.26
Feb. 23	32.42	May 21	38.09	Aug. 27	39.61	Nov. 24	45.80
Mar. 23	32.26	June 20	39.17	Sept. 23	42.70	Dec. 29	43.46

630 (*911, p. 57; 941, p. 39; 949, p. 26; *991, p. 40; 1021, p. 34; 1028, p. 27). E. L. Claridge. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 24, T. 7 S., R. 26 E.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	18.11	Apr. 16	22.81	July 22	37.23	Oct. 27	35.92
Feb. 23	17.93	May 17	34.21	Aug. 27	37.40	Nov. 24	32.02
Mar. 23	18.00	June 20	36.75	Sept. 23	36.30	Dec. 29	31.96

639 (*911, p. 57; 941, p. 39; 949, p. 26; *991, p. 40; 1021, p. 34; 1028, p. 27). Amos Cook. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 31, T. 7 S., R. 26 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 24.57; May 23, 23.80; Sept. 13, 26.25.

661 (*911, p. 57; *941, p. 39; 949, p. 26; *991, p. 40; 1021, p. 34; 1028, p. 27). Louis Michelena. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 1, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, dry; May 21, dry; Dec. 30, dry.

662 (*911, p. 57; 941, p. 40; *949, p. 26; *991, p. 40; 1021, p. 34; 1028, p. 27). Mrs. Jose Somora. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, T. 7 S., R. 27 E.

Daily noon water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1	16.21	16.02	15.94	16.07	16.46	17.01	(a)	(a)	17.20	17.32	17.25	16.80	
2	16.20	16.01	15.94	16.07	16.48	17.03	(a)	(a)	17.18	17.31	17.23	16.79	
3	16.19	16.00	15.92	16.09	16.50	17.05	(a)	(a)	17.17	17.32	17.22	16.78	
4	16.19	15.98	15.93	16.10	16.52	17.06	(a)	(a)	17.15	17.32	17.20	16.77	
5	16.18	15.99	15.94	16.11	16.54	17.08	(a)	(a)	17.14	17.32	17.19	16.76	
6	16.18	15.98	15.94	16.12	16.56	17.09	(a)	cl7.69	17.14	17.32	17.16	16.75	
7	16.19	15.97	15.94	16.13	16.58	17.11	(a)	17.65	17.13	17.33	17.14	16.74	
8	16.18	15.97	15.95	16.14	16.60	17.12	(a)	17.62	17.14	17.32	17.12	16.73	
9	16.18	15.97	15.94	16.15	16.62	17.14bl	17.57	17.58	17.15	17.32	17.10	16.72	
10	16.17	15.96	15.95	16.16	16.64	17.15	(a)	17.54	17.15	17.32	17.09	16.71	
11	16.16	15.96	15.94	16.17	16.65	17.17	(a)	17.50	17.16	17.33	17.07	16.70	
12	16.16	15.96	15.94	16.19	16.68	17.19bl	17.64	17.47	17.18	17.32	17.05	16.69	
13	16.15	15.96	15.94	16.19	16.69	17.21	(a)	17.44	17.20	17.33	17.04	16.68	
14	16.14	15.96	15.94	16.21	16.71	17.22	(a)	17.42	17.21	17.33	17.02	16.67	
15	16.14	15.95	15.95	16.22	16.73	17.24	(a)	17.39	17.23	17.33	17.01	16.66	
16	16.14	15.95	15.96	16.24	16.75	17.25	(a)	17.37	17.24	17.34	16.99	16.65	
17	16.13	15.96	15.97	16.25	16.76	17.27	(a)	17.36	17.26	17.34	16.98	16.65	
18	16.13	15.96	15.97	16.26	16.78	17.29	(a)	17.34	17.25	17.34	16.96	16.64	
19	16.12	15.95	15.98	16.27	16.80	17.30	(a)	17.31	17.26	17.35	16.94	16.63	
20	16.12	15.95	15.98	16.28	16.82	17.32	(a)	17.29	17.26	17.35	16.92	16.62	
21	16.12	15.95	15.99	16.30	16.84	17.34	(a)	17.27	17.27	17.35	16.91	16.61	
22	16.11	15.95	16.00	16.31	16.85	17.35	(a)	17.26	17.28	17.35	16.90	16.60	
23	16.10	15.95	16.00	16.33	16.87	17.37	(a)	17.25	17.29	17.35	16.89	16.59	
24	16.10	15.94	16.01	16.35	16.89	17.38	(a)	17.24	17.30	17.35	16.88	16.59	
25	16.08	15.94	16.01	16.36	16.90	17.40	(a)	17.24	17.31	17.35	16.87	16.58	
26	16.07	15.93	16.02	16.37	16.92	17.41	(a)	17.24	17.33	17.34	16.86	16.58	
27	16.07	15.94	16.03	16.39	16.93	(a)	(a)	17.23	17.33	17.34	16.85	16.57	
28	16.06	15.94	16.04	16.42	16.95	(a)	(a)	17.24	17.34	17.32	16.83	16.57	
29	16.05		16.05	16.43	16.96	(a)	(a)	17.23	17.33	17.30	16.82	16.56	
30	16.05		16.06	16.44	16.97	(a)	bl	17.62	17.21	17.31	17.29	16.81	16.54
31	16.04		16.07		16.99		(a)	17.22		17.27		16.54	

- a Insufficient water in well to operate float.
- b Tape measurement.
- c Deepened to 18.5 feet.

664 (*911, p. 58; 941, p. 40; 949, p. 26; *991, p. 41; 1021, p. 35; 1028, p. 28). San Jose Canal Co. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 17.85; May 21, 18.16; Sept. 12, 22.26; Dec. 30, 19.87.

674 (*911, p. 58; 941, p. 40; 949, p. 26; *991, p. 41; 1021, p. 35; 1028, p. 28). Louis Michelena. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 4, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 15.10; May 21, pumping; Dec. 30, 17.58.

675 (*941, p. 40; 949, p. 26; *991, p. 41; 1021, p. 35; 1028, p. 28). Louis Michelena. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 4, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 12.70; May 21, pumping; Dec. 30, 16.37.

676 (*911, p. 58; 941, p. 41; 949, p. 26; *991, p. 41; 1021, p. 35; 1028, p. 28). Louis Michelena. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 4, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 14.92; May 21, 17.27; Dec. 30, 17.35.

683 (*911, p. 59; 941, p. 41; 949, p. 26; *991, p. 41; 1021, p. 35; 1028, p. 28). Tom Gardner. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 10, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 22.54; May 21, dry; Dec. 30, dry.

685 (*911, p. 59; 941, p. 41; 949, p. 27; *991, p. 41; 1021, p. 35; 1028, p. 28). Brijido Carrasco. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 11, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 26.14; May 21, 25.20; Sept. 12, 26.30; Dec. 30, dry.

689 (*911, p. 59; 941, p. 41; 949, p. 27; *991, p. 41; 1021, p. 35; 1028, p. 28). San Jose Canal Co. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 16, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 45.36; May 21, 66.54; Sept. 12, 73.60; Dec. 30, 58.00.

696 (*911, p. 59; *941, p. 41; 949, p. 27; *991, p. 41; 1021, p. 35; 1028, p. 28). Louis Carrasco. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 18, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 17.30; May 20, dry.

703 (*911, p. 61; 941, p. 42; 949, p. 27; *991, p. 42; 1021, p. 35; 1028, p. 28). William Waldrom. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 19, T. 7 S., R. 27 E. Measurements discontinued after Jan. 30, 1945.

708 (*911, p. 61; *941, p. 42; 949, p. 28; *991, p. 42; 1021, p. 35; 1028, p. 28). Pete Bertaldo. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 20, T. 7 S., R. 27 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 17	38.40	Apr. 16	38.71	July 22	39.61	Oct. 27	39.11
Feb. 23	38.30	May 17	39.15	Aug. 27	39.82	Nov. 24	39.43
Mar. 23	38.33	June 20	39.31	Sept. 23	39.42	Dec. 29	39.61

709 (*911, p. 61; 941, p. 42; 949, p. 28; *991, p. 42; 1021, p. 35; 1028, p. 29). E. E. Taylor. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 30, T. 7 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 17, 21.50; May 20, 21.14; Sept. 12, 22.18; Dec. 31, 23.22.

791 (*911, p. 62; 941, p. 43; 949, p. 28; *991, p. 42; 1021, p. 35; 1028, p. 29). Howard Olsen. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 16, T. 8 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 16, 30.96; Dec. 28, 32.54.

792 (*911, p. 62; *941, p. 43; 949, p. 28; *991, p. 42; 1021, p. 35; 1028, p. 29). Howard Olsen. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 15, T. 8 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 16, 33.71; Dec. 28, 34.63.

793 (*911, p. 62; *941, p. 43; 949, p. 28; *991, p. 43; 1021, p. 35; 1028, p. 29). Howard Olsen. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 16, T. 8 S., R. 27 E. Water levels, in feet below land-surface datum, 1946: Jan. 16, 46.40; Dec. 28, 47.30.

GREENLEE COUNTY (DUNCAN VALLEY)

By R. L. Cushman

The Duncan Valley is entirely within Greenlee County and is a part of a larger valley that extends southeastward into New Mexico. That part of the larger valley extending from the Arizona-New Mexico line southeastward into Hidalgo County, New Mexico, for a distance of about 7 miles is known as the Virden Valley. Water-level measurements made in the Virden Valley are given in the New Mexico section of this paper.

The ground-water resources of the Duncan Valley are described in a report entitled "Ground-water resources of the Duncan Basin, Arizona," issued in December 1946 in cooperation with the Arizona State Land Department.

In 1946 67 water-level measurements were made in Greenlee County.

Approximately 21,000 acre-feet of water was pumped from 58 wells in the Duncan-Virden Valley during 1946, of which about 18,500 acre-feet of water was pumped within the Duncan Valley portion. The following table shows the amount of surface water diverted and the amount of ground water pumped in the Duncan-Virden Valley each year since 1940, obtained from annual reports of the Gila Water Commissioner.

Year	Surface water, acre-feet	Pumped water, acre-feet	Total, acre-feet
1940	39,935	2,436	42,371
1941	34,262	1,348	35,610
1942	36,439	1,900	38,339
1943	31,520	7,100	38,620
1944	27,225	9,500	36,725
1945	27,657	8,300	35,957
1946	14,419	21,000	35,419

Ground water is pumped to supplement surface water that is diverted from the Gila River for irrigation, and the differences in amounts of water pumped from year to year reflect the variations in amounts of river water available. Figure 4 shows the amount of ground water pumped each month, compared with precipitation, and with typical water-table fluctuations in the Duncan-Virden Valley.

Wells 133 and 232 are in areas where large quantities of ground water are pumped for irrigation, and the magnitude of the decline in water levels in these two wells compared with fluctuations in previous years shows the effect of the increase in pumpage during 1946. Well 201 is in an area where the pumping draft is less than in the vicinities of wells 133 and

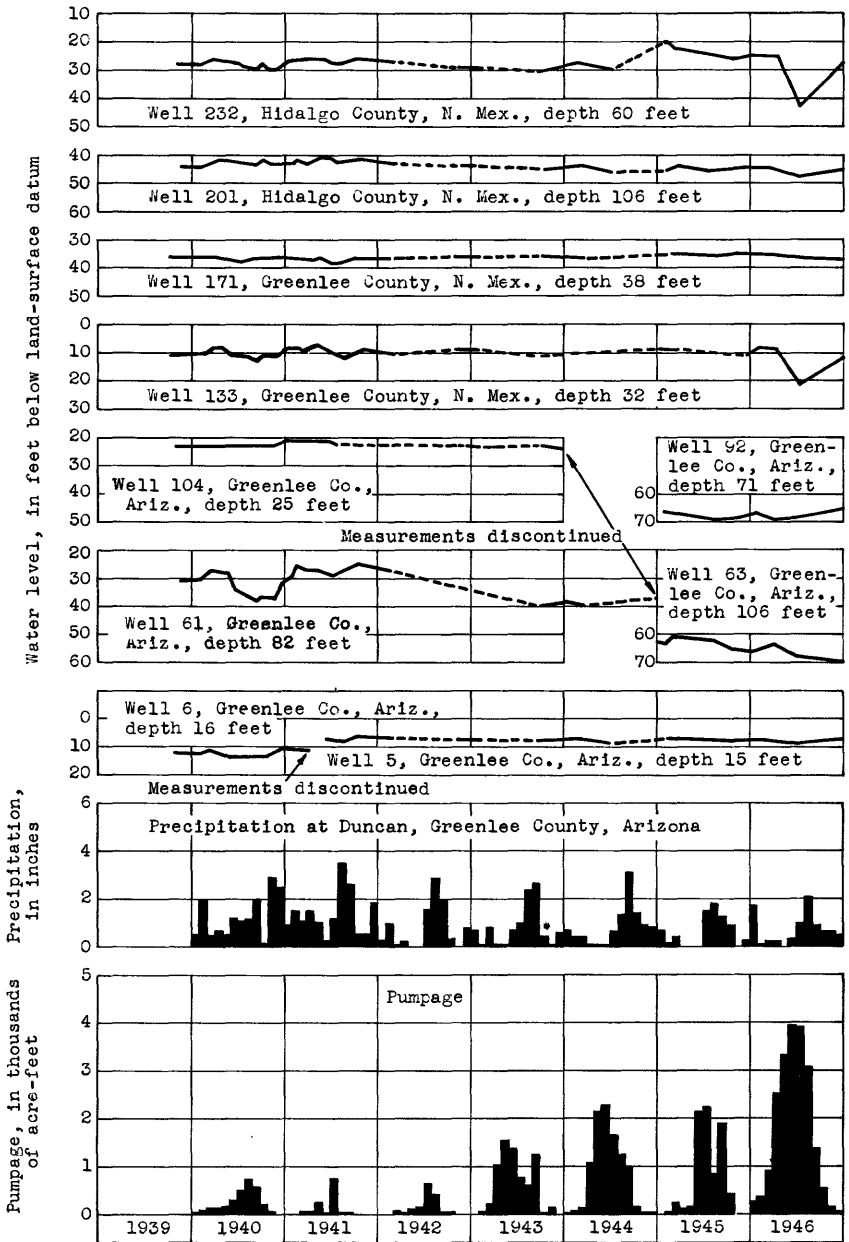


Figure 4.--Graphs showing fluctuations of water level in observation wells in the Duncan-Virden Valley, Greenlee County, Arizona, and Hidalgo County, New Mexico.

232, and the water-level fluctuations in well 201 are less than in the other two wells. Wells 5, 92, and 171 are away from local pumpage effects, and the water levels in these wells indicate the general fluctuations of the water table caused by the pumping in the valley and by variations in the amount of Gila River flow. The water level in well 63 declined as the result of a decrease in recharge in this vicinity because of low flow in the nearby Gila River and in a nearby canal. The water level in the ground-water reservoir in the Duncan-Virden Valley is controlled by the water level in the river. The net decline in the water levels in this valley caused by the increased pumping was not as great as it would have been in an area not controlled by a perennial stream.

Well descriptions and water-level measurements

5 (*941, p. 45; 949, p. 30; *991, p. 45; 1021, p. 36; 1028, p. 31). Warner Foote. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 7, T. 6 S., R. 31 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 7.10; Apr. 11, 7.40; July 4, 8.58; Dec. 30, 7.10.

12 (*911, p. 65; 941, p. 45; 949, p. 30; *991, p. 45; 1021, p. 36; 1028, p. 31). Mr. Wilton. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 20, T. 6 S., R. 31 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 23.92; Apr. 11, mill running; July 4, 25.25; Dec. 30, cannot reach water; well appears to be dry.

14 (*911, p. 65; *941, p. 45; 949, p. 30; *991, p. 45; 1021, p. 38; 1028, p. 31). Victor Rowden. SE $\frac{1}{2}$ SE $\frac{1}{4}$ sec. 19, T. 6 S., R. 31 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 35.82; Apr. 11, pumping; July 4, 37.30; Dec. 30, 37.72.

31 (*911, p. 65; 941, p. 45; 949, p. 30; *991, p. 45; 1021, p. 38; 1028, p. 31). J. C. Merritt. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 4, T. 7 S., R. 31 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 29.25; Apr. 11, 30.88; July 4, 31.45; Dec. 30, 29.31.

36 (*911, p. 66; 941, p. 45; 949, p. 30; *991, p. 45; 1021, p. 38; 1028, p. 31). M. M. Cospser. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 16, T. 7 S., R. 31 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 20.23; Apr. 11, 20.58; July 4, 23.83; Dec. 30, 23.20.

49 (*911, p. 66; 941, p. 45; 949, p. 30; *991, p. 45; 1021, p. 38; 1028, p. 31). W. M. Zumwalt. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 34, T. 7 S., R. 31 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 54.90; Apr. 11, 52.91; July 4, 58.72; Dec. 30, 57.30.

63 (*911, p. 67; 941, p. 46; 949, p. 30; *991, p. 45; 1021, p. 38; 1028, p. 31). M. W. McKelvey. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 3, T. 8 S., R. 31 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 65.11; Apr. 11, 62.37; July 4, 66.60; Dec. 30, 70.05.

72 (*911, p. 67; 941, p. 46; 949, p. 30; *991, p. 45; 1021, p. 38; 1028, p. 31). J. C. Campbell. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 12, T. 8 S., R. 31 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 49.74; Apr. 11, 49.42; July 4, 50.75; Dec. 30, 50.27.

92 (*911, p. 68; 941, p. 46; 949, p. 30; *991, p. 46; 1021, p. 38; 1028, p. 31). Raymond Davis. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 17, T. 8 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 66.90; Apr. 11, 69.24; July 4, 68.82; Dec. 30, 66.10.

96 (*911, p. 68; 941, p. 46; 949, p. 30; *991, p. 46; 1021, p. 38; 1028, p. 32). L. Deane. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 19, T. 8 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 18, 28.77; Apr. 11, 28.95; July 4, 30.44; Dec. 30, 28.70.

111 (*911, p. 68; 941, p. 47; 949, p. 31; *991, p. 46; 1021, p. 38; 1028, p. 32). Franklin Irrigation District well 8. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 28, T. 8 S., R. 32 E. No measurements made in 1946.

120 (*911, p. 69; 941, p. 47; 949, p. 31; *991, p. 46; 1021, p. 38; 1028, p. 32). D. E. Wilkins. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 8 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 18, 9.44; Apr. 11, 9.81; July 4, 11.22; Dec. 30, 10.15.

122 (*911, p. 69; 941, p. 47; 949, p. 31; *991, p. 46; 1021, p. 38; 1028, p. 32). Delbert Moyers. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 32, T. 8 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 18, 23.64; Apr. 11, 24.63; July 4, 23.85; Dec. 30, 25.22.

125 (*911, p. 69; 941, p. 47; 949, p. 31; *991, p. 46; 1021, p. 38; 1028, p. 32). V. L. Crotts. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 33, T. 8 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 18, 20.26; Apr. 11, 20.70; July 4, 22.19; Dec. 30, 24.68.

131 (*911, p. 69; *941, p. 47; 949, p. 31; *991, p. 46; 1021, p. 38; 1028, p. 32). Franklin Irrigation District well 2. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 34, T. 8 S., R. 32 E. No measurements made in 1946.

133 (*911, p. 71; 941, p. 47; *949, p. 31; *991, p. 46; 1021, p. 38; 1028, p. 32). Floyd McDaniels. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 34, T. 8 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 8.07; Apr. 11, 9.16; July 4, 21.00; Dec. 30, 11.18.

136 (*911, p. 71; 941, p. 47; 949, p. 31; *991, p. 46; 1021, p. 39; 1028, p. 32). Franklin Irrigation District well 1. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 34, T. 8 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 42.13; Apr. 11, 45.26; Dec. 30, 44.66.

160 (*911, p. 71; 941, p. 47; 949, p. 31; *991, p. 46; 1021, p. 39; 1028, p. 32). Franklin Irrigation District well 7. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 3, T. 9 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 5.61; Apr. 11, pumping; July 4, pumping; Dec. 30, 9.27.

161 (*911, p. 71; 941, p. 48; 949, p. 31; *991, p. 47; 1021, p. 39; 1028, p. 32). Franklin Irrigation District well 6. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 3, T. 9 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 5.71; Apr. 11, pumping; July 4, pumping; Dec. 30, 9.00.

162 (*911, p. 72; 941, p. 48; 949, p. 31; *991, p. 47; 1021, p. 39; 1028, p. 32). Franklin Irrigation District well 5. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 3, T. 9 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 18.35; Apr. 11, 21.54; July 4, pumping; Dec. 30, 22.03.

171 (*911, p. 72; 941, p. 48; 949, p. 31; *991, p. 47; 1021, p. 39; 1028, p. 32). John Chapman. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 9, T. 9 S., R. 32 E. Water levels, in feet below land-surface datum, 1946: Jan. 20, 35.52; Apr. 11, 35.82; July 4, 36.65; Dec. 30, 37.00.

MARICOPA COUNTY

By F. I. Bluhm and J. P. Mooseau, Jr.

An investigation of the ground-water resources of the Salt River Valley area was started during the latter part of 1945. This area is one of about 15 areas in the State in which ground-water studies are being conducted in cooperation with the Arizona State Land Commissioner. The Salt River Valley area lies principally in Maricopa County, although the eastern part extends

into Pinal County. A total of 548 measurements of water level was made in 148 wells during 1946. In addition to those made by the U. S. Geological Survey, over 500 measurements of water levels made by various irrigation districts are included in this report. The writers wish to express their appreciation to the irrigation districts and to the many individual well owners for permission to publish these measurements.

Records of the quantity of water pumped by the irrigation districts have been supplied by them, and the pumpage from privately owned wells powered with electricity was computed by measuring the discharge and rate of power consumption for individual wells. The following table shows the quantity of water pumped from wells in the Salt River Valley compared with the quantity of surface water diverted at Granite Reef Dam from 1933-46, inclusive.

Quantity of surface water diverted at Granite Reef Dam and quantity of water pumped from wells in Salt River Valley area, 1933-46					
	1933	1934	1935	1936	1937
Water pumped from wells (acre-feet)	572,000	711,000	554,000	684,000	665,000
Water diverted at Granite Reef Dam (acre-feet)	936,700	841,800	1,043,000	1,073,300	1,277,900
Ratio of water pumped from wells to total water used, percent	38	46	35	39	34
	1938	1939	1940	1941	1942
Water pumped from wells (acre-feet)	905,000	738,000	943,000	444,000	1,004,000
Water diverted at Granite Reef Dam (acre-feet)	1,067,800	777,000	603,800	1,249,400	1,104,800
Ratio of water pumped from wells to total water used, percent	47	49	61	26	48
	1943	1944	1945	1946	
Water pumped from wells (acre-feet)	1,104,000	1,017,000	1,143,000	1,360,000	
Water diverted at Granite Reef Dam (acre-feet)	981,400	991,100	997,900	875,500	
Ratio of water pumped from wells to total water used, percent	53	51	53	61	

Figure 5 shows the average cumulative net change in water levels in five areas of the Salt River Valley as follows:

Queen Creek-Higley-Gilbert area
 Tempe-Mesa area
 Phoenix-Glendale-Tolleson area
 Litchfield-Beardsley-Marionette area
 Liberty-Buckeye-Hassayampa area

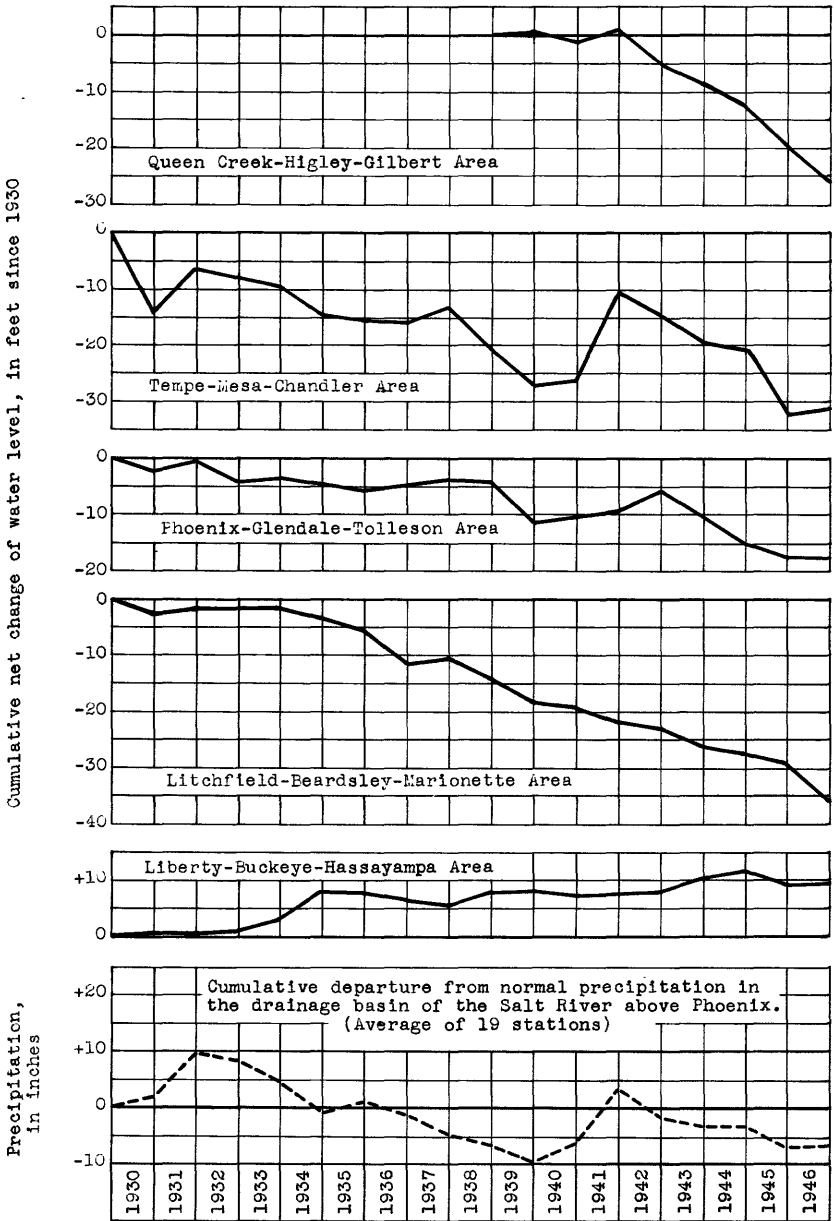


Figure 5.--Graphs showing cumulative net change in water levels in various parts of the Salt River Valley area, Maricopa County, and cumulative departure from normal precipitation since 1930 in the drainage basin of the Salt River above Phoenix, Ariz.

The Queen Creek-Higley-Gilbert area lies in the eastern part of the valley, and each succeeding area lies farther west. Figure 5 also shows the cumulative departure from normal precipitation since 1930 at 19 stations in the drainage basin of the Salt River above Phoenix. For the period 1930-46, inclusive, the cumulative departure from normal precipitation is about -6.25 inches. The curves showing the cumulative net change in water levels in wells show a general decline in all but the Liberty-Buckeye-Hassayampa area as a result of the generally increasing rate of pumping each year, particularly since 1941.

In the Queen Creek-Higley-Gilbert area, little surface water is available in comparison with the amount of water pumped. The development of new land for irrigation has steadily increased, especially since 1940. However, the above-normal precipitation in 1941 reduced the irrigation requirements that year, so that the sharp decline of the water table (see fig. 5) began in 1942. Pumpage in this area is in excess of the annual safe yield.

The trend of the water levels has been downward in the Litchfield-Beardsley-Marionette area. During the period 1930-46 the decline was about 35 feet due to a large amount of pumpage with only a small amount of recharge. Practically all the water used for irrigation in the area was pumped from wells.

The fluctuations of water levels in wells of the Tempe-Mesa-Chandler area are caused mainly by pumping large quantities of water for irrigation and by infiltration of water used for irrigation. In 1941 the system of reservoirs on the Salt and Verde Rivers was filled to capacity, and water flowed in the Salt River past Tempe for long periods. Some of this water infiltrated to the ground-water reservoir, and this, coupled with reduced pumping, caused the abrupt rise in water levels shown by figure 5. During periods of deficient precipitation, when less surface water is available, large quantities of water are pumped from wells to supply irrigation demands. Therefore, either an increased or decreased supply of surface water is reflected rapidly in a rising or declining water table. This is shown graphically in figure 5 by the rapid decline of the water levels for the years 1938-39 and the abrupt rise during 1941.

The fluctuations of the water table in the Phoenix-Glendale-Tolleson area are not as great nor as abrupt as those in the Tempe-Mesa-Chandler area. Recharge in this area is principally from infiltration of irrigation water and from canal seepage, and discharge of ground water from the area is

principally by pumping. The rate of pumping in the area varies less from year to year than in the Tempe-Mesa-Chandler area, although the rate varies in proportion to the amount of surface water used. The trend of the water table in this area (see fig. 5) has been generally downward, the total decline being about 17 feet between 1930 and 1946.

In the Liberty-Buckeye-Hassayampa area the trend of the water levels has been generally upward (see fig. 5), the average increase between 1930 and 1946 being more than 9 feet. This rise was probably caused by two principal factors: First, little ground water has been pumped within the area because of the increasing content of dissolved mineral matter; and second, recharge to the ground-water reservoir from infiltration of irrigation water has exceeded natural discharge. Most of the water used for irrigation in this area has been obtained from wells outside the area.

Well descriptions and water-level measurements

1 (*941, p. 51; 949, p. 34; *991, p. 50; 1021, p. 41; 1028, p. 35). Roosevelt Water Conservation District. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 4, T. 1 N., R. 6 E. Measurements discontinued.

19 (*911, p. 74; 941, p. 51; 949, p. 34; *991, p. 50; 1021, p. 42; 1028, p. 35). E. D. Edwards. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 28, T. 1 N., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 148.28; Aug. 28, 157.43.

68 (*911, p. 75; 941, p. 51; 949, p. 34; *991, p. 50; 1021, p. 42; 1028, p. 35). Mr. Schmitt. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 23, T. 1 N., R. 7 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 306.4; Aug. 27, 306.81.

84 (*911, p. 75; 941, p. 51; 949, p. 34; *991, p. 50; 1021, p. 42; 1028, p. 35). W. A. Anderson. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 11, T. 1 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Jan. 25, 178.28; Aug. 29, 178.99.

87 (*911, p. 75; 941, p. 52; 949, p. 34; *991, p. 50; 1021, p. 42; 1028, p. 35). Mrs. Gardner. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 18, T. 1 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 121.45; Aug. 28, 122.84.

89 (*911, p. 75; 941, p. 52; 949, p. 34; *991, p. 50; 1021, p. 42; 1028, p. 35). D. Cole. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 18, T. 1 S. R. 7 E. Water levels, in feet below land-surface datum, 1946: Jan. 25, 119.71; Aug. 29, 120.89.

94 (*911, p. 75; 941, p. 52; 949, p. 34; *991, p. 50; 1021, p. 42; 1028, p. 35). "Old Clifford Place." NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 21, T. 1 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Jan. 25, 137.60; Aug. 29, 138.44.

101 (*911, p. 76; 941, p. 52; 949, p. 34; *991, p. 50; 1021, p. 42; 1028, p. 35). Mr. Gardiner. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 25, T. 1 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Jan. 25, 167.00; Aug. 27, 168.18.

102 (*911, p. 76; 941, p. 52; 949, p. 34; *991, p. 51; 1021, p. 42; 1028, p. 35). Florence McEntire. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, T. 1 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Jan. 24, 123.73; Aug. 29, 125.40.

- 125 (*911, p. 77; 941, p. 52; 949, p. 35; *991, p. 51; 1021, p. 42; 1028, p. 35). G. H. Dunn. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 12, T. 1 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 162.75; Aug. 28, 172.16.
- 128 (*911, p. 77; 941, p. 52; 949, p. 35; *991, p. 51; 1021, p. 42; 1028, p. 36). Roosevelt Water Conservation District. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 14, T. 1 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 124.60; Aug. 26, 129.58.
- 136 (*911, p. 77; 941, p. 53; 949, p. 35; *991, p. 51; 1021, p. 42; 1028, p. 36). Roosevelt Water Conservation District. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 25, T. 1 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 23, 104.17; Aug. 28, 106.81.
- 151 (*911, p. 77; 941, p. 53; 949, p. 35; *991, p. 51; 1021, p. 42; 1028, p. 36). Roosevelt Water Conservation District. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 13, T. 2 S., R. 5 E. Water levels, in feet below land-surface datum, 1946: Jan. 24, 69.84; Aug. 28, 79.62.
- 164 (*911, p. 78; 941, p. 53; 949, p. 35; *991, p. 51; 1021, p. 42; 1028, p. 36). Roosevelt Water Conservation District. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 5, T. 2 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 24, 87.05; Aug. 28, 89.10.
- 170 (*911, p. 78; 941, p. 53; 949, p. 35; *991, p. 51; 1021, p. 42; 1028, p. 36). A. Sanford. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 3, T. 2 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 24, 105.49; Aug. 28, 110.19, well 300 feet southeast pumping.
- 177 (*911, p. 78; 941, p. 53; 949, p. 35; *991, p. 51; 1021, p. 42; 1028, p. 36). J. O. Power. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 12, T. 2 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 24, 130.25; Aug. 29, 134.13.
- 205 (*911, p. 79; 941, p. 53; 949, p. 35; *991, p. 51; 1021, p. 43; 1028, p. 36). J. E. Watson. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 24, T. 2 S., R. 6 E. Water level, in feet below land-surface datum, 1946: Aug. 29, 144.64.
- 218 (*911, p. 79; 941, p. 54; 949, p. 35; *991, p. 52; 1021, p. 43; 1028, p. 36). Clyde Fitzgerald. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 34, T. 2 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 24, 104.95; Aug. 29, 109.15.
- 221 (*911, p. 79; 941, p. 54; 949, p. 35; *991, p. 52; 1021, p. 43; 1028, p. 36). Roosevelt Water Conservation District. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 31, T. 2 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 24, 42.00; Aug. 29, 46.49.
- 252 (*911, p. 80; 941, p. 54; 949, p. 35; *991, p. 52; 1021, p. 43; 1028, p. 36). Jack Barnes. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 9, T. 2 S., R. 7 E. Water level, in feet below land-surface datum, 1946: Jan. 12, 151.92.
- 254 (*911, p. 80; 941, p. 54; 949, p. 35; *991, p. 52; 1021, p. 43; 1028, p. 36). W. J. Germann. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 7, T. 2 S., R. 7 E. Water level, in feet below land-surface datum, 1946: Jan. 24, 138.50.
- 260 (*911, p. 80; 941, p. 54; 949, p. 35; *991, p. 52; 1021, p. 43; 1028, p. 36). Lawrence Ellsworth. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 18, T. 2 S., R. 7 E. Water level, in feet below land-surface datum, 1946: Jan. 25, 154.87.
- 261 (*911, p. 80; 941, p. 54; 949, p. 35; *991, p. 52; 1021, p. 43; 1028, p. 36). Higley Ward School. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 15, T. 2 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Jan. 25, 150.40; Aug. 29, 159.36.
- 271 (*911, p. 80; 941, p. 54; 949, p. 36; *991, p. 52; 1021, p. 43; 1028, p. 37). Sossaman Bros. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 19, T. 2 S., R. 7 E. No measurements made in 1946.
- 273 (*911, p. 81; 941, p. 55; 949, p. 36; *991, p. 52; 1021, p. 43; 1028, p. 37). Leo Ellsworth. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 28, T. 2 S., R. 7 E. No measurements made in 1946.
- 279 (*911, p. 81; 941, p. 55; 949, p. 36; *991, p. 52; 1021, p. 43; 1028, p. 37). Southern Pacific Railroad Co. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 25, T. 2 S., R. 7 E. Measurements discontinued.

512. Vernon Hughes. NW $\frac{1}{4}$ sec. 26, T. 4 N., R. 7 E., at windmill and concrete stock tank, north bank of Sycamore Creek, 2.5 miles west of former Rio Verde ranger station, 2.0 miles north and 4.0 miles east of Fort McDowell. Used drilled stock well, diameter 8 inches. Equipped with cylinder pump and windmill. Measuring point, top of casing at $\frac{1}{4}$ -inch hole, 1.0 foot above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 9, 1944	23.30	Dec. 15, 1944	31.64	Jan. 21, 1946	32.27
July 21	25.30	Jan. 10, 1945	32.45	June 11	37.64

514. Vernon Hughes. NW $\frac{1}{4}$ sec. 34, T. 4 N., R. 7 E., at windmill about 20 feet east of east boundary of Fort McDowell Indian Reservation, on Sycamore Creek, 3.0 miles northeast of Fort McDowell. Used drilled stock well, diameter 6 inches. Equipped with cylinder pump and windmill. Measuring point, top of column pipe clamp, 3.4 feet above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
July 21, 1944	10.07	Jan. 10, 1945	11.44	June 11, 1946	13.89
Dec. 15	11.50	21, 1946	11.22		

540. Vernon Hughes. NE $\frac{1}{4}$ sec. 30, T. 4 N., R. 8 E., at windmill and underground tank on west bank of Sycamore Creek, at former Rio Verde ranger station, 6.25 miles east and 2.25 miles north of Fort McDowell. Used drilled stock well, diameter 8 inches. Equipped with cylinder pump and windmill. Measuring point, top of casing, 1.0 foot above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 9, 1944	42.59	Dec. 15, 1944	69.91	Jan. 21, 1946	71.01
July 21	51.96	Jan. 10, 1945	72.00	June 11	81.13

601 (*1028, p. 37). City of Phoenix. NE $\frac{1}{4}$ sec. 6, T. 3 N., R. 7 E. Measurements discontinued.

602 (*1028, p. 37). City of Phoenix. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 30, T. 3 N., R. 7 E. Water level, in feet below land-surface datum, 1946: Jan. 11, 16.43.

926. O. H. Semon. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 31, T. 2 N., R. 6 E., 80 feet east of yellow frame house, 150 feet east of road, 2.25 miles east and 4.5 miles north of Mesa Union High School. Used drilled domestic well, diameter 6 inches, depth 135 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.2 foot above land-surface datum and 125.4 feet above mean sea level. All measurements prior to 1946 made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-46

May 15, 1935	65.1	Oct. 3, 1939	74.5	Mar. 16, 1944	89.8
Nov. 20	65.7	Apr. 5, 1940	82.3	July 18	84.3
May 16, 1936	69.7	Dec. 10	91.1	Nov. 8	87.8
Nov. 16	72.1	Apr. 4, 1941	87.1	Mar. 19, 1945	85.0
Apr. 7, 1937	65.0	Nov. 5	70.3	Apr. 9, 1946	88.27
Nov. 22	63.4	Mar. 25, 1942	72.1	June 4	90.33
Apr. 19, 1938	66.6	Oct. 1	88.1	July 25	93.22
Nov. 18	72.5	Mar. 26, 1943	87.2	Oct. 14	90.32
Apr. 13, 1939	75.7	Dec. 20	98.6	Dec. 30	94.44

1061 (*1028, p. 38). W. L. Brooks. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 29, T. 3 N., R. 5 E.

Water level, in feet below land-surface datum, 1946

Jan. 6	181.22	June 20	181.06	Oct. 16	182.70
Apr. 26	181.61	July 24	181.19		

1086 (*1028, p. 38). Salt River Valley Water Users' Association. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 2 N., R. 5 E., 3.5 miles east and 2.0 miles north of Scottsdale (published erroneously in Water-Supply Paper 1028 as 5.75 miles east and 1.0 mile north of Scottsdale). Measuring point, top of casing, at land-surface datum and 1,287 feet above mean sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Apr. 10	100.21	July 25	100.42	Oct. 8	100.71
June 4	100.70	Oct. 7	100.73	Dec. 30	102.44

1087. Salt River Valley Water Users' Association. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 23, T. 2 N., R. 5 E., about 100 feet east of house, at Evergreen Station on the Arizona Canal, 6.5 miles east and 0.5 mile north of Scottsdale. Used drilled domestic well, diameter 6 inches, depth 161 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.7 foot above land-surface datum and 1,290.6 feet above mean sea level. Measurements made by Salt River Valley Water Users' Association. Water levels, in feet below land-surface datum: Dec. 1945, 108.5; Apr. 1, 1946, 109.4; Oct. 30, 1946, 110.5.

1106. Charley Weak. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 25, T. 1 N., R. 5 E., 125 feet west of road behind frame house, 2.25 miles east and 1.5 miles south of Mesa Union High School. Used drilled domestic well, diameter 6 inches. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.8 foot above land-surface datum and 1,235.8 feet above mean sea level. All measurements prior to 1946 made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-46

Apr. 4, 1935	54.4	Apr. 2, 1940	72.2	July 24, 1944	67.9
Nov. 5	59.3	May 17	74.0	Nov. 8	73.0
Mar. 25, 1936	56.4	Dec. 10	83.0	Mar. 7, 1945	70.2
Nov. 4	62.9	Apr. 9, 1941	73.1	Nov. 16	80.4
Mar. 12, 1937	56.2	Mar. 26, 1942	52.7	Apr. 10, 1946	81.72
Oct. 19	53.4	Oct. 13	56.6	June 4	83.20
Mar. 22, 1938	56.0	Mar. 25, 1943	64.1	July 25	84.86
Oct. 19	62.9	Oct. 4	69.6	Oct. 14	84.95
Apr. 3, 1939	65.4	Mar. 17, 1944	69.0	Dec. 30	87.45
Oct. 2	66.2				

1107. Frank E. Shill. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 1 N., R. 5 E., in shed 75 feet north of brick house, 0.1 mile east of north-south road, 0.25 mile east and 3.0 miles north of Mesa Union High School. Used drilled domestic well, diameter 6 inches, depth 111 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.5 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: June 4, 73.53; July 25, 70.76; Oct. 14, 73.31; Dec. 30, 74.64.

1206. John Hoopes. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 16, T. 1 S., R. 5 E., 100 feet east of road, 25 feet east of yellow stucco house, 0.25 mile north of intersection, 1.0 mile west and 2.25 miles north of Chandler Union High School. Used drilled domestic well, equipped with cylinder pump and electric motor. Measuring point, top of concrete base, 0.8 foot above land-surface datum and 1,202.4 feet above mean sea level. All measurements prior to 1946 made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-46

Apr. 1, 1935	31.3	May 29, 1940	54.3	July 8, 1943	49.2
Nov. 1	36.4	Dec. 19	61.2	Dec. 9	42.7
Mar. 20, 1936	33.5	Apr. 16, 1941	48.0	Mar. 23, 1944	40.7
Nov. 10	39.6	Nov. 24	31.2	May 26	39.3
Mar. 4, 1937	32.9	Mar. 27, 1942	30.2	Aug. 2	42.5
Oct. 14	28.2	June 30	32.7	Dec. 6	45.9
Mar. 17, 1938	29.2	Aug. 25	35.3	Mar. 5, 1945	39.2
Oct. 18	41.0	Oct. 7	38.2	Apr. 11, 1946	53.86
Mar. 31, 1939	41.2	Jan. 18, 1943	34.0	June 5	56.55
Sept. 25	45.8	Mar. 3	34.3	July 29	57.24
Apr. 6, 1940	51.9				

1208. Salt River Valley Water Users' Association. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 1, T. 1 S., R. 5 E., 25 feet southeast of intersection of Baseline Road and north-south road, 1.25 miles east and 2.5 miles south of Mesa Union High School. Used drilled domestic well, diameter 16 inches, depth 180 feet. Originally drilled for irrigation use. Equipped with cylinder pump and electric motor. Measuring point, top of 2- by 12-inch board on casing, 1.5 feet below land-surface datum and 1,219.7 feet above mean sea level.

Water level, in feet below land-surface datum, 1945-46

Date	Water level	Date	Water level	Date	Water level
Dec. 10, 1945	a 67.2	June 4, 1946	73.40	Oct. 15, 1946	74.12
Feb. 18, 1946	67.20	July 26	74.95	Dec. 30	75.26
Apr. 10	70.73				

a Measured by Salt River Valley Water Users' Association.

1210. Mrs. J. L. Cobb. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 32, T. 1 S., R. 5 E., 100 feet southwest of house, 0.1 mile north of intersection, 1.0 mile south and 1.0 mile west of Chandler Union High School. Used drilled domestic and stock well, diameter 6 inches, depth 59 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.5 foot below land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 14	48.54	June 4	52.62	Oct. 15	53.36
Apr. 11	52.11	July 29	51.52	Dec. 31	52.76

1211. K. K. Skousen. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 35, T. 1 S., R. 5 E., at west edge of house on west side of road, 2.0 miles east and 0.5 mile south of Chandler Union High School. Unused drilled domestic well, diameter 6 inches, depth 84 feet. Measuring point, top of cement block pump base, 1.3 feet above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 7	75.14	June 4	77.95	Oct. 15	81.50
Apr. 11	77.20	July 29	77.10	Dec. 30	80.15

1307. Bob Milan. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 22, T. 2 S., R. 5 E., 20 feet west of house, west side of road, 0.25 mile north of intersection, 1 mile east and 4.75 miles south of Chandler Union High School. Used drilled domestic well, diameter 6 inches, depth 69 feet. Equipped with rope and bucket. Measuring point, top of concrete tile, 1.5 feet above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 14	36.64	July 29	37.95	Dec. 30	37.24
Apr. 11	36.99	Oct. 15	37.81		

1308. R. W. Hanna. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T. 2 S., R. 5 E., 5 feet west of old water tower at abandoned camp site, north side of road, 6 miles south and 2.2 miles west of Chandler Union High School. Unused drilled well, diameter 6 inches. Measuring point, top of casing, west side, 2.0 feet above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 18	38.89	June 5	39.53	Oct. 15	39.19
Apr. 11	39.25	July 29	39.17	Dec. 30	39.77

1309. Travis Moseley. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 34, T. 2 S., R. 5 E., 40 feet west of white frame house, 300 feet east of Consolidated Canal, 6 miles south and 0.5 mile east of Chandler Union High School. Used drilled domestic well, diameter 6 inches. Equipped with cylinder pump and electric motor. Measuring point, top of casing, south side, 0.4 foot above land-surface datum, and 1,227.0 feet above mean sea level. Water levels, in feet below land-surface datum, 1946: Apr. 11, 52.55; July 29, 52.74; Oct. 15, 51.59; Dec. 30, 45.98.

1456. G. R. Finch. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 15, T. 1 S., R. 4 E., 100 feet east of house, northeast corner of road intersection, 6 miles west and 2 miles north of Chandler Union High School. Used drilled domestic well, diameter 6 inches, depth 400 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, south side, 0.8 foot above land-surface datum, and 1,186.3 feet above mean sea level. All measurements prior to 1946 made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-46

Date	Water level	Date	Water level	Date	Water level
Oct. 30, 1935	32.5	Jan. 3, 1941	46.0	Feb. 25, 1943	34.1
May 19, 1936	30.0	Apr. 16	39.3	June 29	33.8
Nov. 4	32.3	Oct. 31	30.5	Dec. 22	33.0
Mar. 2, 1937	31.2	Jan. 29, 1942	28.7	Mar. 20, 1944	33.2
Oct. 7	26.8	Apr. 2	25.2	May 23	32.7
Mar. 1, 1938	26.6	May 25	29.1	Mar. 5, 1945	36.8
Oct. 11	32.4	June 4	29.9	Apr. 12, 1946	40.25
Mar. 29, 1939	33.7	July 1	29.6	June 5	40.50
Sept. 18	37.0	Aug. 25	32.9	Aug. 1	39.02
Apr. 6, 1940	39.1	Oct. 7	38.9	Dec. 31	38.35
May 27	42.4	Jan. 20, 1943	29.6		

1457. Ben Taylor. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 1 S., R. 4 E., in feed shed about 50 feet east of house, 0.12 mile north of intersection, 8 miles west of Chandler Union High School. Used drilled domestic and stock well, diameter 6 inches, depth 100 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, at land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 20	66.78	June 5	67.23	Oct. 15	68.05
Apr. 12	67.1	Aug. 1	67.41	Dec. 31	67.16

1458. C. W. Brooks. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 1 S., R. 4 E., 50 feet west of road, 75 feet northeast of house, 5 miles west and 0.25 mile north of Chandler Union High School. Used drilled domestic well, diameter 6 inches, depth 63 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Feb. 15	21.54	June 5	22.00	Oct. 15	20.63
Apr. 11	19.23	July 29	22.97	Dec. 31	23.90

1459. F. H. Hall. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 1 S., R. 4 E., in pump house 100 feet northwest of house, 7.75 miles west of Chandler Union High School. Used drilled domestic and stock well, diameter 6 inches, depth 450 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, south side, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 20	71.75	June 5	66.11	Dec. 31	61.76
Apr. 12	70.91	Aug. 1	65.65		

1501. Elkins. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 24, T. 1 N., R. 4 E., in galvanized sheet-iron building 200 feet south of road, behind white frame house, 2.5 miles east of post office at Tempe, 0.5 mile north of Tempe-Mesa highway. Used drilled domestic well, diameter 4 inches. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.6 foot above land-surface datum and 1,181.2 feet above mean sea level. All measurements prior to 1946 made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-46

May 28, 1935	19.3	Apr. 3, 1940	28.1	Mar. 17, 1944	18.7
Oct. 31	20.9	June 1	29.2	May 18	17.1
Mar. 18, 1936	18.9	Mar. 31, 1941	24.1	July 20	19.1
Nov. 5	23.6	Oct. 31	11.2	Sept. 20	21.1
Mar. 3, 1937	18.6	Mar. 26, 1942	11.0	Mar. 20, 1945	23.3
Oct. 12	16.4	June 25	11.9	Apr. 12, 1946	28.9
Mar. 15, 1938	16.3	Aug. 22	13.4	June 5	31.96
Oct. 12	20.0	Nov. 21	17.8	Aug. 1	29.37
Mar. 30, 1939	21.7	June 24, 1943	16.7	Oct. 15	27.76
Sept. 19	25.2	Dec. 30	18.1	Dec. 31	29.94

1502. J. B. House. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 11, T. 1 N., R. 4 E., 50 feet north-east of two-story frame yellow house, east side of Scottsdale Road, 3.25 miles south of Scottsdale. Used drilled domestic well, diameter 6 inches, depth 165 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 21	36.75	June 5	39.58	Oct. 15	39.64
Apr. 12	38.50	Aug. 1	38.82	Dec. 31	39.69

1503. M. P. Bearden. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 23, T. 1 N., R. 4 E., 10 feet north of adobe house, north side of road, at 1010 Dorsey Lane, 1 mile east of post office at Tempe. Used dug domestic well, diameter 4 feet, depth 32 feet. Equipped with hand-operated cylinder pump. Measuring point, U. S. Geol. Survey cooper nail with washer in 2- by 4-inch board north side, 1 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 21	23.34	June 5	24.06	Oct. 15	25.90
Apr. 12	23.60	Aug. 1	24.70	Dec. 31	25.30

1504. Nelson Pritchard. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 35, T. 1 N., R. 4 E., in pump house, south side of store, west side of highway, 5 feet from used domestic supply well, 2 miles south of Tempe-Mesa highway, 2 miles east of post office at Tempe. Unused drilled well, diameter 6 inches, depth 42 feet. Measuring point, top of casing, 0.1 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 15	32.68	June 5	32.97	Oct. 15	36.04
Apr. 12	31.86	Aug. 1	34.74	Dec. 31	34.66

1601A. Stannards. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 19, T. 2 N., R. 4 E., 100 feet south of the Arizona Canal, 3 feet west of shingle house, 3.5 miles west of Scottsdale. Unused dug well, diameter 48 inches, depth unknown. Measuring point, notch in concrete curb, south side, 0.6 foot above land-surface datum and 1,246.45 feet above mean sea level. Measurements from 1935 to 1945, inclusive, made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-46

Oct. 29, 1935	18.3	Sept. 4, 1941	8.8	Apr. 8, 1944	18.9
Apr. 1, 1936	23.3	Oct. 28	12.3	22	18.7
Nov. 7	21.3	Mar. 18, 1942	13.9	May 10	18.7
Mar. 11, 1937	23.5	June 22	5.8	22	18.6
30	22.2	July 31	5.4	June 3	17.7
Apr. 15	21.1	Aug. 20	5.2	17	17.0
Aug. 4	16.2	Nov. 28	9.9	July 1	16.2
Nov. 3	16.4	Jan. 6, 1943	13.3	15	15.5
Apr. 13, 1938	19.5	Feb. 18	13.5	29	16.1
Nov. 14	13.9	Apr. 2	13.7	Aug. 11	14.8
Apr. 12, 1939	20.0	June 8	11.9	28	13.6
Oct. 19	13.8	Sept. 22	12.5	Mar. 22, 1945	19.4
Feb. 26, 1940	19.9	Jan. 18, 1944	18.5	Sept. 5	13.1
June 13	16.5	28	18.2	Apr. 3, 1946	14.71
Dec. 3	21.7	Feb. 11	18.5	June 10	15.13
Mar. 26, 1941	23.1	26	18.6	July 25	15.10
Apr. 28	21.6	Mar. 11	19.3	Oct. 28	12.21
June 14	15.5	25	21.2	Dec. 18	11.79

1603A. Owner unknown. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 26, T. 2 N., R. 4 E., 25 feet south of blue frame house, 0.25 mile south of Indian School Road, and 0.25 mile east of Scottsdale Road. Unused drilled domestic well, diameter 6 inches. Equipped with cylinder pump, hand operated. Measuring point, top of casing, 0.6 foot above land-surface datum and 1,248.6 feet above mean sea level. All measurements prior to 1946 made by Salt River Valley Water Users' Association.

1603A--Continued.

Water level, in feet below land-surface datum, 1935-46

Date	Water level	Date	Water level	Date	Water level
Oct. 29, 1935	63.6	Nov. 16, 1939	67.2	Dec. 16, 1943	66.8
Apr. 1, 1936	61.5	Mar. 28, 1940	67.3	Apr. 14, 1944	64.9
Nov. 3	65.6	Dec. 3	73.9	Oct. 31	76.1
Mar. 16, 1937	62.4	Mar. 31, 1941	68.5	Mar. 21, 1945	58.6
Nov. 6	58.5	Nov. 3	55.7	Apr. 10, 1946	77.80
Apr. 14, 1938	60.7	Mar. 18, 1942	54.0	June 4	78.65
Nov. 15	64.0	Oct. 26	49.4	July 25	79.30
Apr. 13, 1939	66.3	Feb. 20, 1943	58.4	Dec. 23	79.53

1619. Wm. Schrader. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 26, T. 2 N., R. 4 E., 5 feet south of corrugated-iron barn, about 250 feet south of Indian School Road, and 0.75 mile east of Scottsdale Road. Unused domestic well, dug to a depth of 50 feet, diameter 4 feet, and drilled to a depth of 103 feet, diameter 8 inches. Measuring point, top of casing, 1.0 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 6	64.13	June 4	66.83	Oct. 14	67.80
Apr. 10	64.91	July 25	67.74	Dec. 30	67.91

1620. C. T. Sharp. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 29, T. 2 N., R. 4 E., 6 feet west of yellow frame house, 100 feet south of Indian School Road, 0.5 mile east of 48th Street, 2.5 miles west of Scottsdale. Used dug well, diameter 48 inches, depth 25 feet. Measuring point, copper nail and washer on edge of wood curb north side, 0.3 foot below land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 6	10.57	June 10	10.51	Oct. 28	10.03
Apr. 3	10.43	July 25	10.88	Dec. 18	10.96

1701 (*1028, p. 38). K. C. Caswell. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 15, T. 3 N., R. 4 E. Depth 176 feet.

Water level, in feet below land-surface datum, 1914, 1946

Aug. 1914	173.00	Apr. 26, 1946	170.97	July 24, 1946	170.55
Mar. 24, 1946	170.97	June 21	170.99	Oct. 22	170.35

a From U. S. Geol. Survey Water-Supply Paper 375-B, 1915, p. 70, well 19. Record obtained by O. E. Meinzer.

1711. Owner unknown. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 15, T. 3 N., R. 4 E., 150 feet north of east-west road, 150 feet west of Scottsdale Highway, 7 miles north of Scottsdale. Unused drilled domestic well, diameter 6 inches, depth 193 feet. Concrete block around casing 1.5 feet square by 0.5 foot high. Measuring point, top of casing, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 24	165.82	June 21	166.86	Oct. 16	168.66
Apr. 26	165.88	July 24	165.95		

1712. Owner unknown. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 17, T. 3 N., R. 4 E., beside concrete watering trough, about 0.25 mile north of east-west road, 4.25 miles east of Cactus. Unused drilled domestic well, diameter 6 inches, depth 167 feet. 2- by 3 $\frac{1}{2}$ -feet by 1-foot concrete base on well. Measuring point, top of casing, 1 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 25, 161.52; June 21, 161.61; July 24, 161.61; Oct. 16, 161.60.

1756. Christiansen. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 35, T. 4 N., R. 4 E., 100 feet northwest of adobe house, 10 miles north of Scottsdale, 1 mile east of Scottsdale Road. Used drilled domestic and stock well, diameter 8 inches. Measuring point, top of casing, east side, 0.5 foot above land-surface datum. Equipped with cylinder pump, gasoline engine and windmill. Water levels, in feet below land-surface datum, 1946: Apr. 26, 302.1; June 20, 302.02.

1886 (*1028, p. 38). A. D. Hendricks. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 34, T. 4 N., R. 3 E. Measurements discontinued.

1887. Owner unknown. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 3, T. 4 N., R. 3 E., 100 feet west of graded road and 0.7 mile south of Cave Creek Dam. Used dug stock well, diameter 4 feet, depth 35.5 feet. Measuring point, top of 2 by 8, west side, 3.0 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 24, 30.25; June 20, 30.3; July 24, 35.09; Oct. 16, 23.80.

1891. Owner unknown. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 4 N., R. 3 E., 150 feet west of Cave Creek Highway, 100 feet north of east-west road, and 4.0 miles north of Cactus. Unused drilled domestic well, diameter 6 inches, depth 264 feet. Measuring point, top of casing, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 22	213.93	June 20	214.15	Oct. 16	225.21
Apr. 24	213.80	July 24	213.99		

1896. A. J. Norris. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 35, T. 4 N., R. 3 E., about 400 feet east of Cave Creek Highway, about 200 feet north of east-west graded road, about 300 feet northeast of windmill, 3.0 miles north of Cactus. Unused drilled domestic well, diameter 8 inches, depth 242 feet. Measuring point, top of casing, 0.4 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 22, 187.44; June 20, 188.23; July 24, 189.21; Oct. 22, 189.32.

1906 (*1028, p. 38). Maxwell. Formerly owned by George O'Clair. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 1, T. 3 N., R. 3 E. Depth 300 feet.

Water level, in feet below land-surface datum, 1914, 1946

Aug. 1914	195.00	Apr. 24, 1946	182.74	July 24, 1946	182.73
Mar. 24, 1946	182.80	June 20	182.65	Oct. 16	182.61

a From U. S. Geol. Survey Water-Supply Paper 375-B, 1915, p. 70, well 7. Record obtained by O. E. Meinzer.

1906A. Geo. R. Putnam. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 3 N., R. 3 E., 5 feet south of stucco house, 250 feet south and east of road intersection, 6.5 miles north of Phoenix city limits. Unused drilled well, diameter 4 inches, depth 90 feet. Measuring point, top of casing, 0.2 foot above land-surface datum and 1,250.1 feet above mean sea level. Measurements from 1943 to 1945, inclusive, by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1943-46

Sept. 20, 1943	68.1	Oct. 13, 1944	71.3	July 25, 1946	77.55
Apr. 7, 1944	71.0	Mar. 26, 1945	78.8	Oct. 28	78.32
May 29	71.6	Apr. 4, 1946	76.50	Dec. 18	79.80
Sept. 1	71.0	June 10	77.25		

1920. Arizona Aeronautics Corporation. SW $\frac{1}{4}$ sec. 14, T. 3 N., R. 3 E., about 100 feet east of old pump house and well^a, about 0.75 mile northeast of Cactus. Unused drilled public-supply well, diameter 8 inches, depth 338 feet. Measuring point, top of casing, 0.7 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 22	195.32	June 20	195.75	Oct. 22	195.74
Apr. 25	195.18	July 24	195.62		

a Well 15 recorded in U. S. Geol. Survey Water-Supply Paper 375-B, p. 70, 1915. Record obtained by O. E. Meinzer.

1924. Owner unknown. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 5, T. 3 N., R. 3 E., 100 feet south of graded road, 1.35 miles east of 19th Avenue, 11.0 miles north of Phoenix city limits. Unused drilled well, diameter 20 inches, depth unknown. Measuring point, top of casing, 1.5 feet above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 21	206.2	June 10	207.22	Oct. 28	207.03
Apr. 4	207.32	July 25	207.41	Dec. 18	207.69

1925. E. S. Stewart. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 32, T. 3 N., R. 3 E., 10 feet east of frame building, near intersection of Forrest and Townely Streets in Sunnyslope. Used drilled domestic well, diameter 6 inches, depth 120 feet. Measuring point, $\frac{1}{2}$ -inch hole in pump base, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 14	90.39	June 10	92.12	Oct. 28	93.00
Apr. 4	91.45	July 25	92.01	Dec. 18	92.36

1957. P. B. Murphy. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 24, T. 2 N., R. 3 E., 120 feet south of road, 50 feet south of stucco house, inside of garage at 3241 E. Camelback Road, Phoenix. Unused drilled well, diameter 6 inches, depth unknown. Measuring point, top of casing, 0.8 foot above land-surface datum and 1,214.05 feet above mean sea level. Measurements from 1935-45, inclusive, made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-41, 1944-46

Oct. 28, 1935	15.4	Oct. 18, 1939	12.6	Oct. 28, 1941	11.1
Mar. 31, 1936	19.1	Mar. 25, 1940	16.2	Aug. 29, 1944	11.8
Oct. 31	15.8	June 13	16.7	Mar. 22, 1945	16.1
Mar. 11, 1937	18.5	Dec. 3	19.5	Apr. 3, 1946	16.09
30	18.5	Mar. 24, 1941	21.4	June 10	14.73
Nov. 3	12.9	Apr. 29	19.7	July 25	14.38
Apr. 12, 1938	16.1	June 14	14.2	Oct. 28	14.49
Nov. 9	9.5	Sept. 2	11.3	Dec. 18	15.26
Apr. 12, 1939	13.5				

1958. J. H. Forsyth. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, T. 2 N., R. 3 E., 200 feet west of curb and 50 feet south of frame building at 2232 N. 16th Street in Phoenix. Unused drilled well, diameter 6 inches, depth unknown. Measuring point, hole in pump base, 0.7 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 8	39.92	June 10	39.96	Oct. 26	38.90
Apr. 3	39.82	July 25	39.89	Dec. 18	39.19

2056. Godfrey. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 36, T. 1 N., R. 3 E., southwest corner of intersection of 36th Street and Southern Avenue, 2 miles south and 3.5 miles east of highway bridge over the Salt River 1.5 miles south of Phoenix city limits. Used drilled domestic well, diameter 6 inches, depth unknown. Measuring point, top of casing, 1.5 feet above land-surface datum, and 1,136.76 feet above mean sea level. Measurements prior to April 1946 made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-46

May 14, 1935	32.7	June 15, 1940	38.1	Sept. 27, 1943	24.1
Nov. 8,	30.3	Dec. 6	39.3	Mar. 27, 1944	27.9
Mar. 20, 1936	33.4	Sept. 14, 1941	39.7	May 23	28.5
Oct. 22	29.2	Oct. 30	28.0	Sept. 19	26.9
Mar. 25, 1937	31.7	Mar. 20, 1942	29.5	Mar. 14, 1945	29.0
Oct. 6	24.9	June 26	26.9	Apr. 9, 1946	31.05
Mar. 23, 1938	28.6	Aug. 24	24.9	June 13	31.35
Oct. 10	27.2	Nov. 24	24.5	July 30	31.29
Mar. 28, 1939	30.0	Jan. 21, 1943	25.1	Oct. 31	31.36
Oct. 9	33.9	Feb. 23	25.7	Dec. 19	32.41
Apr. 2, 1940	35.4	June 23	24.5		

2058. W. A. Campbell. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 33, T. 1 N., R. 3 E., in well house between two houses, just north of Baseline Road, 0.45 mile east of Seventh Street in Phoenix. Used drilled domestic well, diameter 6 inches, depth 142 feet. Measuring point, top of casing, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 6	94.94	June 13	96.00	Oct. 30	96.44
Apr. 9	95.45	July 30	96.02	Dec. 18	98.20

2157. Bill Damon. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 9, T. 2 S., R. 3 E., west side of tower with galvanized-iron tank, about 250 feet north of old store building at Broad Acres, 13 miles west and 2.0 miles south of Chandler Union High School. Used drilled public-supply well, depth 112 feet. Equipped with cylinder pump and electric motor. Measuring point, top of 2- by 6-inch plank, 0.6 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 15	52.20	June 5	51.42	Oct. 15	51.62
Mar. 20	52.45	Aug. 1	52.32	Dec. 31	52.62

2256. W. R. Collier. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 36, T. 1 S., R. 3 E., about 250 feet east of house, 250 feet south of road, 9.5 miles west of Chandler Union High School. Used drilled domestic well, diameter 8 inches. Equipped with cylinder pump and electric motor. Measuring point, top of casing, north side, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 20	75.42	June 5	78.39	Oct. 15	84.69
Apr. 12	76.23	Aug. 1	80.69	Dec. 31	80.07

2301. A. Cheatum. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 8, T. 1 S., R. 2 E., 60 feet north of road at the northwest corner of road intersection, 1.0 mile south of Laveen. Used dug domestic well, depth and diameter unknown. Measuring point, top of concrete pump base, 0.5 foot above land-surface datum and 1,035.62 feet above mean sea level. Measurements prior to 1946 made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-46

May 10, 1935	15.5	Apr. 1, 1940	11.3	Mar. 21, 1944	11.3
Nov. 12	14.7	June 14	13.7	June 28	8.9
Apr. 7, 1936	17.5	Dec. 5	15.6	July 25	9.0
Oct. 20	12.5	Apr. 25, 1941	16.5	Sept. 18	8.5
May 24, 1937	10.0	Feb. 27, 1942	11.3	Mar. 9, 1945	7.9
Oct. 20	7.3	Sept. 30	7.8	Apr. 9, 1946	9.62
Mar. 28, 1938	7.3	Mar. 26, 1943	8.8	June 13	10.44
Oct. 5	7.1	Oct. 23	9.1	July 29	9.55
May 27, 1939	8.5	Nov. 3	9.3	Oct. 30	10.55
Oct. 4	10.9				

2351. W. E. Sorenson. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 3, T. 1 N., R. 2 E., at the northeast corner of road intersection, 2.5 miles from Phoenix city limits. Used drilled domestic well, depth and diameter unknown. Measuring point, top of casing, 0.35 foot above land-surface datum and 1,058.7 feet above mean sea level. Measurements made by Salt River Valley Water Users' Association from 1935-45, inclusive. Measurements prior to Dec. 19, 1946, made on old well 4 feet from new well, but adjusted to measuring point of new well.

Water level, in feet below land-surface datum, 1935-46

Mar. 15, 1935	33.8	Sept. 11, 1939	53.6	Nov. 10, 1943	59.8
Sept. 11	51.1	Mar. 8, 1940	39.5	Feb. 18, 1944	49.8
Oct. 10	48.0	June 4	48.6	Oct. 2	64.3
Feb. 26, 1936	34.0	Nov. 4	64.8	Mar. 31, 1945	54.5
Sept. 26	54.0	Mar. 10, 1941	42.3	Apr. 5, 1946	57.08
Feb. 26, 1937	34.8	Oct. 2	54.2	June 12	63.80
Mar. 9, 1938	32.8	Feb. 9, 1942	38.6	July 29	63.89
Sept. 30	55.8	Nov. 6	36.0	Oct. 28	66.20
Mar. 24, 1939	34.0	Feb. 3, 1943	39.6	Dec. 19	60.55

2352. C. V. Hilburs. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7, T. 1 N., R. 2 E., 200 feet east of county road, 5.5 miles west of Phoenix city limits. Unused drilled well, diameter 4 inches, depth 67 feet. Measuring point, top of casing, at land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 21	54.05	June 12	62.17	Oct. 29	61.43
Apr. 5	56.47	Aug. 29	62.21	Dec. 18	56.70

2353. C. Hobson. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 28, T. 1 N., R. 2 E., 50 feet north-east of dwelling, 2.25 miles north of Laveen. Used drilled domestic well, diameter 6 inches, depth 50 feet. Measuring point, top of casing, 0.6 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 19	18.73	June 13	21.02	Oct. 30	21.09
Apr. 9	19.40	July 29	20.95	Dec. 18	21.36

2451. V. E. Messinger. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 2 N., R. 2 E., 40 feet south of frame house, 125 feet east of road, 0.75 mile south of Glendale. Unused drilled well, diameter 6 inches, depth unknown. Measuring point, top of concrete pump base, 0.8 foot above land-surface datum and 1,144.65 feet above mean sea level. Measurements made from 1935-45, inclusive, by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-46

Apr. 12, 1935	53.0	Oct. 13, 1939	59.4	Nov. 17, 1943	59.6
Sept. 10	54.2	May 21, 1940	59.5	Mar. 13, 1944	60.6
Oct. 9	54.4	June 10	60.2	Oct. 26	61.8
Mar. 7, 1936	54.9	Nov. 19	65.7	Apr. 5, 1945	65.2
Sept. 30	55.9	Mar. 25, 1941	64.2	Jan. 14, 1946	65.41
Apr. 2, 1937	56.3	Oct. 10	59.7	Apr. 5	66.98
Oct. 25	54.0	Feb. 25, 1942	57.3	June 13	68.09
Apr. 5, 1938	54.6	Nov. 9	50.4	Oct. 29	69.29
Oct. 25	56.0	Feb. 12, 1943	51.7	Dec. 18	70.54
Apr. 7, 1939	57.0				

2452. Leonard. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 2 N., R. 2 E., 15 feet north of frame house, 150 feet north of county road, 3.0 miles north and 1.0 mile west of the intersection of Grand Avenue and Van Buren Street in Phoenix. Unused drilled well, diameter 6 inches, depth 49 feet. Measuring point, top of casing, 0.5 foot above land-surface datum and 1,140.45 feet above mean sea level. Measurements made by Salt River Valley Water Users' Association from 1935-45, inclusive.

Water level, in feet below land-surface datum, 1935-46

Apr. 17, 1935	24.7	Nov. 19, 1940	32.4	June 22, 1943	28.0
Sept. 12	25.7	Mar. 14, 1941	32.0	Sept. 17	27.5
Oct. 22	26.0	May 1	31.7	Mar. 13, 1944	29.1
Mar. 11, 1936	26.0	June 16	29.5	May 29	28.6
Oct. 8	25.3	Sept. 5	25.5	Sept. 2	28.4
Apr. 6, 1937	25.0	Oct. 9	25.0	Oct. 30	28.7
Oct. 27	22.5	Feb. 20, 1942	27.1	Mar. 29, 1945	29.5
Apr. 6, 1938	23.5	June 19	25.8	Jan. 14, 1946	30.81
Nov. 4	24.5	Aug. 21	26.0	Apr. 5	31.57
Apr. 10, 1939	26.3	Nov. 3	25.1	June 12	32.2
Oct. 17	27.1	Jan. 14, 1943	27.8	July 29	32.19
Mar. 20, 1940	28.7	Feb. 15	25.5	Dec. 20	32.84
June 11	30.6				

2453. B. F. Reichenberger. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 20, T. 2 N., R. 2 E., 150 feet east of county road, 2.75 miles south of Glendale. Used drilled domestic well, diameter 6 inches, depth 95 feet. Equipped with cylinder pump and electric motor. Measuring point, 3/4-inch hole in north side pump base, 0.7 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 21	59.75	June 12	61.06	Oct. 28	58.32
Apr. 5	60.28	July 29	61.17	Dec. 18	60.23

* 2551. Charles Christopher. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24, T. 3 N., R. 2 E., 250 feet west of county road, 10 feet north of tank tower, 175 feet west of yellow house, 8.0 miles north of Phoenix city limits. Unused drilled well, diameter 6 inches, depth unknown. Measuring point, top of casing, at land-surface datum and 1,255.7 feet above mean sea level. Measurements from 1940 to 1945, inclusive, by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1940-46

Date	Water level	Date	Water level	Date	Water level
Apr. 17, 1940	99.9	Feb. 17, 1943	116.7	Apr. 4, 1946	130.7
Nov. 27	101.0	Dec. 17	112.4	June 10	132.79
Mar. 26, 1941	99.7	Apr. 15, 1944	114.7	July 25	133.76
Oct. 24	100.4	Oct. 13	118.5	Oct. 28	136.25
Feb. 27, 1942	101.1	Mar. 27, 1945	122.7	Dec. 18	136.05

2552. Lee Hopper. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7, T. 3 N., R. 2 E., 200 feet north-east of house, 0.3 mile south of canal, 5.0 miles north and 0.5 mile west of Glendale. Used drilled well, diameter 6 inches, depth 220 feet. Measuring point, top of 6-inch casing, 1.2 feet above land-surface datum and 1,211 feet above mean sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Apr. 4	118.82	July 29	120.16	Dec. 18	116.43
June 10	120.06	Oct. 28	121.30		

2553. American Institute of Foreign Trade. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T. 3 N., R. 2 E., in pump house between kitchen and carpenter shop at school headquarters, 6.0 miles north of Glendale. Used drilled public-supply well, diameter 20 inches, depth 525 feet. Equipped with automatic turbine pump and electric motor. Measuring point, top of 1 $\frac{1}{4}$ -inch hole in pump base, 1.5 feet above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Apr. 4	133.89	July 26	142.19	Dec. 18	149.17
June 10	135.00	Oct. 28	138.85		

2555. Salt River Valley Water Users' Association. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 26, T. 3 N., R. 2 E., 40 feet south of Arizona Canal, 50 feet north of concrete block house, 3 miles east and 2.25 miles north of Glendale. Used drilled well, diameter 6 inches, depth 263 feet. Measuring point, top of 3/4-inch pipe, 0.8 foot above land-surface datum and 1,228.03 feet above mean sea level. Measurements prior to Apr. 4, 1946, made by owner.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
Oct. 13, 1944	101.3	Dec. 4, 1945	108.6	June 10, 1946	111.90
Mar. 30, 1945	102.2	Mar. 12, 1946	109.5	Nov. 13	114.9
May 11	104.6	Apr. 4	110.26		

2651. Frank Echenique. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 27, T. 4 N., R. 2 E., by abandoned rock chimney, 300 feet north of house, 8.5 miles north and 3 miles east of Glendale. Unused drilled well, diameter 6 inches, depth 277 feet. Measuring point, top of casing, 0.4 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Jan. 15, 217.00; Apr. 4, 217.60; June 10, 218.40; Dec. 18, 214.11.

2781. C. F. Edwards. SW $\frac{1}{4}$ sec. 20, T. 5 N., R. 1 E., 11 miles north and 0.25 mile east of Marionette. Unused drilled irrigation well, diameter 18 inches, depth 76 feet. Measuring point, top of concrete curb, west side, at land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 13	44.34	June 27	46.34	Dec. 30	45.49
Apr. 9	45.31	Oct. 16	45.89		

2802. J. G. Boswell. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 5, T. 4 N., R. 1 E., 100 feet west of Marinette Canal, 8.75 miles north of Marinette. Used domestic well, diameter 24 inches, depth 95 feet. Measuring point, hole in wooden well cover, 0.7 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 13	71.54	June 27	72.84	Dec. 30	75.18
Apr. 9	71.90	Oct. 16	74.20		

2803. Owner unknown. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 30, T. 4 N., R. 1 E., 5 miles north of Marinette, 0.5 mile east of Agua Fria River. Unused drilled irrigation well, diameter 16 inches, depth 180 feet. Measuring point, top of casing, 1.0 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 13, 125.20; Apr. 9, 137.83; Oct. 16, 140.07; Dec. 30, 140.14.

2804. R. E. Grace. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 34, T. 4 N., R. 1 E., 1 mile west of New River and 4.25 miles north of U. S. Highways 70 and 80. Unused drilled irrigation well, diameter 18 inches, depth unknown. Measuring point, top of casing, 0.5 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 15, 142.10; June 26, 147.59; Dec. 30, 154.74.

2851. Essley & Durby. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 1, T. 3 N., R. 1 E., on west bank of Skunk Creek, 25 feet southeast of tank tower, 4.5 miles northeast of Marinette. Unused drilled irrigation well, diameter 16 inches, depth 156 feet. Measuring point, top of casing, east side, 4.0 feet above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 15	109.10	July 24	112.26	Dec. 30	114.70
Apr. 9	109.41	Oct. 16	114.83		

2852. J. G. Boswell. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 9, T. 3 N., R. 1 E., about 1.75 miles east of Marinette and 1.75 miles north of U. S. Highways 70 and 80. Used drilled irrigation well, diameter 18 inches, depth 248 feet. Equipped with turbine pump and electric motor. Measuring point, edge of concrete base, at land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 15, 103.89; Apr. 9, 114.30; June 26, 112.62; Dec. 20, 110.75.

2854. J. G. Boswell. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 7, T. 3 N., R. 1 E., in small frame building, about 1 mile north of U. S. Highways 70 and 80 on the west side of the Lake Pleasant road. Used drilled irrigation well, diameter 18 inches, depth 285 feet. Equipped with turbine pump and 50 horse-power electric motor. Measuring point, top of steel flange on pump base, 0.5 foot above land-surface datum, which is 1,160.6 feet above mean sea level.

Water level, in feet below land-surface datum, 1942, 1944, 1946

Mar. 10, 1942	all4.5	Apr. 9, 1946	120.12	Oct. 16, 1946	123.52
Oct. 19, 1944	all1.4	June 26	122.34	Dec. 30	118.59
Jan. 17, 1946	111.62				

a Measurement by J. G. Boswell Co.

2856. Otis Cook. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 35, T. 3 N., R. 1 E., 20 feet south of dwelling house, in pump shed, 1.0 mile south and 0.35 mile east of Peoria. Used drilled domestic well, diameter 6 inches, depth 217 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.3 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 20	54.47	June 10	56.29	Oct. 28	56.75
Apr. 4	54.87	July 29	a 60.72	Dec. 18	a 66.23

a Pumping prior to measurement.

2951. Ray Fram. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 8, T. 2 N., R. 1 E., 100 feet west of county road, 30 feet north of stucco house, 5.2 miles south and 1.0 mile east of Marinette. Unused drilled well, diameter 8 inches, depth unknown. Measuring point, top of wooden platform, 0.8 foot above land-surface datum and 1,059.20 feet above mean sea level. Measurements from 1935-45, inclusive, made by Salt River Valley Users' Association.

2951--Continued.

Water level, in feet below land-surface datum, 1935-46

Date	Water level	Date	Water level	Date	Water level
Apr. 9, 1935	36.4	Mar. 20, 1940	50.6	Apr. 8, 1944	48.9
Sept. 5	48.0	June 10	53.6	Oct. 5	55.2
Oct. 2	45.4	Nov. 20	54.7	Dec. 1945	51.6
Mar. 4, 1936	43.3	Mar. 25, 1941	45.9	Apr. 4, 1946	55.25
26, 1937	40.5	Oct. 10	43.4	June 4	57.40
Oct. 22	45.7	Feb. 18, 1942	43.2	July 29	57.35
Mar. 29, 1938	42.1	Nov. 16	44.2	Oct. 28	60.50
Oct. 21	50.1	Feb. 9, 1943	43.1	Dec. 18	56.30
Apr. 5, 1939	46.6	Nov. 17	47.8		

2952. E. N. Jacobs. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 14, T. 2 N., R. 1 E., 50 feet south of Grand Canal by yellow frame house, 3.0 miles west and 1.0 mile south of Glendale. Used drilled domestic well, diameter 6 inches, depth 65 feet. Equipped with cylinder pump and electric motor. Measuring point, top of casing, 0.6 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 21	45.39	June 4	45.57	Oct. 28	45.53
Apr. 4	45.52	July 29	45.75		

3051. Roosevelt Irrigation District. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 12, T. 1 N., R. 1 E., 200 feet south of Southern Pacific Railroad tracks, 6.0 miles west of Phoenix city limits. Used drilled irrigation well, diameter 20 inches, depth 182 feet. Measuring point, top of casing, 3.6 feet below land-surface datum and 1,028.81 feet above mean sea level. Measurements prior to December 1946 made by owner.

Water level, in feet below land-surface datum, 1930-41, 1943-46

Mar. 6, 1930	27.3	Mar. 21, 1935	30.6	May 11, 1940	43.0
Nov. 15	32.3	Dec. 1	39.6	Nov. 8	47.9
Dec. 15	31.2	Feb. 15, 1936	34.1	21, 1941	41.6
Mar. 15, 1931	27.9	Dec. 1	40.4	Feb. 5, 1943	47.6
Dec. 1	34.6	Mar. 1, 1937	34.1	Nov. 6	52.2
Mar. 1, 1932	27.8	Dec. 1	38.1	Feb. 19, 1944	44.9
Dec. 1	26.1	Mar. 1, 1938	31.0	Nov. 20, 1945	49.6
Feb. 1, 1933	33.6	Jan. 1, 1939	36.6	Mar. 6, 1946	53.9
Dec. 1	37.7	Mar. 1	31.6	Dec. 20	55.09
1, 1934	35.7	Apr. 29, 1940	45.0		

3053. Isabell-Hartner Co. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 4, T. 1 N., R. 1 E., 60 feet southwest of road intersection, 1.0 mile north of Tolleson. Unused drilled well, diameter 20 inches, depth 158 feet. Measuring point, notch in top of casing, 0.6 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Jan. 14, 54.93; June 12, 69.12; July 29, 69.09; Oct. 29, 67.20.

3054. Owner unknown. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 6, T. 1 N., R. 1 E., at the southwest corner of road intersection, 40 feet east of dwelling, 1 mile north and 2 miles west of Tolleson. Used drilled irrigation well, diameter and depth unknown. Equipped with turbine pump and diesel engine. Measuring point, 1-inch opening in pump base, 0.8 foot above land-surface datum and 1,011.62 feet above mean sea level. Measurements prior to 1946 made by Salt River Valley Water Users' Association.

Water level, in feet below land-surface datum, 1935-43, 1945-46

Sept. 5, 1935	40.6	Sept. 25, 1939	36.2	Feb. 8, 1943	45.0
Oct. 2	40.1	Oct. 10	43.1	Apr. 1945	52.1
Feb. 29, 1936	38.0	Mar. 8, 1940	41.3	Dec. 1945	51.1
Apr. 8	38.6	June 7	43.1	Jan. 14, 1946	53.40
Sept. 22	42.7	Mar. 12, 1941	48.2	Apr. 5	58.06
26, 1937	37.0	Oct. 13	41.1	June 12	62.72
Mar. 7, 1938	34.9	Feb. 10, 1942	41.3	July 29	62.69
Sept. 29	40.0	Nov. 10	46.4	Oct. 30	62.88
Apr. 5, 1939	41.3				

3366. D. E. Accomazzo. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 1 S., R. 1 W., about 0.75 mile south of Gila River, 1.5 miles east and 8.25 miles west of Litchfield Park. Used drilled irrigation well, diameter 20 inches, depth 142 feet. Equipped with turbine pump and diesel motor. Measuring point, hole in pump base, at land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 1, 42.14; Apr. 3, 42.06; June 13, 43.00; Dec. 18, 42.00.

3386. Goodyear Farms well 9B. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 9, T. 1 N., R. 1 W., 200 feet east of railroad, 0.5 mile west of paved road, 3.5 miles south of Litchfield Park. Used drilled irrigation well, diameter 26 inches, depth 218 feet. Equipped with turbine pump and electric motor. Measuring point, bottom edge of pump base, 0.9 foot above land-surface datum and 982.6 feet above mean sea level.

Water level, in feet below land-surface datum, 1940-42, 1945-46

Date	Water level	Date	Water level	Date	Water level
June 21, 1940	49.2	Aug. 19, 1941	47.0	Apr. 8, 1946	45.27
Oct. 17	45.1	Feb. 4, 1942	43.0	July 24	46.90
Dec. 26	58.6	Jan. 1945	44.3	Oct. 16	47.51
Mar. 3, 1941	55.4	Mar. 4, 1946	43.63	Dec. 31	46.56

3388. T. C. Rhodes. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 6, T. 1 N., R. 1 W., about 100 feet south of county road, 2.0 miles south and 2.5 miles west of Litchfield Park. Used drilled irrigation well, diameter 20 inches, depth 173 feet. Equipped with turbine pump and electric motor. Measuring point, bottom edge of pump base, south side, 1.5 feet above land-surface datum.

Water level, in feet below land-surface datum, 1946

Mar. 6	75.00	July 24	76.48	Dec. 31	76.51
Apr. 8	75.67	Oct. 16	76.99		

3389. A. R. Petri. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 28, T. 1 N., R. 1 W., in corrugated iron pump house, 0.52 mile south of main road, 2.0 miles south and 0.5 mile west of Goodyear. Used dug irrigation well, diameter 4 feet, depth 24 feet. Measuring point, top edge of 8 by 8, northeast corner of pump base, at land-surface datum. Equipped with turbine pump and diesel engine.

Water level, in feet below land-surface datum, 1946

Mar. 4	12.71	June 10	14.12	Dec. 20	13.74
Apr. 5	13.06	Oct. 25	13.20		

3486. Goodyear Farms. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 2 N., R. 1 W., about 1,400 feet south of road, 100 feet west of fifth power-line pole south of road, 1 mile west of the Agua Fria River and 8.5 miles west of Glendale. Unused drilled well, diameter 20 inches, depth 180 feet. Measuring point, top of casing, north side, 1.0 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946

Jan. 17	87.78	June 27	94.61	Dec. 31	94.55
Apr. 9	94.62	Oct. 16	95.50		

3487. Goodyear Farms well 19D. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 19, T. 2 N., R. 1 W., 2 miles west and 1 mile north of Litchfield Park. Used drilled irrigation well, diameter 26 inches, depth 280 feet. Measuring point, top of casing, at land-surface datum and about 1,060 feet above mean sea level. All measurements by Goodyear Farms.

Water level, in feet below land-surface datum, 1927-36, 1938, 1940-46

Jan. 6, 1927	72.5	Sept. 12, 1927	74.0	Oct. 25, 1928	73.0
Feb. 15	71.6	Nov. 2	72.9	Dec. 7	73.8
18	71.6	26	73.0	Feb. 8, 1929	72.2
21	71.6	Dec. 24	72.4	Apr. 25	71.2
24	71.8	Jan. 27, 1928	71.9	May 23	71.1
Mar. 14	72.0	Feb. 14	71.5	June 22	71.6
17	71.8	Mar. 28	71.8	July 30	73.1
Apr. 8	71.6	Apr. 24	71.6	Aug. 28	74.1
May 5	71.5	May 10	71.7	Sept. 23	74.0
June 23	72.1	June 22	72.1	Oct. 30	73.6
July 13	72.5	July 30	73.7	Nov. 20	73.3
Aug. 10	73.7	Sept. 1	74.8	Dec. 27	72.7

3487--Continued.

Water level, in feet below land-surface datum, 1927-36, 1938, 1940-46					
Date	Water level	Date	Water level	Date	Water level
June 25, 1930	75.3	June 23, 1932	71.4	Jan. 24, 1935	72.6
Sept. 26	78.6	July 27	70.9	Nov. 23	74.4
Oct. 25	76.9	Sept. 27	70.8	Dec. 18	74.0
Dec. 3	75.9	Oct. 17	70.3	Jan. 20, 1936	73.2
27	75.1	Nov. 28	70.1	Dec. 29	75.6
Jan. 28, 1931	74.5	Dec. 30	69.9	Jan. 1938	78.0
Feb. 26	74.1	Jan. 28, 1933	69.6	June 27, 1940	92.9
Mar. 5	74.5	Feb. 25	69.4	Oct. 2	97.5
28	74.1	Mar. 4	69.2	17	91.4
June 18	73.9	Apr. 26	70.5	Dec. 26	89.5
July 27	73.9	May 29	70.0	Mar. 3, 1941	87.1
Aug. 25	75.9	June 14	70.0	Aug. 12	97.0
Sept. 21	76.0	Oct. 16	74.0	Mar. 23, 1942	91.5
Nov. 17	74.8	Dec. 29	71.9	Feb. 17, 1943	92.8
Dec. 21	74.2	Feb. 15, 1934	71.1	Aug. 29, 1944	110.0
Jan. 30, 1932	73.4	Mar. 23	71.5	Jan. 1945	101.2
Mar. 22	72.4	Nov. 21	74.2	May 1946	103.0
Apr. 25	71.8	Dec. 24	73.4	Dec. 15	111.0
May 20	71.7				

3489. R. E. McMurchy. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 2 N., R. 1 W., western-most of four wells about 0.5 mile west of Agua Fria River, about 2 miles east and 1.5 miles north of Litchfield Park. Unused drilled well, diameter 20 inches, depth 143 feet. Measuring point, top of concrete platform, 0.3 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946			
Jan. 16	59.11	June 27	58.56
Apr. 9	59.61	Oct. 16	59.20
		Dec. 31	59.16

3586. A. J. Reems. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 3 N., R. 1 W., 50 feet north of store building, in frame pump house, about 3 miles south of Beardsley. Used drilled domestic well, diameter 8 inches, depth 372 feet. Measuring point, top of casing, south side, at land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 3, 196.22; June 6, 197.5; Oct. 16, 198.40.

3587. Rancho Santa Maria. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 22, T. 3 N., R. 1 W., 100 feet south of irrigation well, 200 feet southeast of road intersection, 4 miles west and 0.5 mile south of Marinette. Unused drilled well, diameter 18 inches, depth 190 feet. Measuring point, top of concrete pump base, at land-surface datum. Measurements made by owner.

Water level, in feet below land-surface datum, 1932-44			
Aug. 1932	92	May 1939	112
Aug. 1935	97	Dec. 1940	117
Jan. 1937	99	Feb. 1942	120
		June 1942	134
		June 1944	137

3588. Maricopa County Municipal Water Conservation District No. 1. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 31, T. 3 N., R. 1 W., 150 feet from road intersection, 2.5 miles south and 7.0 miles west of Marinette. Unused drilled well, diameter 6 inches, depth unknown. Measuring point, top of casing, north side, 0.6 foot above land-surface datum.

Water level, in feet below land-surface datum, 1946			
Feb. 6	170.96	June 6	174.4
Apr. 9	172.32	Oct. 16	175.26
		Dec. 31	171.66

3686. Maricopa County Municipal Water Conservation District No. 1. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 8, T. 4 N., R. 1 W., 50 feet south of canal, 2.0 miles north of Beardsley. Unused drilled irrigation well, depth 500 feet, diameter 20 inches. Measuring point, top of casing, west side, 4.0 feet above land-surface datum and 1,339 feet above mean sea level.

Water level, in feet below land-surface datum, 1946			
Feb. 6	192.04	June 6	196.85
Apr. 9	194.97	Oct. 16	199.60
		Dec. 20	200.41

3786. Bard Ranch. Approximate location, SW $\frac{1}{4}$ sec. 36, T. 5 N., R. 1 W., about 0.5 mile north of M. C. M. W. C. D. canal, 6.7 miles northeast of junction of canal with U. S. Highway 70-80, 2.0 miles northwest of Beardsley. Used drilled domestic and stock well, diameter 8 inches, depth unknown. Well equipped with cylinder pump and windmill. Measuring point, top of casing, 1.5 feet above land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 15	161.50	July 24	163.18	Dec. 30	159.45
Apr. 9	161.83	Oct. 17	166.26		

a Windmill running prior to measurement.

3940. Goodyear Farms. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 26, T. 2 N., R. 1 W., about 100 feet south of county road, 3 miles north and 1.5 miles west of Tolleson. Unused drilled well, diameter 26 inches, depth 127 feet. Measuring point, top of casing, at land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 16	76.62	July 24	79.28	Dec. 31	76.43
Apr. 9	75.76	Oct. 16	80.45		

3956. Maricopa County Municipal Water Conservation District No. 1. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 4, T. 3 N., R. 2 W., 0.75 mile west of canal, about 2.0 miles south and 5.5 miles west of Beardsley. Unused drilled test well, diameter 8 inches, depth 700 feet. Measuring point, top of nut welded to cap, 2.0 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 3, 258.46; June 6, 258.22; Oct. 16, 260.71; Dec. 31, 259.66.

4002. Maricopa County Municipal Water Conservation District No. 1. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 4, T. 2 N., R. 2 W., 20 feet east of road along canal bank, 4.3 miles south and 11 miles west of Marinette. Unused drilled well, diameter 20 inches, depth unknown. Measuring point, top of casing, west side, 1.0 foot above land-surface datum and 1,204 feet above mean sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 7	202.80	June 6	206.06	Dec. 31	205.80
Apr. 9	204.08	Oct. 16	207.41		

4051. Roosevelt Irrigation District. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 16, T. 1 N., R. 2 W., 50 feet northeast of road intersection, 1.0 mile south and 1.0 mile west of Perryville. Used drilled irrigation well, diameter 20 inches, depth 200 feet. Equipped with turbine pump and electric motor. Measuring point, bottom edge of pump base, east side, 0.5 foot above land-surface datum and 954.8 feet above mean sea level. All measurements prior to 1946 made by Roosevelt Irrigation District.

Water level, in feet below land-surface datum, 1928-46

Apr. 30, 1928	77.5	Feb. 15, 1936	70.5	Feb. 3, 1940	73.2
Jan. 31, 1929	77.5	May 1	71.5	May 1	74.2
May 1	78.8	Nov. 1	71.6	Jan. 13, 1941	75.0
Nov. 12	79.6	Dec. 1	71.6	Feb. 10	73.5
Jan. 1, 1930	79.8	Jan. 1, 1937	71.5	Mar. 26	74.3
Mar. 5	78.6	Feb. 1	72.3	May 1	74.1
May 1	79.1	Mar. 1	72.5	Nov. 15	70.7
Jan. 15, 1931	77.6	May 1	73.9	Jan. 1, 1942	71.2
May 1	78.0	Nov. 1	75.5	May 1	71.1
Jan. 1, 1932	77.4	Dec. 1	75.0	Jan. 1, 1943	71.0
May 1	77.0	Jan. 1, 1938	75.8	May 1	70.9
Jan. 1, 1933	76.4	Feb. 1	73.5	Jan. 1, 1944	70.7
May 1	76.0	Mar. 1	73.5	May 1	70.6
Jan. 1, 1934	75.4	May 1	74.0	June 1	70.0
Mar. 20	74.5	Jan. 1, 1939	73.0	Jan. 14, 1945	70.0
May 1	74.8	Feb. 1	73.4	Mar. 5, 1946	72.69
Jan. 13, 1935	71.5	May 1	74.0	Apr. 5	76.02
May 1	71.9	Nov. 1	73.6	June 10	81.2
Dec. 1	70.5	Jan. 1, 1940	73.9	Dec. 23	75.07
Jan. 11, 1936	71.0				

4052. H. F. Hollingshead. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 3, T. 1 N., R. 2 W., 50 feet southeast of road intersection, 3.0 miles north of Perryville. Used drilled irrigation well, diameter 20 inches, depth 435 feet. Equipped with turbine pump and electric motor. Measuring point, bottom edge of pump base, north side, 0.1 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 6, 134.41; Apr. 5, 136.42; June 10, 138.65.

4054. Jettie Robinson. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 12, T. 1 N., R. 2 W., 0.5 mile north of east-west highway, 150 feet west of north-south road, 3.0 miles west and 0.5 mile north of Goodyear. Used drilled domestic well, diameter 4 inches, depth 180 feet. Measuring point, top of casing, 0.1 foot above land-surface datum. Equipped with cylinder pump and windmill.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 4	64.4	June 10	123.1	Dec. 20	63.85
Apr. 5	79.82	Oct. 25	63.20		

a Irrigation well, 150 feet southeast, pumping.

4055. H. T. Kiefer. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 23, T. 1 N., R. 2 W., 0.4 mile north of south side of section near north-south center line of section, about 1.6 miles south and 1.5 miles east of Perryville. Used drilled irrigation well, diameter 20 inches, depth 188 feet. Equipped with turbine pump with electric motor. Measuring point, top of casing, west side, 1.1 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 5, 23.94; Apr. 5, 25.35; Oct. 25, 25.02; Dec. 20, 25.40.

4151. Lee Hunter. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 4, T. 1 S., R. 2 W., 20 feet south of house, 150 feet south of U. S. Highway 80, 1.75 miles east of Liberty. Unused driven well, diameter 1 inch, depth 22 feet. Measuring point, top of 1-inch pipe, at land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 11, 15.58; June 12, 17.9; Oct. 25, 16.02; Dec. 20, 15.70.

4352. Mrs. John Hughes. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 5, T. 1 S., R. 3 W., beneath windmill, 0.25 mile south of U. S. Highway 80 and 0.4 mile east of Buckeye grade school. Unused driven stock well, diameter 4 inches. Equipped with cylinder pump and windmill. Measuring point, top of casing, 0.2 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 11, 5.23; June 24, 5.07; Oct. 25, 5.14; Dec. 20, 5.71.

4401. Roosevelt Irrigation District. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 34, T. 1 N., R. 3 W., about 25 feet southeast of intersection, 1.5 miles north and 2.0 miles east of Buckeye. Unused drilled irrigation well, diameter 20 inches, depth 200 feet. Measuring point, edge of pump base, at land-surface datum and 916.7 feet above mean sea level. All measurements prior to 1946 made by Roosevelt Irrigation District.

Water level, in feet below land-surface datum, 1928-46

Apr. 30, 1928	60.0	Jan. 11, 1936	57.5	Jan. 1, 1940	59.6
Jan. 31, 1929	60.0	Feb. 15	57.0	Feb. 3	59.5
May 1	62.2	May 1	57.3	May 1	59.9
Nov. 12	66.7	Nov. 1	58.3	Jan. 13, 1941	61.0
Jan. 1, 1930	66.3	Dec. 1	58.4	Feb. 10	61.8
Mar. 5	65.8	Jan. 1, 1937	58.5	Mar. 26	60.1
May 1	65.7	Feb. 1	58.2	May 1	59.9
Jan. 15, 1931	65.5	Mar. 1	59.8	Nov. 15	58.7
May 1	65.4	May 1	60.1	Jan. 1, 1942	58.6
Jan. 1, 1932	65.3	Nov. 1	61.1	May 1	58.2
May 1	65.3	Dec. 1	61.0	Jan. 1, 1943	57.3
Jan. 1, 1933	65.1	Jan. 1, 1938	61.0	May 1	56.9
May 1	65.0	Feb. 1	61.5	Jan. 15, 1944	55.9
Jan. 1, 1934	64.9	Mar. 1	61.0	May 1	54.6
Mar. 20	65.0	May 1	60.7	June 1	54.2
May 1	63.9	Jan. 1, 1939	59.2	Jan. 14, 1945	56.0
Jan. 13, 1935	57.8	Feb. 1	59.5	June 23, 1946	60.91
May 1	58.2	May 1	59.7	Oct. 25	56.69
Dec. 1	58.8	Nov. 1	59.8	Dec. 20	58.90

4402. Roosevelt Irrigation District. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 1 N., R. 3 W., 20 feet south of road, 0.5 mile from north-south section lines, and 1.5 miles north of Buckeye. Used drilled irrigation well, diameter 20 inches, depth 206 feet. Equipped with turbine pump and electric motor. Measuring point, bottom of notch, north side, at land-surface datum and 923.8 feet above mean sea level. All measurements prior to 1946 made by Roosevelt Irrigation District.

Water level, in feet below land-surface datum, 1937-41, 1944-46

Date	Water level	Date	Water level	Date	Water level
May 1937	75.0	Nov. 1, 1939	69.8	June 1, 1944	60.2
Nov. 1	70.5	Feb. 3, 1940	69.6	Jan. 14, 1945	65.0
Dec. 1	69.8	Jan. 13, 1941	70.0	Feb. 15, 1946	64.89
Jan. 1, 1938	69.1	Feb. 10	70.0	Apr. 5	64.67
Feb. 1	69.3	Mar. 26	70.2	June 10	65.63
Mar. 1	69.0	Nov. 15	68.5	Oct. 25	64.48
Jan. 1, 1939	68.2	Jan. 15, 1944	64.5	Dec. 27	64.50
Feb. 1	68.5				

4616. Palmer. NE $\frac{1}{4}$ sec. 15, T. 6 N., R. 4 W., at Rose Ranch headquarters, 20 feet northwest of rock masonry tank, 15 feet square by 5 feet high, 2.5 miles west and 0.75 mile north of Morristown. Used stock well, dug 68 feet, with diameter 5 feet, and drilled 16 feet. Equipped with cylinder pump and gasoline engine. Measuring point, top of 2 by 6 cover, 2.0 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 4, 40.03; July 24, 45.36; Oct. 17, 47.74; Dec. 30, 50.45.

4665. Lawrence Narramore. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 4 N., R. 4 W., north side of tank tower, 100 feet northeast of Wagner tanks (large dirt tank), 250 feet south of green frame house, 1.5 miles north and 14 miles west of Beardsley. Used drilled stock well, diameter 6 inches. Equipped with cylinder pump and gasoline engine. Measuring point, top of concrete base, 1.2 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 4, 316.8; July 24, 316.7.

4711. Roosevelt Irrigation District. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 31, T. 1 N., R. 4 W., 20 feet north of road, 0.25 mile east of intersection, 0.5 mile north and 6.75 miles west of Buckeye. Used drilled irrigation well, diameter 20 inches, depth 250 feet. Equipped with turbine pump and electric motor. Measuring point, south edge of pump base, at land-surface datum and 919.7 feet above mean sea level. All measurements through Jan. 1, 1946, made by Roosevelt Irrigation District.

Water level, in feet below land-surface datum, 1937-41, 1944-46

Date	Water level	Date	Water level	Date	Water level
July 10, 1937	60.0	Jan. 1, 1939	74.0	Mar. 26, 1941	72.2
Nov. 1	75.8	Feb. 1	77.5	Nov. 15	67.0
Dec. 1	75.5	Nov. 1	72.8	Jan. 15, 1944	67.1
Jan. 1, 1938	75.7	Feb. 3, 1940	73.5	Jan. 14, 1945	65.0
Feb. 1	76.0	Jan. 13, 1941	71.4	Jan. 1, 1946	63.5
Mar. 1	76.8	Feb. 10	72.3	Dec. 23	59.66

4712. Roosevelt Irrigation District. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 34, T. 1 N., R. 4 W., 15 feet north of road, 0.5 mile north and 3.5 miles west of Buckeye. Used drilled irrigation well, diameter 20 inches, depth 212 feet. Equipped with turbine pump and electric motor. Measuring point, bottom edge of notch, east side, 0.7 foot above land-surface datum and 903.0 feet above mean sea level. All measurements prior to 1946 made by Roosevelt Irrigation District.

Water level, in feet below land-surface datum, 1928-31, 1934-41, 1944-46

Date	Water level	Date	Water level	Date	Water level
Apr. 30, 1928	65.0	Feb. 15, 1936	56.0	Feb. 1, 1938	55.4
Jan. 31, 1929	65.0	Nov. 1	56.1	Mar. 1	55.0
Nov. 12	68.0	Dec. 1	55.6	Jan. 1, 1939	54.2
Mar. 5, 1930	66.2	Jan. 1, 1937	55.5	Feb. 1	54.4
Jan. 15, 1931	66.5	Feb. 1	55.6	Nov. 1	55.5
Mar. 20, 1934	60.6	Mar. 1	56.0	Feb. 3, 1940	54.9
Jan. 13, 1935	53.3	Nov. 1	55.0	Jan. 13, 1941	54.7
Dec. 1	57.3	Dec. 1	54.5	Feb. 10	56.0
Jan. 11, 1936	57.5	Jan. 1, 1938	55.1	Nov. 15	53.0

4712--Continued.

Water level, in feet below land-surface datum, 1928-31, 1934-41, 1944-46

Date	Water level	Date	Water level	Date	Water level
Jan. 15, 1944	53.7	Feb. 15, 1946	48.45	Oct. 25, 1946	47.85
June 1	50.0	Apr. 8	48.31	Dec. 27	48.76
Jan. 14, 1945	49.0	June 10	50.25		

4713. D. E. Accomazzo. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 16, T. 1 N., R. 4 W., at end of trail along north line of section, 0.75 mile east of north-south road along west line of section, 4.25 miles west and 4.5 miles north of Buckeye. Unused drilled well, diameter 20 inches, depth 175.7 feet. Measuring point, top of casing, 5.8 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Feb. 28, 167.26; Apr. 8, 167.25; Oct. 25, 166.9.

4714. Ben Youngker. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 19, T. 1 N., R. 4 W., 0.1 mile west of road along east side of section, on north line of section, 6.1 miles west and 3.5 miles north of Buckeye. Used drilled irrigation well, diameter 16 inches, depth 370 feet. Equipped with turbine pump and electric motor. Measuring point, top of casing, 0.2 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Feb. 28, 56.95; Apr. 8, 56.81; Oct. 26, 57.47; Dec. 20, 57.70.

4715. Owner unknown. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T. 1 N., R. 4 W., about 100 feet southwest of section center, 2.0 miles north and 1.5 miles west of Buckeye. Unused drilled irrigation well, diameter 16 inches, depth 83 feet. Measuring point, top of casing, 2.7 feet above land-surface datum.

Water level, in feet below land-surface datum, 1946				
Feb. 15	68.38	June 23	69.91	68.93
Apr. 8	69.10	Oct. 25	67.87	Dec. 20

4761. Blake. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 17, T. 1 S., R. 4 W., 5 feet east of tank tower, about 150 feet east of house, east side of road, 1 mile west and 0.5 mile south of Palo Verde. Unused drilled well, diameter 4 inches, depth 90 feet. Measuring point, top of casing, east side, 0.3 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 11, 13.37; June 13, 15.18; Oct. 25, 5.75.

4762. George G. Sevey. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 11, T. 1 S., R. 4 W., about 100 feet south of house, south side of road, 0.1 mile west of intersection, 3 miles east and 0.5 mile north of Palo Verde. Used drilled domestic well, diameter 4 inches, depth 85 feet. Equipped with jet centrifugal pump and electric motor. Measuring point, top of concrete base, 0.3 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 11, 4.54; Oct. 25, 4.46.

5350 (*1028, p. 38). Owner unknown. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 13, T. 5 S., R. 5 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 31.63; May 27, 32.24; Sept. 6, 32.41; Dec. 3, 30.80.

5456. H. A. Kreager. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T. 2 S., R. 5 W., 100 feet south of house, 0.25 mile east of U. S. Highway 80, 4.25 miles south and west of Arlington. Used drilled domestic well, diameter 4 inches, depth 98 feet. Equipped with cylinder pump and electric motor. Measuring point, bottom of notch south side, 0.7 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 6, 19.38; June 12, 22.1; Oct. 25, 21.11; Dec. 27, 20.94.

5457. Bill Jagow. NE $\frac{1}{4}$ sec. 20, T. 2 S., R. 5 W., beneath windmill tower, 300 feet northeast of U. S. Highway 80, 6.35 miles from Arlington toward Gillespie Dam. Used drilled stock well, diameter 6 inches, depth 102 feet. Equipped with jet pump and electric motor. Measuring point, top of casing, 1.5 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 7, 24.06; June 12, 24.35; Oct. 25, 25.92; Dec. 20, 26.33.

5502 (*1028, p. 38). Gillespie Land & Irrigation Co. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 36, T. 2 S., R. 5 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 49.15; May 27, 54.92; Sept. 6, 59.37; Dec. 3, 56.29.

5506. Charles Yokum. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 1, T. 1 S., R. 5 W., beneath timber windmill tower, about 200 feet south of road, 0.13 mile west of intersection, 0.5 mile north and 7.1 miles west of Buckeye. Used drilled stock well, diameter 6 inches, depth 185 feet. Equipped with cylinder pump, windmill and gasoline engine. Measuring point, top of casing, at land-surface datum.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 7	68.02	June 12	67.64	Dec. 20	62.87
Apr. 8	67.76	Oct. 25	62.77		

5507. Owner unknown. NE $\frac{1}{4}$ sec. 11, T. 1 S., R. 5 W., east side of tank tower, 50 feet northeast of house, 300 feet west of west bank of Hassayampa River, 0.75 mile north of Hassayampa. Used dug domestic well, diameter 3 feet, depth 44 feet. Equipped with cylinder pump and windmill. Measuring point, top of 2 by 4, south side, 3.5 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 21, 27.95; June 12, 28.00; Oct. 25, 26.80; Dec. 20, 27.95.

5606. Wheeler. SE $\frac{1}{4}$ sec. 4, T. 1 N., R. 5 W., beneath timber windmill tower, north side of concrete and stone water tank, 150 feet east of abandoned house, 0.5 mile west of Hassayampa River, about 2.0 miles south of Tonapah Road, and 2.0 miles west and 7.5 miles north of Hassayampa. Used dug stock well, diameter 4 feet. Equipped with cylinder pump and windmill. Measuring point, top of concrete curbing, 1.7 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Apr. 8, 62.40; June 12, 63.71.

5607. Spencer Wilson. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 22, T. 1 N., R. 5 W., north side of large galvanized water tank and stock watering trough, 0.55 mile from west bank of Hassayampa River, southwest along Roosevelt Irrigation District canal. Used drilled stock well, diameter 20 inches, depth 145 feet. Equipped with centrifugal pump and gasoline engine. Originally drilled for irrigation use by Roosevelt Irrigation District. Measuring point, top of casing, 0.5 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Feb. 7, 5.87; Apr. 8, 5.97; June 12, 6.37; Oct. 26, 5.71.

5731. Carl Arnold. NE $\frac{1}{4}$ SE $\frac{1}{4}$ 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 4 feet, depth 102 feet. Measuring point, top of concrete surface, at land-surface datum. Water level, in feet below land-surface datum, 1946: Apr. 2, 97.83.

5921. Owner unknown. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 20, T. 2 N., R. 6 W., 50 feet north of abandoned adobe house, north side of road, 1 mile south and 1.5 miles west of Wintersburg. Unused drilled well, diameter 4 inches. Equipped with cylinder pump and windmill. Measuring point, top of casing, 0.3 foot above land-surface datum. Water level, in feet below land-surface datum, 1946: May 2, 89.03.

5971. Mitchell. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 16, T. 1 N., R. 6 W., beneath windmill tower, 50 feet west of abandoned store building, southwest corner of intersection at Wintersburg. Unused drilled well, diameter 10 inches, depth 119 feet. Measuring point, top of cement base, 0.3 foot above land-surface datum. Water level, in feet below land-surface datum, 1946: May 2, 85.34.

5972. Owner unknown. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 22, T. 1 N., R. 6 W., 25 feet west of abandoned white stucco house, beneath windmill tower, 0.8 mile southeast of Wintersburg. Unused drilled well, diameter 12 inches. Equipped with cylinder pump. Measuring point, top of casing, 0.5 foot above land-surface datum. Water level, in feet below land-surface datum, 1946: May 2, 68.98.

6260 (*1028, p. 39). Gillespie Land & Irrigation Co. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 4, T. 6 S., R. 6 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 121.77; Apr. 28, 122.49; Sept. 6, 124.46; Dec. 3, 120.79;

6563. Dr. Ward. SE $\frac{1}{4}$ sec. 32, T. 1 S., R. 7 W., 15 feet northeast of old Surprise well, north side of trail, 0.8 mile northwest of Caliente Road at point 0.7 mile southwest of turnoff to Harqua, 15 miles west and 3.5 miles south of Hassayampa. Unused drilled well, diameter 6 inches, depth 35 feet. Measuring point, top of casing, 1.0 foot above land-surface datum. Water level, in feet below land-surface datum, 1946: Apr. 12, 29.94.

6581. Owner unknown. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 26, T. 2 N., R. 7 W., 100 feet west of house, south side of road, at west end of Tonapah. Unused drilled well, diameter 10 inches, depth 162 feet. Measuring point, top of concrete base, north side, 0.2 foot above land-surface datum. Water level, in feet below land-surface datum, 1946: May 2, 139.43.

6733. Roy Davis. NE $\frac{1}{4}$ sec. 32, T. 1 S. R. 8 W., beneath windmill tower, 2 miles south and 1.25 miles west of Volcanic school, 21.25 miles west and 3.25 miles south of Hassayampa. Used drilled stock well, diameter 6 inches, depth 88 feet. Equipped with cylinder pump and windmill. Measuring point, top of casing, 0.7 foot above land-surface datum. Water level, in feet below land-surface datum, 1946: Apr. 12, 67.00.

6751. Owner unknown. Dixie Mine well, in NE $\frac{1}{4}$ sec. 1, T. 2 S., R. 8 W., about 300 feet south of Caliente Road, west bank of wash, 3.6 miles southwest of turnoff to Harqua, 17 miles west and 4.0 miles south of Hassayampa. Used dug public-supply well, diameter 4 feet. Equipped with cylinder-type hand pump. Measuring point, top of concrete base, 1.4 feet above land-surface datum. Water level, in feet below land-surface datum, 1946: Apr. 12, 34.96.

7201. Moser. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 31, T. 3 N., R. 9 W., 20 feet north of abandoned adobe house, 100 feet north of Buckeye-Salome highway, 34 miles northwest of Hassayampa along Buckeye-Salome highway. Unused dug well, diameter 4 feet. Equipped with bucket and hand windlass. Measuring point, top of wood curb, 3.0 feet above land-surface datum. Water level, in feet below land-surface datum, 1946: Mar. 27, 326.61.

7241. R. E. Miller and Hodgeman. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 34, T. 7 N., R. 9 W., about 200 feet north of house, 0.5 mile east of graded road, 2.25 miles south and 0.5 mile west of Aguila. Unused drilled well, diameter 20 inches, depth 400+ feet. Measuring point, top of oil barrel, 1.4 feet above land-surface datum. Water level, in feet below land-surface datum, 1946: Mar. 27, 355.1.

NAVAJO COUNTY

By H. M. Babcock

An investigation of the ground-water resources of the Holbrook area, Navajo County, was made in 1946. Water-level measurements have been made in selected observation wells in the county since 1944. A total of 126 measurements in 18 wells in the county was made in 1946.

The main source of ground water in the county is from the Coconino sandstone. Discharge of ground water from the Coconino sandstone takes place through springs and seeps, and from flowing and nonflowing wells. The main area of discharge is in the vicinity of Holbrook. In 1946 the discharge from 24 flowing and 12 nonflowing wells was 4,300 acre-feet of water. An additional, undetermined amount of water was discharged through springs and seeps.

Water levels in wells in the Coconino sandstone fluctuate very little. The water level in wells that penetrate the alluvial fill of the rivers and washes fluctuates with the rise and fall of the surface flow of the streams.

Well descriptions and water-level measurements

2853. Simon Ranch. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 27, T. 19 N., R. 15 E., about 0.2 mile east of side road, 1.0 mile north of State Highway 65, 3.5 miles southwest of Winslow. Drilled well, diameter 6 inches, depth 280 feet. Measuring point, top of casing, south side, 1.05 feet above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 14, 1944	162.17	Sept. 28, 1945	164.04	Aug. 9, 1946	164.15
Aug. 11	164.14	July 1, 1946	164.16	Oct. 2	163.88
June 4, 1945	164.10				

5452. A. Smith. In Joseph City, on small knoll, one block north of store. Unused drilled well, diameter 8 inches, depth 325 feet. Measuring point, top of casing, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
Aug. 12, 1944	42.04	Sept. 27, 1945	41.79	Aug. 5, 1946	41.88
June 4, 1945	41.60	June 12, 1946	41.64	Oct. 2	41.48

5652. Ben Hunt. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 30, T. 18 N., R. 20 E., east of barn, 0.5 mile south of U. S. Highway 66, 5.9 miles west of Holbrook. Drilled irrigation well, diameter 10 inches, depth 100 feet. Measuring point, hole in pump base, 0.5 foot above land-surface datum. Equipped with turbine pump and electric motor.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 12, 1944	38.67	Sept. 27, 1945	39.20	Aug. 8, 1946	38.70
Aug. 11	39.20	June 14, 1946	38.64	Oct. 2	40.11
June 1, 1945	38.55				

5653. Ben Hunt. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 30, T. 18 N., R. 20 E., west of house, 0.5 mile south of U. S. Highway 66, 5.9 miles west of Holbrook. Drilled irrigation well, diameter 12 inches, depth 160 feet. Measuring point, hole in pump base, south side, 0.2 foot above land-surface datum. Equipped with turbine pump and electric motor.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 12, 1944	21.72	Sept. 27, 1945	22.35	Aug. 6, 1946	21.82
Aug. 11	22.37	June 14, 1946	21.84	Oct. 2	21.60
June 1, 1945	21.72				

5654. Ben Hunt. SE $\frac{1}{4}$ sec. 32, T. 18 N., R. 20 E., about 200 feet north of U. S. Highway 66, 4.3 miles west of Holbrook. Drilled stock well, diameter 8 inches, depth unknown. Measuring point, top of casing, west side, 3.4 feet above land-surface datum. Equipped with windmill and cylinder pump.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 12, 1944	37.03	Sept. 27, 1945	37.13	Aug. 6, 1946	36.95
Aug. 11	37.44	June 14, 1946	36.92	Oct. 2	37.29
June 1, 1945	36.87				

5655. John Mocko. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 10, T. 17 N., R. 21 E., about 500 feet north of U. S. Highway 260, 3.1 miles east of Holbrook. Unused drilled well, diameter 6 inches, depth 160 feet. Measuring point, top of casing, 1.0 foot above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 9, 1944	51.16	Sept. 26, 1945	51.24	Aug. 5, 1946	51.32
Aug. 10	51.41	May 31, 1946	51.15	Oct. 1	50.89
May 31, 1945	51.08	June 20	51.33		

7451. E. B. Neuman. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 1, T. 17 N., R. 20 E., in flood plain of Little Colorado River, south of railroad track, 1.0 mile west of Holbrook. Unused drilled stock well, diameter 8 inches, depth 65 feet. Measuring point, top of casing, west side, 4.0 feet above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 24, 1944	1.86	Sept. 27, 1945	2.43	Aug. 6, 1946	2.41
Aug. 11	2.19	June 25, 1946	2.34	Oct. 2	1.67
June 1, 1945	2.13				

7470. R. E. Whiting. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 10, T. 17 N., R. 20 E., about 300 feet southeast of swimming pool, on south side of Little Colorado River, 3.9 miles west of Holbrook. Drilled stock well, diameter 6 inches, depth unknown. Measuring point, top of casing, south side, 1.6 feet above land-surface datum. Equipped with windmill and cylinder pump.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 10, 1944	29.26	Sept. 26, 1945	29.31	Aug. 5, 1946	29.31
Aug. 10	29.44	June 25, 1946	29.66	Oct. 2	29.54
May 31, 1945	29.46				

7471. R. E. Whiting. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 10, T. 17 N., R. 20 E., in dug pit, 100 feet south of road, 3.9 miles west of Holbrook. Drilled irrigation well, diameter 18 inches, depth unknown. Measuring point, top of pipe clamp, 0.3 foot above bottom of pit, 12 feet below land-surface datum. Equipped with centrifugal pump and electric motor.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 10, 1944	17.68	Sept. 26, 1945	17.70	July 23, 1946	17.64
Aug. 10	17.87	May 24, 1946	(a)	Aug. 5	17.75
May 31, 1945	(a)	June 25	(a)	Oct. 2	17.60

a Pumping.

7478. Geo. McLaws. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 10, T. 17 N., R. 20 E., on east side of trail, 0.3 mile south of main gravel road, 3.9 miles west of Holbrook. Unused drilled irrigation well, diameter 12 inches, depth 205 feet. Measuring point, top of casing, south side, 1.75 feet above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 10, 1944	50.62	Sept. 26, 1945	50.74	Aug. 5, 1946	50.74
Aug. 10	50.86	May 24, 1946	50.79	Oct. 2	50.49
May 31, 1945	50.75	June 25	50.95		

7489. R. Henderson. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 11, T. 17 N., R. 20 E., about 200 feet south of gravel road, 2.4 miles west of U. S. Highway 260, 3.4 miles west of Holbrook. Drilled stock well, diameter and depth unknown. Measuring point, top of casing, west side, 0.6 foot above land-surface datum. Equipped with windmill.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 10, 1944	10.11	Sept. 26, 1945	13.46	Aug. 5, 1946	13.47
Aug. 10	13.51	May 24, 1946	13.49	Oct. 2	13.17
May 31, 1945	13.75	June 25	13.61		

7493. F. J. McLaws. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 12, T. 17 N., R. 20 E., about 0.2 mile south of house, 0.5 mile south of road, 1.9 miles southwest of Holbrook. Drilled well, diameter 12 inches, depth unknown. Measuring point, top of concrete pump base, 0.8 foot above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 10, 1944	54.20	Sept. 27, 1945	54.29	Aug. 5, 1946	54.47
Aug. 10	54.54	June 25, 1946	54.51	Oct. 2	(a)
May 31, 1945	54.24				

a Pumping.

7651. Ambrosia Armijo. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 6, T. 17 N., R. 21 E., about 100 feet north of trail, 0.2 mile east of U. S. Highway 260, 0.3 mile southeast of bridge over Little Colorado River. Drilled domestic well, diameter 6 inches, depth 300 feet. Measuring point, hole in pump base, west side, 1.5 feet above land-surface datum. Equipped with turbine pump and electric motor.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 10, 1944	13.20	Sept. 27, 1945	13.42	Aug. 5, 1946	13.31
Aug. 10	13.51	June 10, 1946	13.55	Oct. 2	12.90
May 31, 1945	13.20				

7652. Ambrosia Armijo. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 6, T. 17 N., R. 21 E., about 400 feet north of trail, 0.2 mile east of U. S. Highway 260, 0.3 mile southeast of bridge over Little Colorado River. Unused dug well, diameter 48 inches, depth 12 feet. Measuring point, top of wood casing, west side, 0.3 foot above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 10, 1944	7.85	Sept. 27, 1945	8.05	Aug. 5, 1946	8.40
Aug. 10	7.63	June 10, 1946	8.30	Sept. 2	8.38
May 31, 1945	7.80				

7653. State of Arizona. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 7, T. 17 N., R. 21 E., between junction of State Highway 77 and U. S. Highway 260, 50 feet east of State Highway 77, 0.7 mile south of Holbrook. Unused well, diameter 10 inches, depth 110 feet. Measuring point, top of casing, 0.3 foot above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 9, 1944	39.70	Sept. 21, 1945	39.92	June 10, 1946	39.98
Aug. 10	40.10	May 24, 1946	39.81	Aug. 5	39.91
May 31, 1945	39.95				

7654. Roy Richards. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 7, T. 17 N., R. 21 E., south of house, 300 feet west of State Highway 77, 0.9 mile south of Holbrook. Drilled domestic well, diameter 6 inches, depth unknown. Measuring point, hole in base plate, west side, at land-surface datum. Equipped with pump and electric motor.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
June 9, 1944	57.10	Sept. 27, 1945	56.93	Aug. 5, 1946	56.80
Aug. 10	57.03	May 24, 1946	56.82	Oct. 2	56.77
May 31, 1945	56.80	June 11	56.93		

10500. McNeil. In small valley, 0.4 mile north of U. S. Highway 60, 1.9 miles west of Showlow. Unused drilled well, diameter 8 inches, depth unknown. Measuring point, top of casing, 0.8 foot above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
Aug. 5, 1944	54.21	Sept. 25, 1945	56.32	Oct. 12, 1946	a 57.1
May 29, 1945	53.63	May 22, 1946	a 57.1		

a Dry.

11000. U. S. Indian Service. Unsurveyed land. In shed behind house, at Forestdale Trading Post, 9 miles south of Showlow. Unused driven sand point, diameter 2 inches, depth unknown. Measuring point, top of casing, 1.3 feet above land-surface datum.

Water level, in feet below land-surface datum, 1944-46

Date	Water level	Date	Water level	Date	Water level
Aug. 5, 1944	12.00	Sept. 29, 1945	14.95	Oct. 23, 1946	9.12
Aug. 29, 1945	8.13	May 22, 1946	13.72		

PIMA COUNTY

By R. L. Cushman

Routine measurement of water levels in wells and collection of information about the quantity of water pumped from wells were done in 1946 in Pima County in cooperation with the Arizona State Land Department.

A report entitled "Ground-water resources of the Santa Cruz River Basin, Arizona" was released in 1943, and, at present, an addendum to this report is in preparation summarizing information obtained since the release of the earlier report. This addendum will be released in 1947.

A total of 306 water-level measurements were made in 48 wells in Pima County during 1946. Figure 6 shows the water-level fluctuations in five selected wells, the total pumpage in Pima County by months, and the precipitation in Tucson by months.

The water-level fluctuations in wells 1337 and 4379, as shown by the graphs in figure 6, are typical of wells penetrating heavily pumped aquifers. The intermittent operation of pumped wells nearby caused irregular fluctuations of the water level, but the concerted pumping in the areas produced the over-all downward trend in water levels between March and June. The rising water levels after July and August were the result of decreased rates of pumping and increased recharge resulting from the rains in July and August. Wells 2823 and 8686 are in areas of more moderate pumping, and their water-level fluctuations are not as great as the fluctuations in wells 1337 and 4379. Well 4156 is away from the immediate effects of pumping, and the water level in this well follows the downward trend of the regional water level as water moves from storage in the vicinity of this well to recharge aquifers in the pumped areas.

The following table summarizes the amounts of water pumped from wells in Pima County each year since 1941. The decrease in the amount pumped in 1946 as compared with 1945 was, in part, caused by increased precipitation

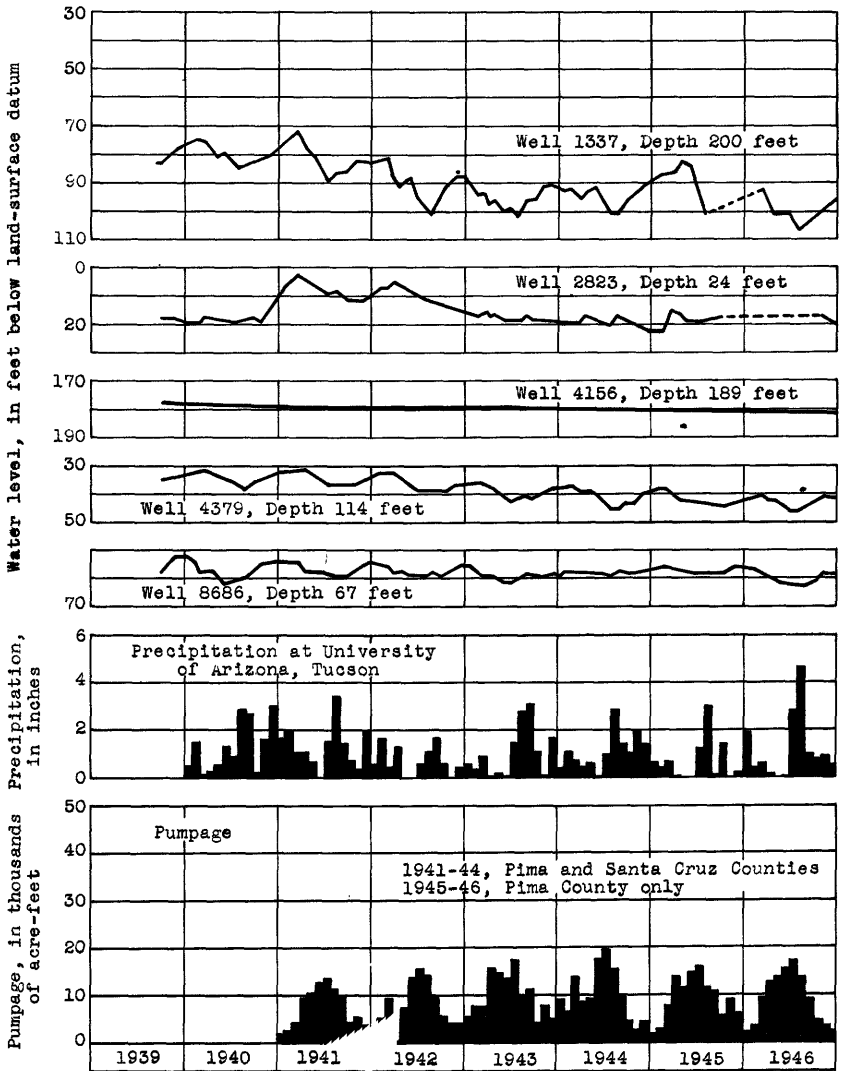


Figure 6.--Graphs showing fluctuations of water level in observation wells in the Santa Cruz Valley, Pima County, Arizona.

Year	Acre-feet
1941	68,500
1942	85,500
1943	100,000
1944	106,000
1945	111,000
1946	108,000

during 1946. The total precipitation was 13.67 inches during 1946 compared with 7.63 inches during 1945. Several large irrigation wells were idle during part of the 1946 pumping season because the owners were changing the pump power from liquid fuel to electricity and this part-time idleness also reduced the pumpage in 1946.

Well descriptions and water-level measurements

454 (*949, p. 39; *991, p. 55; 1021, p. 47; 1028, p. 41). Cortaro Farms. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 11, T. 11 S., R. 10 E. (published erroneously in previous water-supply papers as SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 11, T. 11 S., R. 11 E.)

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 8	153.85	July 24	161.42	Oct. 11	164.37	Dec. 26	155.12
Apr. 25	157.50	Aug. 28	169.68	Dec. 2	159.66		

457 (*941, p. 57; *949, p. 39; *991, p. 55; 1021, p. 47; 1028, p. 41). T. J. Smith. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 22, T. 11 S., R. 10 E. Water levels, in feet below land-surface datum, 1946: Mar. 8, 145.75; May 8, pumping; July 25, pumping.

460 (*941, p. 57; *949, p. 39; *991, p. 55; 1021, p. 47; 1028, p. 41). W. E. Anway. NW $\frac{1}{4}$ sec. 27, T. 11 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 8	144.34	July 25	145.46	Dec. 4	145.20
May 8	(a)	Oct. 22	147.07		

a Pumping.

461 (*941, p. 57; *949, p. 39; *991, p. 55; 1021, p. 47; 1028, p. 41). T. V. Valenzuela. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 32, T. 11 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Jan. 3	159.05	May 8	161.42	Oct. 22	167.24
Mar. 8	162.43	July 25	170.90	Dec. 4	166.96

463 (*941, p. 57; *949, p. 39; *991, p. 55; 1021, p. 47; 1028, p. 41). Bud Parker. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 36, T. 11 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	(a)	May 8	(a)	Aug. 22	169.89	Dec. 4	170.16
Mar. 8	169.81	July 25	(a)	Oct. 22	170.13		

a Pumping.

535 (*911, p. 85; 941, p. 58; *949, p. 39; *991, p. 55; 1021, p. 47; 1028, p. 41). Cortaro Farms. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 30, T. 11 S., R. 11 E.

Water level, in feet below land-surface datum, 1946

Mar. 8	175.51	June 18	177.59	Aug. 28	178.07	Dec. 2	176.78
Apr. 25	177.07	July 24	(a)	Oct. 11	177.57	26	176.69

a Pumping.

1254 (*911, p. 85; *941, p. 58; *949, p. 39; *991, p. 55; 1021, p. 47; 1028, p. 41). Cortaro Farms. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 31, T. 12 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 6	100.52	June 18	103.96	Aug. 28	107.39
Apr. 25	102.98	July 24	104.90		

1337 (*911, p. 85; 941, p. 58; *949, p. 39; *991, p. 55; 1021, p. 47; 1028, p. 41). Cortaro Farms. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 16, T. 12 S., R. 12 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 6	92.06	June 18	102.19	Aug. 28	109.45	Dec. 2	96.08
Apr. 25	102.71	July 24	106.93	Oct. 11	100.90	26	95.48

1367 (*911, p. 86; 941, p. 58; *949, p. 39; *991, p. 56; 1021, p. 47; 1028, p. 41). Grady Adams. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 28, T. 12 S., R. 12 E. (published erroneously in previous water-supply papers as NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, T. 12 S., R. 12 E.).

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 6	131.56	June 18	135.73	Aug. 28	140.63	Dec. 2	136.77
Apr. 25	134.84	July 24	138.17	Oct. 11	140.50	26	136.19

1428 (*1028, p. 42). J. E. Glover. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 12 S., R. 11 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 3	186.63	May 8	187.60	Oct. 22	188.32
Mar. 9	187.01	July 25	190.54	Dec. 4	188.45

1430 (*941, p. 58; *949, p. 40; *991, p. 56; 1021, p. 48; 1028, p. 42). J. E. Glover. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 18, T. 12 S., R. 11 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 4	194.28	May 8	195.36	Oct. 21	195.07
Mar. 9	194.26	July 25	200.24	Dec. 4	195.13

1432 (*941, p. 59; *949, p. 40; *991, p. 56; 1021, p. 48; 1028, p. 42). P. Johansen. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 29, T. 12 S., R. 11 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 4	231.68	May 6	(a)	Oct. 21	244.65
Mar. 9	230.48	Aug. 22	243.12		

a Pumping.

1435 (*941, p. 59; *949, p. 40; *991, p. 56; 1021, p. 48; 1028, p. 42). S. B. Niles. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 34, T. 12 S., R. 11 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 4	(a)	Mar. 7	301.48	Aug. 22	(a)	Dec. 3	305.40
10	(a)	May 6	301.12	Oct. 21	302.75		

a Pumping.

1503 (*941, p. 59; *949, p. 40; *991, p. 56; 1021, p. 48; 1028, p. 42). V. Valenzuela. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 9, T. 12 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 3	164.90	May 8	164.96	Dec. 4	164.93
Mar. 8	163.72	Oct. 22	160.57		

1505 (*1028, p. 42). Wirt Bowman. Formerly owned by Alonzo Stephens. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 20, T. 12 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 3	185.97	May 8	186.20	Oct. 22	185.46
Mar. 8	186.00	Aug. 22	186.22	Dec. 4	186.32

1506 (*941, p. 59; *949, p. 40; *991, p. 56; 1021, p. 48; 1028, p. 42). Harry Alexander. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 26, T. 12 S., R. 10 E. Water levels, in feet below land-surface datum, 1946: Mar. 9, 195.52; Oct. 21, 196.46; Dec. 4, 196.22.

2504 (*1028, p. 42). Wirt Bowman. Formerly owned by R. R. Manville. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 10, T. 13 S., R. 10 E. Water levels, in feet below land-surface datum, 1946: Jan. 3, 212.39; Mar. 8, 214.85. Measurements discontinued after May 8, 1946.

2651 (*1028, p. 42). Pima County. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 7, T. 13 S., R. 12 E. Corrected description: At rear of adobe ruin at road forks in Kinney Road, 4.25 miles south of a cross road that is 0.75 mile west of Silver Bell Road at a point 12 miles northwest of Tucson.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 4	28.97	May 6	31.04	Oct. 21	30.46
Mar. 8	29.44	July 25	31.87	Dec. 3	31.05

2708 (*911, p. 87; 941, p. 59; *949, p. 40; *991, p. 56; 1021, p. 48; 1028, p. 42). Cortaro Farms. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 7, T. 13 S., R. 13 E. Measurements discontinued; well destroyed.

2731 (*911, p. 88; 941, p. 60; *949, p. 40; *991, p. 56; 1021, p. 48; 1028, p. 42). Ralph Wetmore. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24, T. 13 S., R. 13 E. Water levels, in feet below land-surface datum, 1946: Jan. 2, 33.46; Mar. 6, 32.64; May 9, pumping; June 18, pumping.

2738 (*911, p. 88; 941, p. 60; *949, p. 40; *991, p. 56; 1021, p. 48; 1028, p. 43). Bruce Knapp. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 28, T. 13 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 6	37.69	June 18	(a)	Aug. 28	46.30	Nov. 22	43.92
Apr. 25	42.59	July 24	40.73	Oct. 11	(a)	Dec. 26	42.44

a Pumping.

2808 (*911, p. 88; 941, p. 60; *949, p. 40; *991, p. 56; 1021, p. 48; 1028, p. 43). Courtright Stables. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 25, T. 13 S., R. 14 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	11.60	June 18	13.50	Aug. 28	10.08	Dec. 2	9.89
Mar. 6	11.27	July 23	14.16	Oct. 11	8.67	23	10.26
May 9	12.15						

2823 (*911, p. 89; 941, p. 61; *949, p. 41; *991, p. 56; 1021, p. 48; 1028, p. 43). Southern Arizona Polo Association. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 28, T. 13 S., R. 14 E. No measurements made in 1946.

2903 (*911, p. 89; *941, p. 61; *949, p. 41; *991, p. 56; 1021, p. 48; 1028, p. 43). E. L. Urquides. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T. 13 S., R. 15 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	13.07	June 18	12.86	Aug. 28	13.84	Dec. 2	12.53
Mar. 6	12.53	July 23	13.80	Oct. 11	13.25	23	12.42
May 9	12.27						

2910 (*911, p. 90; 941, p. 61; *949, p. 41; *991, p. 57; 1021, p. 48; 1028, p. 43). V. C. Crouch. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 36, T. 13 S., R. 15 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	36.42	June 18	33.00	Aug. 28	35.09	Dec. 2	35.20
Mar. 6	36.27	July 23	32.43	Oct. 11	35.91	23	34.95
May 9	31.99						

4156 (*911, p. 90; 941, p. 62; *949, p. 41; *991, p. 57; 1021, p. 48; 1028, p. 43). Charles Reynard. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 7, T. 14 S., R. 15 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	181.51	Apr. 26	181.65	July 26	181.87	Nov. 1	182.04
Feb. 25	181.62	May 26	181.67	Aug. 29	182.04	27	182.12
Mar. 28	181.64	June 26	181.84	Sept. 27	182.08	Dec. 23	182.13
Apr. 23	181.59						

4375 (*911, p. 91; 941, p. 62; *949, p. 41; *991, p. 57; 1021, p. 48; 1028, p. 43). E. L. Rogers. Formerly owned by Hal Manning. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 34, T. 14 S., R. 15 E. (published erroneously in previous water-supply papers as SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 34, T. 14 S., R. 15 E.).

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 6	(a)	June 17	(a)	Aug. 30	(a)	Dec. 2	43.53
May 8	46.28	July 23	50.41	Oct. 11	45.77	24	43.78

a Pumping.

4379 (*911, p. 91; 941, p. 62; *949, p. 41; *991, p. 57; 1021, p. 49; 1028, p. 43). Hal Manning. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 35, T. 14 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 6	40.61	May 9	43.06	July 23	46.54	Dec. 2	41.15
Apr. 2	42.30	June 17	46.21	Oct. 11	43.20	24	41.46

4450 (*941, p. 62; *949, p. 41; *991, p. 56; 1021, p. 49; 1028, p. 43). Pima County. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 6, T. 14 S., R. 12 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	68.00	May 6	(a)	July 25	72.60	Dec. 3	67.31
Mar. 7	(a)	8	68.95	Oct. 21	(a)		

a Pumping.

4452 (*941, p. 62; *949, p. 41; *991, p. 57; 1021, p. 49; 1028, p. 43). Pima County. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 17, T. 14 S., R. 12 E. Water levels, in feet below land-surface datum, 1946: Jan. 3, 69.26; Mar. 7, 69.62; May 8, 71.86; Oct. 21, 68.98.

4453 (*941, p. 62; *949, p. 41; *991, p. 57; 1021, p. 49; 1028, p. 43). Pima County. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 21, T. 14 S., R. 12 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	57.97	May 6	58.50	Oct. 21	57.67		
Mar. 7	58.18	July 25	58.54	Dec. 3	57.94		

4454 (*1028, p. 43). State of Arizona. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 21, T. 14 S., R. 12 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	63.46	May 6	64.57	Oct. 21	61.38		
Mar. 7	63.62	July 25	65.04	Dec. 3	61.10		

4601 (*941, p. 63; *949, p. 42; *991, p. 57; 1021, p. 49; 1028, p. 44). J. Burrell. Sec. 10, T. 14 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	21.19	May 6	22.54	Oct. 21	22.57		
Mar. 7	21.92	June 18	24.40	Dec. 3	21.30		

4602 (*941, p. 63; *949, p. 42; *991, p. 57; 1021, p. 49; 1028, p. 44). J. Burrell. Sec. 10, T. 14 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 2	14.39	May 6	14.28	Oct. 21	12.54
Mar. 7	12.72	June 18	21.16	Dec. 3	12.90

4604 (*941, p. 63; *949, p. 42; *991, p. 57; 1021, p. 49; 1028, p. 44). Frank R. Rendon. SW $\frac{1}{4}$ sec. 24, T. 14 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 2	(a)	May 6	(a)	Oct. 21	306.50
Mar. 7	306.55	June 18	313.75	Dec. 3	306.84

a Pumping.

6404 (*941, p. 63; *949, p. 42; *991, p. 47; 1021, p. 49; 1028, p. 44). Everett Inscho. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 29, T. 15 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	144.49	May 6	145.26	Aug. 22	144.42	Dec. 3	144.22
Mar. 7	144.60	June 18	144.28	Oct. 21	144.25		

6405 (*941, p. 63; *949, p. 42; *991, p. 57; 1021, p. 49; 1028, p. 44). C. W. Van Camp. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 33, T. 15 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	150.20	May 6	152.17	Aug. 23	149.27	Dec. 3	151.00
Mar. 7	150.48	June 18	155.82	Oct. 21	150.45		

6410 (*941, p. 63; *949, p. 42; *991, p. 57; 1021, p. 49; 1028, p. 44). C. W. Van Camp. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 35, T. 15 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	213.29	May 6	213.33	Aug. 23	213.23	Dec. 3	213.25
Mar. 7	213.35	June 19	213.94	Oct. 21	213.24		

6575 (*911, p. 91; 941, p. 63; *949, p. 42; *991, p. 58; 1021, p. 49; 1028, p. 44). H. C. Barker. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 1, T. 15 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 6	53.55	June 17	a 56.12	Aug. 29	a 64.84	Nov. 22	53.07
May 7	a 55.73	July 23	54.06	Oct. 10	53.84	Dec. 23	52.95

a Pumping.

6582 (*911, p. 91; 941, p. 64; *949, p. 42; *991, p. 58; 1021, p. 49; 1028, p. 44). San Xavier School. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 15, T. 15 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 6	39.91	June 17	41.08	Aug. 30	41.30	Dec. 2	40.37
May 9	40.73	July 23	41.70	Oct. 11	42.28	24	42.27

6593 (*911, p. 92; 941, p. 64; *949, p. 42; *991, p. 58; 1021, p. 49; 1028, p. 44). U. S. Indian Service, San Xavier Reservation. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 22, T. 15 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 6	30.05	June 17	31.39	Aug. 30	31.37	Dec. 2	30.28
May 9	31.69	July 23	31.55	Oct. 11	31.76	24	30.58

6612 (*949, p. 42; *991, p. 58; 1021, p. 49; 1028, p. 44). City of Tucson. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 2, T. 15 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 24	35.06	Apr. 23	36.11	July 26	36.91	Nov. 1	36.66
Feb. 25	35.23	May 26	36.84	Aug. 29	36.66	27	36.16
Mar. 28	35.32	June 26	37.74	Sept. 27	36.81	Dec. 24	36.07

7152 (*911, p. 93; 941, p. 64; *949, p. 42; *991, p. 58; 1021, p. 50; 1028, p. 44). State of Arizona. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 7, T. 16 S., R. 14 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	43.38	June 17	43.91	Aug. 29	(a)	Nov. 22	43.35
May 7	43.95	July 23	43.93	Oct. 10	43.34	Dec. 23	43.00

a Dry.

7166 (*911, p. 93; 941, p. 65; *949, p. 42; *991, p. 58; 1021, p. 50; 1028, p. 44). Lane Farms. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 31, T. 16 S., R. 14 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	49.06	June 17	53.99	Aug. 29	50.44	Nov. 22	47.15
May 7	53.11	July 23	54.26	Oct. 10	46.44	Dec. 23	47.95

8578 (*911, p. 93; 941, p. 65; *949, p. 43; *991, p. 58; 1021, p. 50; 1028, p. 44). Lane Farms. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 13, T. 17 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	63.50	June 17	66.24	Aug. 29	73.64	Nov. 22	66.77
May 7	65.28	July 23	67.56	Oct. 10	67.03	Dec. 23	66.20

8686 (*911, p. 94; 941, p. 65; *949, p. 43; *991, p. 58; 1021, p. 50; 1028, p. 45). Arizona State Highway Department. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 18, T. 17 S., R. 14 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	56.19	June 17	61.66	Aug. 29	60.74	Nov. 22	57.48
Apr. 2	59.56	July 23	62.00	Oct. 10	60.66	Dec. 23	57.58
May 7	60.69						

9230 (*911, p. 95; 941, p. 65; *949, p. 43; *991, p. 58; 1021, p. 50; 1028, p. 45). J. B. Bull. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 1, T. 18 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	50.83	June 17	55.93	Aug. 29	(a)	Nov. 22	51.65
May 7	(a)	July 23	(a)	Oct. 10	52.90	Dec. 23	50.87

a Pumping.

9238 (*911, p. 95; 941, p. 66; *949, p. 43; *991, p. 58; 1021, p. 50; 1028, p. 45). Intercontinental Ranch Co. well E2. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 26, T. 18 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	45.99	July 23	55.48	Oct. 10	48.94	Dec. 23	47.92
May 7	50.02	Aug. 29	56.50	Nov. 22	48.43		

10477 (*911, p. 95; 941, p. 66; *949, p. 43; *991, p. 58; 1021, p. 50; 1028, p. 45). Intercontinental Ranch Co. well W1. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 3, T. 19 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	54.24	June 17	57.21	Aug. 29	58.10	Nov. 22	55.10
May 7	57.98	July 23	58.51	Oct. 10	53.80	Dec. 23	55.07

10483 (*911, p. 96; 941, p. 66; *949, p. 43; *991, p. 58; 1021, p. 50; 1028, p. 45). Gustave Amado. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 19 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	30.92	June 17	33.08	Aug. 29	30.56	Nov. 22	30.83
May 7	31.77	July 23	33.32	Oct. 10	30.36	Dec. 23	31.01

PINAL COUNTY

By R. L. Cushman

A total of 261 water-level measurements was made in 73 wells in Pinal County in 1946, and an inventory was made of the amount of water pumped. Water levels in Pinal County have been measured by the Geological Survey since 1939. The effects of pumping on water levels during the period 1940-46 are discussed in a report that is in preparation. This report, to be released in 1947, will be an addendum to an earlier report entitled "Ground-water resources of the Santa Cruz Basin, Arizona", released in 1943.

Figure 7 shows graphs of water-level fluctuations in five selected wells, the amount of monthly precipitation at Casa Grande Ruins National Monument, and the amount of monthly pumpage in Pinal County. Precipitation was 12.11 inches during 1946, 1.51 inches more than normal. In spite of above-normal precipitation in the area in 1946, pumpage was greater than in previous years, because of new lands being brought into cultivation and because of decreased surface-water supplies for the San Carlos Project.

Well 890 is an unused well, about 3.5 miles northwest of Casa Grande at the edge of an area irrigated primarily with surface water diverted from the Gila River, with a supplemental supply of water pumped from wells. The downward trend of the water level is caused by the pumping, which was increased in 1946 to make up for the scarcity of surface water.

Well 975 is an irrigation well about 1 mile northeast of Casa Grande, in an area irrigated with both surface water and pumped water. The downward trend of the graph of water level is similar to that in well 890, but is complicated by the effects of intermittent pumping from the well.

Well 1532 is an unused well, about 7 miles southwest of Casa Grande in an area irrigated entirely from wells. The water level in this well lowered 8.5 feet during the 1946 pumping season, although the nearest active irrigation well is a mile away. The incomplete recovery of the water level each year shows that the annual pumpage in this area exceeds the annual recharge.

Well 1795 is an irrigation well, about 4.5 miles south of Elcy in an area irrigated entirely from wells. The well has been operated so constantly that few measurements could be made. The graph shows, however, that the water level is lowering from year to year, indicating that the rate of pumping exceeds the rate of recharge.

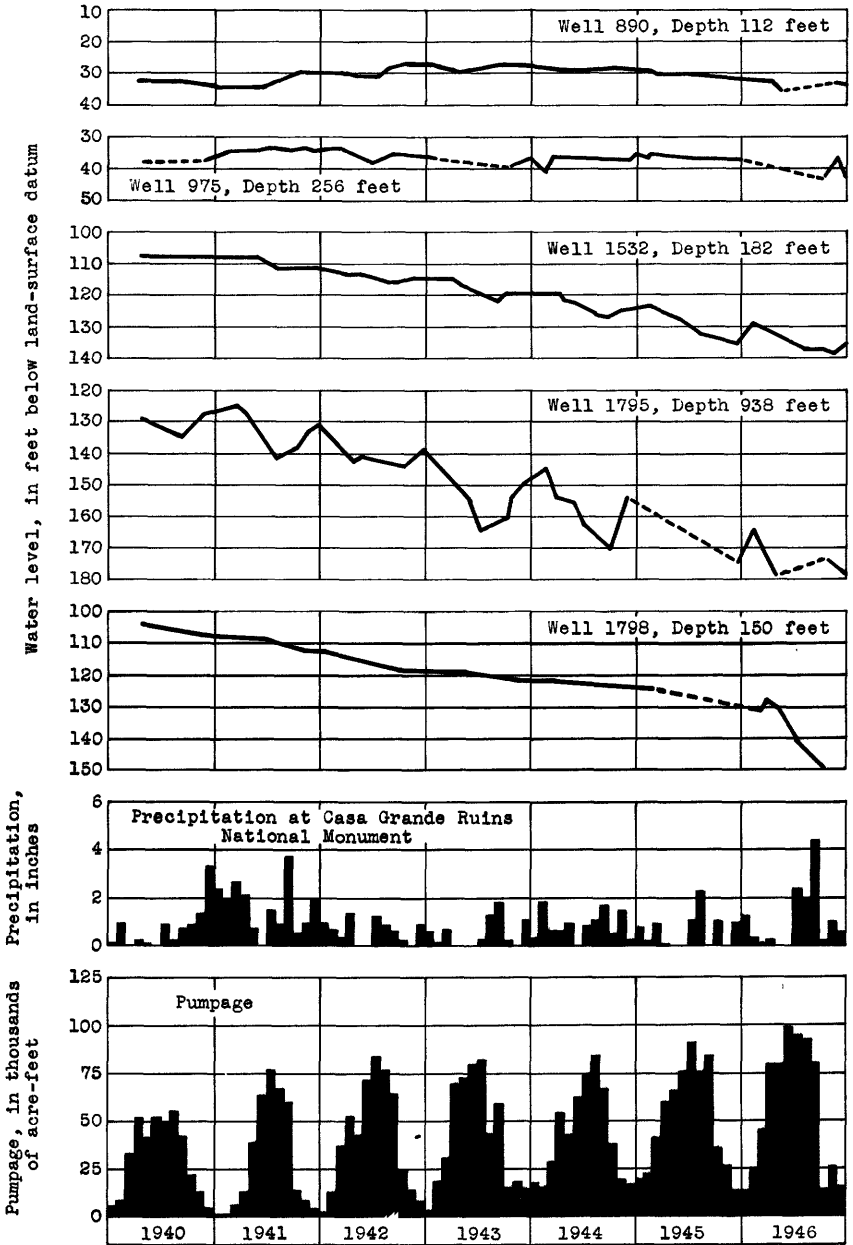


Figure 7.--Graphs showing fluctuations of water level in observation wells in the Casa Grande-Eloy area, Pinal County, Arizona.

Well 1798, an unused well about 6.5 miles southwest of Eloy, is at the western edge of an area that is irrigated entirely from wells. Pumping was greatly increased near this well in 1946, and lowered the water level below the bottom of the well. The well was later abandoned and filled.

The amounts of water pumped from wells in Pinal County each year since 1939 are shown in the following table.

Year	Pumpage, in acre-feet
1940	372,000
1941	351,000
1942	500,000
1943	515,000
1944	530,000
1945	610,000
1946	660,000

The following pages contain records of measurements of water level in wells in Pinal County for 1946. Wells 12 to 71, inclusive, are north of the Gila River in the Queen Creek area of Pinal and Maricopa Counties. The rest of the wells listed are in the Casa Grande-Florence-Maricopa-Eloy areas, south of the Gila River.

Well descriptions and water-level measurements

12 (*941, p. 69; 949, p. 46; *991, p. 62; 1021, p. 55; 1028, p. 48). Mr. Dobson. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 15, T. 1 S., R. 8 E. Measurements discontinued.

22 (*911, p. 81; 941, p. 69; 949, p. 46; *991, p. 62; 1021, p. 55; 1028, p. 49). Hart Mullins. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 35, T. 1 S., R. 10 E. Water levels, in feet below land-surface datum, 1946: Jan. 22, 15.40; Aug. 27, 18.40, nearby irrigation well pumping.

23 (*911, p. 81; 941, p. 69; 949, p. 47; *991, p. 62; 1021, p. 55; 1028, p. 49). Hart Mullins. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 35, T. 1 S., R. 10 E. Water level, in feet below land-surface datum, 1946: Jan. 22, 14.96.

24 (*911, p. 82; 941, p. 69; 949, p. 47; *991, p. 62; 1021, p. 55; 1028, p. 49). Jack Gray. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 35, T. 1 S., R. 10 E. Water level, in feet below land-surface datum, 1946: Jan. 22, 37.37. Measurements discontinued.

25b (*1021, p. 55; 1028, p. 49). Clemens Cattle Co. Unsurveyed territory, approximately SW $\frac{1}{4}$ sec. 32, T. 1 S., R. 11 E. Measurements discontinued.

25d (*1021, p. 55; 1028, p. 49). Francisco Rascon. Unsurveyed territory, approximately SW $\frac{1}{4}$ sec. 28, T. 1 S., R. 11 E. Measurements discontinued.

25g (*1021, p. 56; 1028, p. 49). Agapito Camarena. Unsurveyed territory, approximately NW $\frac{1}{4}$ sec. 33, T. 1 S., R. 11 E. Measurements discontinued.

25i (*1021, p. 56; 1028, p. 49). Magma Railroad. Unsurveyed territory, approximately NE $\frac{1}{4}$ sec. 33, T. 1 S., R. 11 E. Measurements discontinued.

25j (*1021, p. 56; 1028, p. 49). Owner unknown. Unsurveyed territory, approximately NW $\frac{1}{4}$ sec. 34, T. 1 S., R. 11 E. Measurements discontinued.

25k (*1021, p. 56; 1028, p. 49). R. E. Olson. Unsurveyed territory, approximately SE $\frac{1}{4}$ sec. 34, T. 1 S., R. 11 E. Measurements discontinued.

25o (*1021, p. 56; 1028, p. 49). Owner unknown. Unsurveyed territory, approximately SE $\frac{1}{4}$ sec. 2, T. 2 S., R. 11 E. Measurements discontinued.

25r (*1021, p. 56; 1028, p. 50). 88 Ranch. Unsurveyed territory, approximately NE $\frac{1}{4}$ sec. 10, T. 2 S., R. 11 E. Measurements discontinued.

32 (*911, p. 82; 941, p. 69; 949, p. 47; *991, p. 62; 1021, p. 57; 1028, p. 50). L. C. Baldwin. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 34, T. 1 S., R. 10 E. Water level, in feet below land-surface datum, 1946: Aug. 27, 43.25.

35 (*911, p. 82; 941, p. 70; 949, p. 47; *991, p. 62; 1021, p. 57; 1028, p. 50). E. M. Little. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 2 S., R. 10 E. Water levels, in feet below land-surface datum, 1946: Jan. 22, 396.82; Aug. 27, 397.11.

41 (*911, p. 82; 941, p. 70; 949, p. 47; *991, p. 62; 1021, p. 57; 1028, p. 50). W. A. Barkley. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 2 S., R. 8 E. Water levels, in feet below land-surface datum, 1946: Jan. 25, 227.37; Aug. 30, 228.72.

71 (*911, p. 82; 941, p. 70; 949, p. 47; *991, p. 63; 1021, p. 57; 1028, p. 50). Magma Arizona Railroad. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 35, T. 3 S., R. 8 E. Water levels, in feet below land-surface datum, 1946: Jan. 25, 158.50; Aug. 30, 160.64.

123 (*949, p. 47; *991, p. 63; 1021, p. 57; 1028, p. 50). U. S. Indian Service well 61. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 36, T. 3 S., R. 4 E. Water levels, in feet below land-surface datum, 1946: Oct. 23, 25.56; Dec. 17, 25.74.

174 (*949, p. 47; *991, p. 63; 1021, p. 57; 1028, p. 50). G. W. Yancy. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 18, T. 4 S., R. 3 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	26.18	June 4	27.80	Aug. 14	27.30	Nov. 26	27.20
Mar. 27	26.25	July 15	28.22	Oct. 23	27.27	Dec. 17	26.10
Apr. 25	27.60						

249 (*949, p. 48; *991, p. 63; 1021, p. 57; 1028, p. 50). U. S. Indian Service well 11X. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 4, T. 4 S., R. 6 E. Dry; measurements discontinued.

257 (*949, p. 48; *991, p. 63; 1021, p. 58; 1028, p. 51). U. S. Indian Service well 44. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 19, T. 4 S., R. 7 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 14	24.26	June 6	25.03	Aug. 13	25.54	Nov. 25	25.93
Mar. 26	24.46	July 16	25.50	Oct. 25	26.10	Dec. 19	(a)
Apr. 24	24.60						

a Pumping.

258 (*949, p. 48; *991, p. 63; 1021, p. 58; 1028, p. 51). U. S. Indian Service well 42. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 20, T. 4 S., R. 7 E. No measurements made in 1946.

259 (*949, p. 48; *991, p. 63; 1021, p. 58; 1028, p. 51). U. S. Indian Service well 43. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 30, T. 4 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Feb. 14, 22.48; June 6, 23.53; Oct. 25, 24.70; Dec. 19, 25.25.

278 (*941, p. 70; 949, p. 48; *991, p. 63; 1021, p. 58; 1028, p. 51). Arizona Ranches, Inc. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 2, T. 4 S., R. 8 E. Water levels, in feet below land-surface datum: Feb. 12, 1945, 165.21; Jan. 25, 1946, 167.80; Aug. 30, 1946, 169.33.

324 (*949, p. 48; *991, p. 63; 1021, p. 58; 1028, p. 51). U. S.
Indian Service well 1. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 21, T. 4 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 26	90.67	June 7	(a)	Aug. 13	(a)
Apr. 24	(a)	July 16	(a)	Oct. 25	(b)

a Pumping.

b Pump sealed.

327 (*949, p. 48; *991, p. 64; 1021, p. 58; 1028, p. 51). U. S.
Indian Service well 4. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 31, T. 4 S., R. 10 E. Water levels,
in feet below land-surface datum, 1946: Oct. 25, 103.55; Dec. 19, 104.42.

341 (*949, p. 48; *991, p. 64; 1021, p. 58; 1028, p. 51). U. S.
Indian Service well 7. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7, T. 4 S., R. 11 E. Water levels,
in feet below land-surface datum, 1946: Oct. 25, 37.48; Dec. 19, 38.96.

437 (*949, p. 49; *991, p. 64; 1021, p. 58; 1028, p. 51). U. S.
Indian Service well 76. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 29, T. 5 S., R. 9 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 14	119.82	June 6	123.77	Aug. 13	125.06	Nov. 25	126.20
Mar. 26	120.90	July 16	124.93	Oct. 25	126.26	Dec. 19	127.02
Apr. 24	122.06						

493 (*949, p. 49; *991, p. 64; 1021, p. 58; 1028, p. 51). S. H. Wynn.
SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 5 S., R. 8 E. Water levels, in feet below land-surface
datum, 1946: Feb. 14, 73.26; June 6, pumping; Oct. 25, 74.75; Dec. 19,
pumping.

503 (*949, p. 49; *991, p. 64; 1021, p. 58; 1028, p. 51). L. D.
Ulmer. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 1, T. 5 S., R. 8 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 14	40.94	June 6	42.64	Aug. 13	44.64	Nov. 25	43.59
Mar. 26	41.25	July 16	45.25	Oct. 25	43.24	Dec. 19	43.46
Apr. 24	41.51						

554 (*949, p. 49; *991, p. 64; 1021, p. 59; 1028, p. 51). S. B.
Rial. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 13, T. 5 S., R. 7 E. Water levels, in feet below land-
surface datum, 1946: Jan. 15, 57.80; Oct. 25, 63.30; Dec. 19, 65.02.

556 (*1028, p. 52). Owner unknown. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 24, T. 5 S., R. 7 E.
No measurements made in 1946.

616 (*949, p. 49; *991, p. 64; 1021, p. 59; 1028, p. 52). H. D.
Murphy. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 4, T. 5 S., R. 4 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	75.10	June 4	78.78	Aug. 14	77.64	Nov. 26	77.53
Mar. 27	75.84	July 15	77.46	Oct. 23	78.18	Dec. 17	77.47
Apr. 24	76.28						

618 (*949, p. 49; *991, p. 64; 1021, p. 59; 1028, p. 52). J. R.
Ross. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 30, T. 5 S., R. 4 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	89.83	June 5	91.13	Aug. 14	(a)	Nov. 26	93.64
Mar. 27	89.93	July 15	94.01	Oct. 23	94.32	Dec. 18	93.39
Apr. 25	89.23						

a Road flooded, no measurements.

653 (*949, p. 49; *991, p. 64; 1021, p. 59; 1028, p. 52). Bernice
White. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 3, T. 5 S., R. 3 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	59.91	June 4	60.30	Aug. 14	60.94	Nov. 26	61.50
Mar. 27	60.01	July 15	60.61	Oct. 23	61.26	Dec. 17	61.20
Apr. 25	60.14						

724 (*1021, p. 59; 1028, p. 52). Vester Branum. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 29, T. 6 S., R. 3 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	223.35	June 5	219.73	Aug. 14	216.95	Nov. 26	213.34
Apr. 25	223.98	July 15	(a)	Oct. 23	216.15	Dec. 18	212.80

a Mill running.

738 (*949, p. 50; *991, p. 64; 1021, p. 59; 1028, p. 52). A. A. Wallace. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 9, T. 6 S., R. 3 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	138.73	Apr. 25	(a)	July 15	154.64	Oct. 23	158.00
Mar. 27	(a)	June 5	(a)	Aug. 14	(a)	Dec. 18	142.57

a Pumping.

801 (*941, p. 70; 949, p. 50; *991, p. 64; 1021, p. 59; 1028, p. 52). Jake Stegmeier. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 1, T. 6 S., R. 4 E. Well destroyed; measurements discontinued.

887 (*941, p. 71; 949, p. 50; *991, p. 65; 1021, p. 59; 1028, p. 52). Paul Knobloch. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 9, T. 6 S., R. 5 E. Water levels, in feet below land-surface datum, 1946: Jan. 15, 43.18; Dec. 17, 44.90.

890 (*941, p. 71; 949, p. 50; *991, p. 65; 1021, p. 59; 1028, p. 52). Mrs. Gus Dratzka. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 15, T. 6 S., R. 5 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	32.16	Apr. 24	35.45	July 15	(a)	Nov. 26	34.29
Mar. 27	32.40	June 4	(a)	Oct. 23	34.23	Dec. 17	34.72

a Obstructed at 38 feet.

893 (*941, p. 71; 949, p. 50; *991, p. 65; 1021, p. 60; 1028, p. 53). P. H. Ethington. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 16, T. 6 S., R. 5 E. Water levels, in feet below land-surface datum, 1946: Oct. 23, 52.31; Dec. 17, 51.65.

906 (*949, p. 51; *991, p. 65; 1021, p. 60; 1028, p. 53). U. S. Indian Service well 100. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 23, T. 6 S., R. 5 E. Water levels, in feet below land-surface datum, 1946: June 4, 40.92; Nov. 26, 39.80; Dec. 17, 42.50.

907 (*941, p. 72; 949, p. 51; *991, p. 65; 1021, p. 60; 1028, p. 53). Burris Bros. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 23, T. 6 S., R. 5 E. Water levels, in feet below land-surface datum, 1946: June 4, 46.20; Nov. 26, 45.30; Dec. 17, 44.98.

961 (*941, p. 72; 949, p. 51; *991, p. 65; 1021, p. 60; 1028, p. 53). Floyd Smith. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 7, T. 6 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Oct. 25, 33.15; Dec. 19, 32.86.

967 (*941, p. 73; 949, p. 51; *991, p. 65; 1021, p. 60; 1028, p. 53). E. E. Rosenberry. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 10, T. 6 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Feb. 12, 35.48; Dec. 19, road impassable.

968 (*941, p. 73; 949, p. 51; *991, p. 65; 1021, p. 60; 1028, p. 53). C. E. Sherrill. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 13, T. 6 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Feb. 12, pumping; June 6, 48.34; Oct. 24, 48.94; Dec. 19, pumping.

975 (*941, p. 73; 949, p. 51; *991, p. 65; 1021, p. 60; 1028, p. 53). Gilbert Bros. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 17, T. 6 S., R. 6 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	(a)	June 6	(a)	Aug. 14	(a)	Nov. 25	37.56
Mar. 27	(a)	July 15	(a)	Oct. 24	43.61	Dec. 19	43.10
Apr. 24	(a)						

a Pumping.

981 (*941, p. 74; 949, p. 51; *991, p. 65; 1021, p. 60; 1028, p. 53). Gilbert Bros. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 20, T. 6 S., R. 6 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 15	44.00	Apr. 24	45.29	Aug. 14	46.61	Nov. 25	45.57
Feb. 13	44.05	June 6	45.40	Oct. 24	45.98	Dec. 19	46.43
Mar. 27	45.64	July 16	46.14				

991 (*941, p. 74; 949, p. 51; *991, p. 65; 1021, p. 60; 1028, p. 53). Mrs. Emma Pennington. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 25, T. 6 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: June 6, 48.46; Oct. 21, 52.33; Dec. 19, 50.72.

1002 (*949, p. 52; *991, p. 66; 1021, p. 60; 1028, p. 53). U. S. Indian Service well 103. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 33, T. 6 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Feb. 14, 39.48; June 15, pumping; Nov. 26, 44.27; Dec. 18, pumping.

1066 (*941, p. 74; 949, p. 52; *991, p. 66; 1021, p. 60; 1028, p. 53). Diwan Singh. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 22, T. 6 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Feb. 12, 60.97; June 6, 77.40; Oct. 24, pumping, Dec. 19, pumping.

1072 (*949, p. 52; *991, p. 66; 1021, p. 60; 1028, p. 53). U. S. Indian Service well 85. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 6 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Jan. 15, 68.13; June 6, 76.58; Oct. 24, 77.30; Dec. 19, 76.60.

1079 (*949, p. 52; *991, p. 66; 1021, p. 60; 1028, p. 54). U. S. Indian Service well 84. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 35, T. 6 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: June 6, 107.07; Oct. 24, 96.80; Dec. 19, 92.64.

1118 (*941, p. 75; 949, p. 52; *991, p. 66; 1021, p. 60; 1028, p. 54). Dick Shiflet. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 4, T. 6 S., R. 8 E. Water levels, in feet below land-surface datum, 1946: June 6, pumping; Dec. 19, 71.62.

1153 (*949, p. 52; *991, p. 66; 1021, p. 60; 1028, p. 54). U. S. Indian Service well 82. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 30, T. 6 S., R. 8 E. Water levels, in feet below land-surface datum, 1946: Jan. 15, 82.94; June 6, 93.25; Oct. 24, 92.78; Dec. 19, 92.05.

1157 (*949, p. 52; *991, p. 66; 1021, p. 61; 1028, p. 54). U. S. Indian Service well 78. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 35, T. 6 S., R. 8 E. Water levels, in feet below land-surface datum, 1946: June 6, 34.62; Oct. 24, 44.53; Dec. 19, 43.58.

1162 (*949, p. 52; *991, p. 66; 1021, p. 61; 1028, p. 54). Mr. McFarland. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 27, T. 6 S., R. 8 E. Water levels, in feet below land-surface datum, 1946: June 6, 86.87; Oct. 24, 86.46; Dec. 19, 72.53.

1172 (*1021, p. 61; 1028, p. 54). W. W. Ray. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 20, T. 6 S., R. 8 E.

Water level, in feet below land-surface datum, 1946

Feb. 13	86.58	June 6	104.84	Aug. 14	105.05	Nov. 25	93.25
Mar. 26	97.17	July 16	110.98	Oct. 24	107.14	Dec. 19	94.20
Apr. 24	99.61						

1173 (*1021, p. 61; 1028, p. 54). Owner unknown. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 10, T. 6 S., R. 8 E. Measurements discontinued.

1331 (*949, p. 52; *991, p. 66; 1021, p. 61; 1028, p. 54). D. C. Roberts. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 20, T. 7 S., R. 8 E.

Water level, in feet below land-surface datum, 1946

Jan. 15	116.77	June 5	(a)	Aug. 14	(a)	Nov. 22	129.30
Feb. 13	116.80	July 16	(a)	Oct. 24	134.06	Dec. 18	127.69
Mar. 27	(a)						

a Pumping.

1405 (*949, p. 53; *991, p. 66; 1021, p. 61; 1028, p. 54). S. C. McFarland. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 11, T. 7 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Feb. 12, 120.58; Oct. 24, 123.17; Dec. 19, pumping.

1421 (*941, p. 75; 949, p. 53; *991, p. 66; 1021, p. 61; 1028, p. 54). F. W. Shedd. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 27, T. 7 S., R. 7 E. Well sealed; measurements discontinued on June 5, 1946.

1422 (*941, p. 75; 949, p. 53; *991, p. 66; 1021, p. 61; 1028, p. 54). D. S. Cramer. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 29, T. 7 S., R. 7 E. No measurements made in 1946.

1430 (*1021, p. 61; 1028, p. 54). Les Milligan. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, T. 7 S., R. 7 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	104.09	June 6	120.14	Aug. 14	125.46	Nov. 25	112.35
Mar. 26	113.20	July 16	130.66	Oct. 24	111.80	Dec. 19	105.62

1476 (*941, p. 75; 949, p. 53; *991, p. 66; 1021, p. 61; 1028, p. 54). D. A. Trekell. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 7, T. 7 S., R. 6 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 14	42.15	June 5	(a)	Dec. 18	43.10
Mar. 27	(a)	Nov. 22	43.05		

a Dry.

1479 (*941, p. 76; 949, p. 53; *991, p. 67; 1021, p. 61; 1028, p. 55). Paul Brophy. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 12, T. 7 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 15, 68.06; Dec. 20, 71.40.

1485 (*941, p. 76; 949, p. 53; *991, p. 67; 1021, p. 62; 1028, p. 55). F. W. Shedd. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 7 S., R. 6 E. Water level, in feet below land-surface datum, 1946: Dec. 18, 71.92.

1489 (*949, p. 53; *991, p. 67; 1021, p. 62; 1028, p. 55). Albert Steinfeld. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 30, T. 7 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Jan. 15, 58.27; June 4, 64.39; Nov. 26, 64.91; Dec. 18, 60.54.

1532 (*941, p. 76; 949, p. 53; *991, p. 67; 1021, p. 62; 1028, p. 55). Phoenix Church of Brethren. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 7, T. 7 S., R. 5 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 14	129.68	June 5	134.40	Aug. 14	137.56	Nov. 26	138.08
Mar. 27	131.12	July 15	136.04	Oct. 23	137.62	Dec. 18	136.36
Apr. 25	133.34						

1539 (*949, p. 54; *991, p. 67; 1021, p. 62; 1028, p. 55). W. S. Stephenson Estate. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 22, T. 7 S., R. 5 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 14	95.42	June 4	97.68	Aug. 14	103.67	Nov. 26	97.86
Mar. 27	96.51	July 15	105.70	Oct. 23	99.50	Dec. 18	98.70
Apr. 25	97.60						

1716 (*941, p. 77; 949, p. 54; *991, p. 67; 1021, p. 62; 1028, p. 55). Smith-Thornburg Co. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 29, T. 8 S., R. 6 E. Water level, in feet below land-surface datum, 1946: Dec. 20, 73.57.

1725 (*949, p. 54; *991, p. 67; 1021, p. 62; 1028, p. 55). State of Arizona. SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 21, T. 8 S., R. 6 E. No measurements made in 1946.

1776 (*941, p. 77; 949, p. 54; *991, p. 67; 1021, p. 62; 1028, p. 55). S. C. Milligan. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 8, T. 8 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: June 5, pumping; Oct. 24, 177.80; Dec. 18, 131.00.

1787 (*941, p. 77; 949, p. 54; *991, p. 67; 1021, p. 62; 1028, p. 55). Sam Phillips. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 15, T. 8 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Feb. 15, pumping, June 5, pumping, Oct. 24, pumping; Dec. 18, 141.35.

1791 (*941, p. 77; 949, p. 54; *991, p. 67; 1021, p. 62; 1028, p. 55). S. G. Wilson. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 22, T. 8 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: June 5, pumping; Oct. 24, 165.30; Dec. 18, 155.27.

1795 (*941, p. 78; 949, p. 54; *991, p. 67; 1021, p. 62; 1028, p. 55). Jack Pretzer, Jr. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 25, T. 8 S., R. 7 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 13	162.59	Apr. 24	178.48	July 16	(a)	Nov. 27	(a)
Mar. 27	(a)	June 5	(a)	Oct. 24	172.40	Dec. 18	179.38

a Pumping.

1798 (*941, p. 78; 949, p. 55; *991, p. 68; 1021, p. 63; 1028, p. 55). F. W. Shedd. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 33, T. 8 S., R. 7 E. Dry; measurements discontinued Nov. 27, 1946.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 15	130.67	Apr. 24	128.76	July 16	142.33
Mar. 27	130.94	June 5	132.57	Aug. 14	(a)

a Roads flooded.

1855 (*949, p. 55; *991, p. 68; 1028, p. 56). D. A. Trekell. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 7, T. 8 S., R. 8 E. Water levels, in feet below land-surface datum, 1946: Feb. 12, 161.14; June 5, pumping; Oct. 24, 182.94; Dec. 18, 173.82.

1864 (*1021, p. 63; 1028, p. 56). John Arujo. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 18, T. 8 S., R. 8 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 13	159.86	Apr. 24	(a)	Nov. 27	(a)
Mar. 27	163.97	June 5	(a)		

a Dry.

1884 (*941, p. 78; 949, p. 55; *991, p. 68; 1021, p. 63; 1028, p. 56). Arizona Farm Products Co., known locally as Jack Pretzer well 6. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 33, T. 8 S., R. 8 E. Water levels, in feet below land-surface datum, 1946: Oct. 25, 179.06; Dec. 20, 178.32.

2104 (*941, p. 79; 949, p. 55; *991, p. 68; 1021, p. 63; 1028, p. 56). P. G. Wolfe. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 20, T. 9 S., R. 8 E. Water levels, in feet below land-surface datum, 1946: Oct. 25, 191.18; Dec. 18, 205.58.

2108 (*949, p. 55; *991, p. 68; 1021, p. 63; 1028, p. 56). J. F. Nutt. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 26, T. 9 S., R. 8 E. No measurements made in 1946.

2173 (*949, p. 55; *991, p. 68; 1021, p. 63; 1028, p. 56). Owner's well 2. R. W. Dickey. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 15, T. 9 S., R. 7 E. Water levels, in feet below land-surface datum, 1946: Oct. 24, 156.30; Dec. 18, 150.02.

2174 (*1021, p. 63; 1028, p. 56). Carl West. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 16, T. 9 S., R. 7 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 15	132.25	June 5	(a)	Aug. 14	(b)	Nov. 27	139.88
Mar. 27	152.94	July 16	(a)	Oct. 24	145.23	Dec. 18	139.37
Apr. 24	156.87						

a Pumping.

b Roads flooded.

2233 (*949, p. 55; *991, p. 68; 1021, p. 64; 1028, p. 56). J. Sevak. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24, T. 9 S., R. 6 E. Water levels, in feet below land-surface datum, 1946: Oct. 22, 92.58; Dec. 18, 91.90.

2236 (*949, p. 56; *991, p. 68; 1021, p. 64; 1028, p. 56). B. F. Nelszen. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 3, T. 9 S., R. 6 E. Water level, in feet below land-surface datum, 1946: Dec. 20, 119.00.

2311 (*941, p. 79; 949, p. 56; *991, p. 68; 1021, p. 64; 1028, p. 56). J. C. Kinney. NW $\frac{1}{4}$ sec. 3, T. 10 S., R. 7 E. Water level, in feet below land-surface datum, 1946: Dec. 20, 112.26.

2332 (*941, p. 79; 949, p. 56; *991, p. 69; 1021, p. 64; 1028, p. 56). J. C. Kinney. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 5, T. 10 S., R. 8 E. Water level, in feet below land-surface datum, 1946: Dec. 20, 170.24.

2351 (*949, p. 56; *991, p. 69; 1021, p. 64; 1028, p. 56). J. C. Kinney. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 5, T. 10 S., R. 9 E. Water levels, in feet below land-surface datum, 1946: Feb. 15, 154.11; Mar. 27, dry; Oct. 25, dry.

2354 (*941, p. 79; 949, p. 56; *991, p. 69; 1021, p. 64; 1028, p. 57). H. H. Cake. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 10, T. 10 S., R. 9 E. Water levels, in feet below land-surface datum, 1946: Oct. 25, 159.00; Dec. 20, 156.92.

2361 (*941, p. 80; 949, p. 56; *991, p. 69; 1021, p. 64; 1028, p. 57). King Bros. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 22, T. 10 S., R. 9 E. Measurements discontinued.

2363 (*941, p. 80; *949, p. 56; *991, p. 69; 1021, p. 64; 1028, p. 57). H. B. Aguirre. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 36, T. 10 S., R. 9 E. Water levels, in feet below land-surface datum, 1946: July 25, 153.73; Oct. 22, 152.00; Dec. 4, 141.72.

2383 (*991, p. 69; 1021, p. 64; 1028, p. 57). Tom Soleng. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 34, T. 10 S., R. 10 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Mar. 8	152.24	July 25	163.30	Dec. 4	152.91
May 8	152.40	Oct. 22	155.82		

SANTA CRUZ COUNTY

By R. L. Cushman

Ground-water studies in Santa Cruz County during 1946 consisted of measuring water levels in selected wells and making an inventory of the quantity of water pumped from wells. An addendum to the report entitled "Ground-water resources of the Santa Cruz River Basin, Arizona", released in 1943, is in preparation, and this addendum will summarize ground-water data obtained since the release of the earlier report.

A total of 64 measurements of water level was made in 8 wells during 1946. The average net rise in water level in the 8 wells was 4.0 feet during 1946, as compared with an average net rise of 2.0 feet during 1945. Water levels in 5 of the 8 wells averaged 6.8 feet higher at the end of 1946 than at the end of 1945, and the water levels in the other 3 wells declined 0.6 foot during the same period. The rise in water levels is attributed to above-normal rainfall during July, August, and September that contributed much recharge to the ground-water reservoir, principally as seepage losses from surface flows in the Santa Cruz River and tributary washes.

Figure 8 shows the water-level fluctuations in two selected wells compared with surface flow in the Santa Cruz River near Nogales, precipitation at Nogales, and pumpage by months.

Well 915 is near the river and in an area where large quantities of ground water are pumped from wells. The water level declined because of heavy pumping from a common aquifer. Seepage losses from surface flows in the nearby river, caused by the rains in July, August, and September, recharged the ground-water reservoir at a rate in excess of the pumping draft, and the water level rose in well 915. The coarse materials near the river were saturated more quickly and to a higher level than the materials farther from the river; therefore, the water level in well 915 declined during October and November as a part of the ground water moved away from the river.

The water level in well 1525 rose about 23 feet in response to recharge from the heavy summer rains.

The following table summarizes the quantity of water pumped annually from wells since 1941. The water pumped increased 30 percent over 1945 and 92 percent over 1944. Figure 8 shows the pumpage by months.

Year	Pumpage in acre-feet
1941	11,500
1942	14,500
1943	15,000
1944	12,500
1945	18,500
1946	24,000

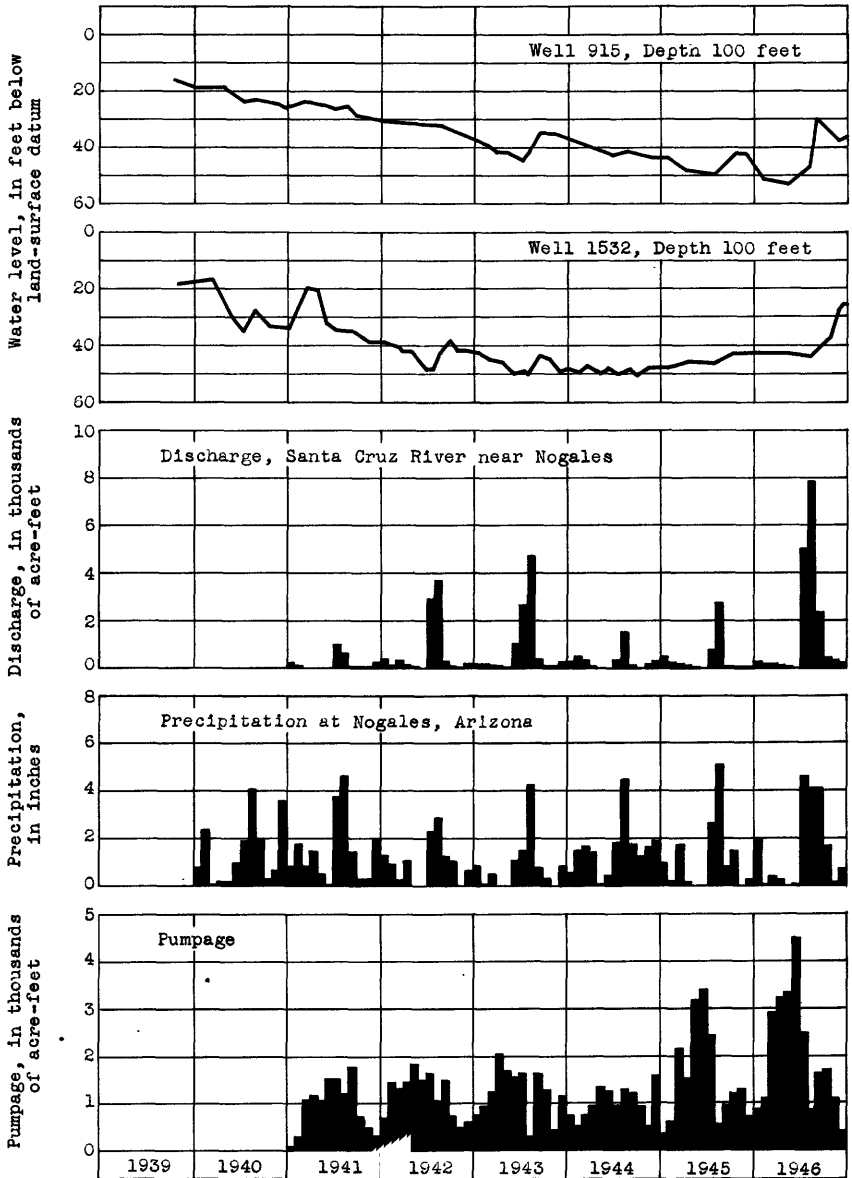


Figure 8.--Graphs showing fluctuations of water level in observation wells in the Santa Cruz Valley, Santa Cruz County, Arizona.

Well descriptions and water-level measurements

5 (*911, p. 96; 941, p. 81; *949, p. 57; *991, p. 70; 1021, p. 65; 1028, p. 59). R. W. Littlejohn. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 13, T. 20 S., R. 12 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	62.03	June 17	63.78	Aug. 29	62.25	Nov. 22	62.19
May 7	63.19	July 23	64.20	Oct. 10	62.64	Dec. 23	62.81

79 (*911, p. 97; 941, p. 81; *949, p. 57; *991, p. 70; 1021, p. 66; 1028, p. 59). Mrs. Schenkel. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 20 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	28.53	June 17	31.72	Aug. 29	(a)	Nov. 22	28.86
May 7	29.79	July 23	30.66	Oct. 10	29.06	Dec. 23	28.83

a Pumping.

616 (*911, p. 97; 941, p. 81; *949, p. 57; *991, p. 70; 1021, p. 66; 1028, p. 59). Mrs. Mary Ellen Cotter. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 19, T. 21 S., R. 13 E. Measurements discontinued.

908 (*911, p. 98; 941, p. 82; *949, p. 58; *991, p. 70; 1021, p. 66; 1028, p. 59). T. T. Pendleton. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 16, T. 22 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	26.59	June 17	31.71	Aug. 29	18.17	Nov. 22	15.98
May 7	29.97	July 23	31.22	Oct. 10	14.97	Dec. 23	17.20

915 (*911, p. 99; 941, p. 82; *949, p. 58; *991, p. 70; 1021, p. 66; 1028, p. 59). T. T. Pendleton. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 35, T. 22 S., R. 13 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	51.71	June 17	(a)	Aug. 29	29.56	Nov. 22	37.30
Apr. 2	(a)	July 23	47.94	Oct. 10	(a)	Dec. 23	36.80
May 7	53.04						

a Pumping.

1504 (*911, p. 100; 941, p. 83; *949, p. 58; *991, p. 71; 1021, p. 66; 1028, p. 59). J. F. Dalton. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 19, T. 23 S., R. 14 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	13.25	June 17	14.67	Aug. 29	14.22	Nov. 22	13.67
Apr. 2	12.66	July 23	15.47	Oct. 10	13.50	Dec. 23	13.10
May 7	13.14						

1513 (*911, p. 100; 941, p. 83; *949, p. 58; *991, p. 71; 1021, p. 66; 1028, p. 59). Dines Nelson. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 27, T. 23 S., R. 14 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	17.68	June 17	20.20	Aug. 29	20.84	Nov. 22	18.60
May 7	18.49	July 23	20.93	Oct. 10	19.07	Dec. 23	18.10

1525 (*911, p. 100; 941, p. 83; *949, p. 58; *991, p. 71; 1021, p. 66; 1028, p. 59). Camberos Bros. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 36, T. 23 S., R. 14 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Apr. 2	43.30	June 17	44.18	Aug. 29	43.20	Nov. 22	27.22
17	43.50	July 23	44.76	Oct. 10	39.91	Dec. 23	25.12
May 7	43.87						

1912 (*911, p. 101; 941, p. 84; *949, p. 59; *991, p. 71; 1021, p. 66; 1028, p. 60). Simon Mastick. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 8, T. 24 S., R. 14 E.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 11	23.35	June 17	24.38	Aug. 29	23.18	Nov. 22	19.89
Apr. 2	23.45	July 23	24.41	Oct. 10	19.64	Dec. 23	18.20
May 7	23.79						

YUMA COUNTY

By H. M. Babcock

An investigation of the ground-water resources was continued in the Lower Gila region in Yuma County during 1946. Measurements of water levels were continued in selected observation wells, and an inventory of most of the water pumped for irrigation was made. Measurements of water level were also made in a few selected observation wells in the Ranegras Valley but the small amount of water pumped in this valley was not measured. A total of 84 measurements in 26 wells in the county are listed.

At least 74,000 acre-feet of water was pumped for irrigation from wells in the county in 1946. The following table shows the amount pumped, in acre-feet, during the period of record.

Area	1944	1945	1946
Dateland area	4,000	4,000	4,000
Wellton-Mohawk area	37,000	35,000	38,000
South Gila Valley	20,000	22,000	32,000
Total	61,000	61,000	74,000

Figure 9 shows graphs of water-level fluctuations in selected wells in the Lower Gila region.

Well 195 is a drilled well at Aztec, on the desert plain about 5 miles south of the Gila River. The slight downward trend in the water level since measurements began is probably a result of the withdrawal of water by pumping from wells near the river channel to the north.

Well 680 is a drilled well 5 miles east and 2 miles north of Roll, in the river bottom near a group of large irrigation wells. The water level shows a seasonal lowering as a result of the heavy pumping nearby, and only a partial recovery after the pumping season. There has been an average annual lowering of the water level of 0.9 foot in this area for the past 20 years.

Well 710 is 6.5 miles east of Roll, in the river bottom a short distance from an area of heavy pumping. The water level in this well shows a steady lowering of the water table in that vicinity.

Well 1280, a few hundred feet from a large irrigation canal, near Blaisdell, showed a rise in water level in 1946. The water level rose rapidly during the summer months when a large volume of water was flowing in the nearby canal. During the latter part of the year when the flow in the canal was greatly decreased, the water level in the well began to decline.

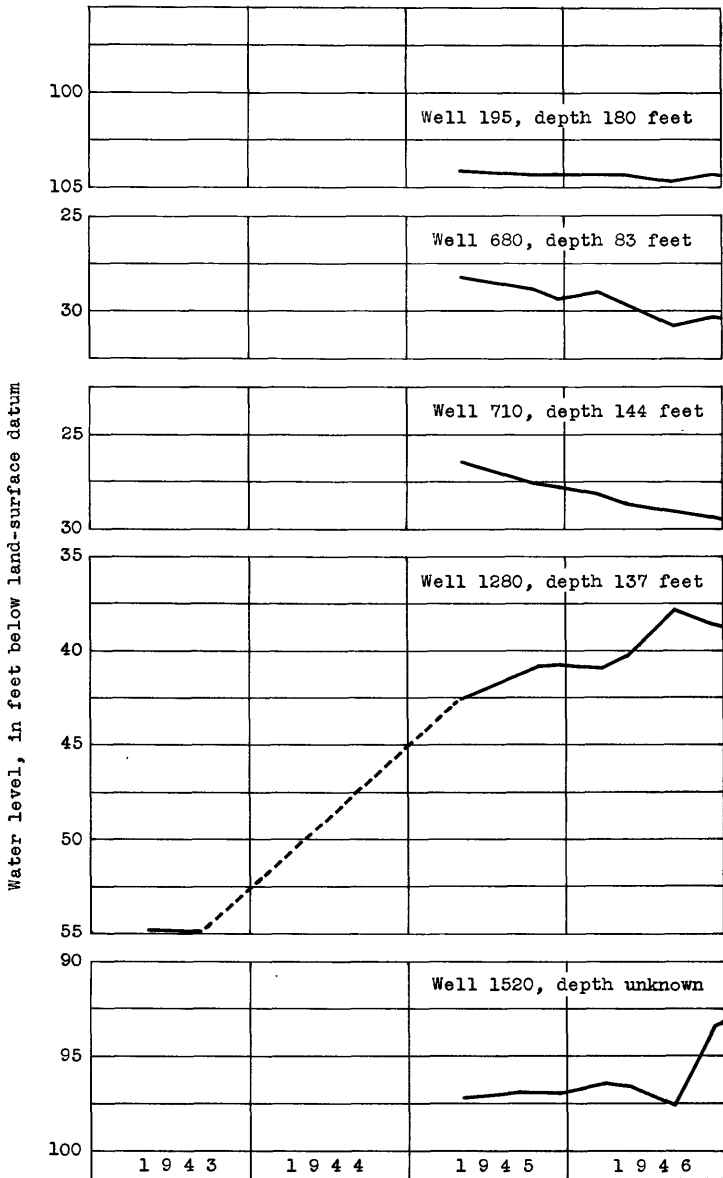


Figure 9.--Graphs showing fluctuations of water level in observation wells in Lower Gila region, Yuma County, Arizona.

Well 1520 is in the newly developed Yuma Mesa Irrigation Project. The sudden rise in water level during the fall of 1946 was due to recharge from a nearby area which was irrigated for the first time in the fall of 1946. The surface soil is very sandy in this area, and transmits water quite readily.

Well descriptions and water-level measurements

- 155 (*1028, p. 60). Western Farm Management Co. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 19, T. 6 S., R. 12 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 35.80; May 29, 35.98; Sept. 6, 37.41; Dec. 3, 36.94.
- 195 (*1028, p. 60). H. P. Johnson. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 13, T. 7 S., R. 12 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 104.33; May 28, 104.40; Sept. 6, 105.16; Dec. 3, 104.36.
- 200 (*1028, p. 60). Owner unknown. NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 18, T. 7 S., R. 12 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 24.35; May 29, 22.36; Sept. 6, 19.34; Dec. 3, 18.90.
248. Mr. Ludweid. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 22, T. 5 N., R. 13 W., near house, 1.5 miles southwest of jail, 1.75 miles southwest of Salome. Unused drilled well, diameter 6 inches, depth unknown. Measuring point, top of suction pipe, 1.2 feet above land-surface datum. Water levels, in feet below land-surface datum: Jan. 6, 1945, 111.10; June 11, 1945, 112.20; Oct. 3, 1945, 111.25; Feb. 19, 1946, 111.30.
- 312 (*1028, p. 60). Owner unknown. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 1, T. 7 S., R. 13 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 82.67; May 29, 81.58; Sept. 6, 81.80; Dec. 3, 81.37.
- 440 (*1028, p. 61). Southern Pacific Railroad. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 25, T. 6 S., R. 14 W. Water levels, in feet below land-surface datum, 1946: Mar. 22, 55.49; May 29, 55.44.
502. J. S. Riley. NE $\frac{1}{4}$ sec. 8, T. 4 N., R. 15 W., at Desert Wells, south of U. S. Highway 70, near house. Used drilled domestic well, diameter 8 inches, depth 206 feet. Measuring point, top of casing, west side, 0.4 foot above land-surface datum. Water levels, in feet below land-surface datum: Jan. 1, 1945, 127.85; June 10, 1945, 127.75; Oct. 3, 1945, 127.62; Feb. 2, 1946, 127.99.
- 575 (*1028, p. 61). Mohawk Municipal Water Conservation District. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T. 7 S., R. 15 W. Water levels, in feet below land-surface datum, 1946: Mar. 22, 28.38; May 29, 32.96; Sept. 6, 34.07; Dec. 5, 29.54.
- 680 (*1028, p. 61). Mohawk Municipal Water Conservation District. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, T. 7 S., R. 16 W., 5.5 miles northeast of Roll (published erroneously in Water-Supply Paper 1028 as NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 33, T. 7 S., R. 16 W., 7.0 miles east of Roll). Water levels, in feet below land-surface datum, 1946: Mar. 3, 29.03; May 29, 29.75; Sept. 6, 30.77; Dec. 5, 30.35.
- 710 (*1028, p. 61). Western Farm Management Co. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 11, T. 8 S., R. 16 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 28.34; May 28, 28.87; Dec. 3, 29.80.
- 722 (*1028, p. 61). Smiley Air Field. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 28, T. 8 S., R. 16 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 82.77; May 28, 82.96; Sept. 5, 82.94; Dec. 3, 83.09.

758. Judge Bellows. NW $\frac{1}{4}$ sec. 22, T. 7 N., R. 17 W., in shed, 0.4 mile west of State Highway 72, 1.0 mile northwest of Bouse. Used dug domestic well, diameter 6 feet, depth 38 feet. Measuring point, top of wooden platform, 2 feet from north side, 0.7 foot above land-surface datum.

Water level, in feet below land-surface datum, 1945-46

Date	Water level	Date	Water level	Date	Water level
Jan. 9, 1945	27.92	Oct. 3, 1945	26.97	Nov. 17, 1946	29.15
June 10	28.37	Feb. 9, 1946	27.64		

760. V. C. Tarpley. SW $\frac{1}{4}$ sec. 23, T. 7 S., R. 17 W., south side of hotel at Bouse. Used dug domestic well, diameter 4 feet, depth unknown. Measuring point, top of well platform at center, 0.75 foot above land-surface datum.

Water level, in feet below land-surface datum, 1945-46

Jan. 9, 1945	42.19	Oct. 3, 1945	42.18	Nov. 16, 1946	41.84
June 10	a 46.57	Feb. 18, 1946	41.91		

a Pumping.

762. Owner unknown. NW $\frac{1}{4}$ sec. 23, T. 7 S., R. 17 W., north of depot, 200 feet northwest of road to Camp Butler, at Bouse. Unused dug well, diameter 4 feet, depth unknown. Measuring point, top of lower 6-inch timber, south side, 0.5 foot above land-surface datum.

Water level, in feet below land-surface datum, 1945-46

Jan. 9, 1945	56.35	Oct. 3, 1945	56.25	Nov. 17, 1946	56.80
June 10	56.25	Feb. 19, 1946	56.14		

764. Julian M. Jones. Sec. 26, T. 7 N., R. 17 W., near house, 0.6 mile southwest of State Highway 72, 1.5 miles south of Bouse. Used dug domestic well, diameter 4 feet, depth unknown. Measuring point, top of 4- by 4-inch plank, north side, 0.6 foot above land-surface datum. Equipped with windmill.

Water level, in feet below land-surface datum, 1945-46

Jan. 9, 1945	31.30	Oct. 3, 1945	31.44	Nov. 17, 1946	31.20
June 10	a 34.50	Feb. 20, 1946	31.34		

a Pumping.

784 (*1028, p. 61). Mohawk Municipal Water Conservation District. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, T. 8 S., R. 17 W. Water levels, in feet below land-surface datum, 1946: Mar. 22, 33.51; May 29, 34.44; Sept. 6, 35.52; Dec. 5, 34.85.

795 (*1028, p. 61). Roy Killen. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 13, T. 8 S., R. 17 W.

Water level, in feet below land-surface datum, 1946

Feb. 6	24.80	May 28	25.84	Dec. 3	26.44
Mar. 26	24.82	Sept. 5	25.77		

817 (*1028, p. 61). Gust Svensen. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 33, T. 8 S., R. 17 W. Water levels, in feet below land-surface datum, 1946: Mar. 20, 106.65; May 29, 106.89; Sept. 5, 107.36; Dec. 3, 107.10.

865. R. B. Deason. NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 27, T. 8 S., R. 18 W., 0.3 mile north of fence, 0.95 mile north of Wellton-Roll road, 3.5 miles northeast of Wellton. Unused drilled irrigation well, diameter 14 inches, depth unknown. Measuring point, top of casing, 3.6 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Feb. 5, 21.6³; May 29, 21.52; Sept. 6, 21.60; Dec. 4, 21.88.

900 (*1028, p. 61). Robert Welch. NE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 5, T. 9 S., R. 18 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 56.43; May 28, 57.04; Sept. 6, 57.67; Dec. 4, 57.20.

975 (*1028, p. 61). Owner unknown. $SE\frac{1}{4}SW\frac{1}{4}$ sec. 4, T. 9 S., R. 19 W. Water levels, in feet below land-surface datum, 1946: Mar. 20, 22.75; May 28, 23.18; Sept. 6, 23.04; Dec. 4, 22.10.

1280 (*1028, p. 62). Owner unknown. $SW\frac{1}{4}NW\frac{1}{4}$ sec. 21, T. 8 S., R. 21 W. Water levels, in feet below land-surface datum, 1946: Mar. 26, 40.81; May 28, 40.37; Sept. 5, 37.74; Dec. 4, 38.58.

1474. J. L. Morrish. $SE\frac{1}{4}SE\frac{1}{4}$ sec. 25, T. 8 S., R. 22 W., about 200 feet north of State Highway 95, 2.8 miles east of Gila Valley store. Unused drilled irrigation well, diameter 16 inches, depth 300 feet. Measuring point, top of casing, south side, 0.4 foot above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 26, 35.95; May 25, 35.96; Sept. 5, 33.23; Dec. 4, 34.83.

1485 (*1028, p. 62). Owner unknown. $NW\frac{1}{4}NW\frac{1}{4}$ sec. 34, T. 8 S., R. 22 W. (erroneously reported in Water-Supply Paper 1028 as $NW\frac{1}{4}NW\frac{1}{4}$ sec. 27). Water levels, in feet below land-surface datum, 1946: Mar. 25, 30.53; May 28, 31.14; Sept. 5, 30.16; Dec. 4, 28.90.

1520 (*1028, p. 62). Owner unknown. $SE\frac{1}{4}SE\frac{1}{4}$ sec. 17, T. 9 S., R. 22 W. Water levels, in feet below land-surface datum, 1946: Mar. 25, 96.48; May 28, 97.00; Sept. 5, 97.63; Dec. 4, 93.39.

CALIFORNIA

By A. A. Garrett, A. S. Sollid, H. M. Stafford,
H. G. Thomasson, Jr., and G. F. Worts, Jr.

SCOPE OF THE WATER-LEVEL PROGRAM

This report shows the progress made in 1946 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 covers 4,132 water-level measurements during 1946 in 505 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 but all the remaining seven for which water-level records appear in this report are in the southern part of the State, south of the Tehachapi Mountains. Among the eight, only for San Diego and Santa Barbara Counties do the water levels of this report cover all the principal ground-water areas; in the remaining six counties only scattered basins or areas are covered.

Distribution of observation wells in California in 1946

County	Number of observation wells			Number of records of water levels in this report	Number of wells with water-stage recorders (R) or float gages (F)		
	Estab- during 1946a/	Discon- in 1946	At year end		Through- out 1946	Part of 1946	At year end
Kern County:							
Antelope Valley, part	3	0	10	b 29	0	0	0
Los Angeles County:							
Antelope Valley, part	17	11 c	122	b 358	1R	1R	1R

a Includes wells established prior to 1946 but for which water-level records are renewed or are given for the first time in this report.

b In 1946 only; previous water levels also given in this report.

c 26 additional wells in which no measurements were made in 1946.

Distribution of observation wells in California in 1946--Continued

County	Number of observation wells			Number of records of water levels in this report	Number of wells with water-stage recorders (R) or float gages (F)		
	Estab- lished during 1946	Discon- tinued in 1946	At year end		Through- out 1946	Part of 1946	At year end
Los Angeles County:							
San Gabriel River Basin	0	0	1	365	1R	0	1R
Coastal plain	4	50	59	925	0	0	0
Orange County:							
Coastal plain	0	1	23	526	0	0	0
Riverside County:							
San Jacinto Valley	0	0	8	22	0	0	0
San Bernardino County:							
Mojave River Basin	0	4	63	63	0	0	0
Santa Ana River Basin	0	0	10	88	0	0	0
San Diego County:							
San Luis Rey River Basin	0	0	17	121	0	0	0
San Dieguito River Basin	0	0	6	23	0	0	0
San Diego River Basin	1	1	20	58	0	0	0
Sweetwater River Basin	0	0	2	10	0	0	0
Otay River Basin	0	0	2	8	0	0	0
Tia Juana River Basin	0	1	4	21	0	0	0
San Joaquin County:							
Mokelumne River Basin	0	1	23	280	0	0	0
Santa Barbara County:							
Carpinteria Basin	2	4	15	97	0	0	0
Goleta Basin	0	10	26	291	1R, 1F	1R	1R, 1F
Middle Santa Ynez Valley	0	3	13	88	0	0	0
Lower Santa Ynez Valley	1	9	36	333	2R, 2F	1F	2R, 2F
San Antonio Valley	0	0	4	25	0	0	0
Santa Maria Valley	0	7	35	334	2F	0	2F
Cuyama Valley	0	1	6	37	0	0	0
The State	28	103	505	4,132	5R, 5F	2R, 1F	5R, 5F

a Includes wells established prior to 1946 but for which water-level records are renewed or are given for the first time in this report.

b 14 additional wells in which no measurements were made in 1946.

In addition to this program in which the Geological Survey participated, systematic measurements of water level were made by numerous agencies in widely scattered and extensive parts of California. For the southern part of the State, the following programs were carried forward. In Ventura County basins measurements were continued by the Ventura County Water Survey. In the San Fernando Valley semiannual measurements in 310 wells and monthly measurements in about 20 wells were made by the Los Angeles

Department of Water and Power, also, semiannual measurements in 97 wells and monthly measurements in 21 wells were made by the Los Angeles County Flood Control District; in the western portion of San Fernando Valley, in the city of Los Angeles, monthly measurements were made in about 40 piezometer wells by the Soil Conservation Service, United States Department of Agriculture, in cooperation with the city of Los Angeles and the San Fernando Valley Soil Conservation District. In the San Gabriel Valley monthly measurements in 22 key wells and semiannual measurements in 87 wells were made by the Los Angeles County Flood Control District, and measurements were made monthly or oftener in 97 wells by the San Gabriel Valley Protective Association. In the Chino Basin, largely in San Bernardino County, semiannual measurements were made in about 500 wells by the San Bernardino County Flood Control District. In the San Bernardino Valley the San Bernardino Valley Water Conservation District continued measurements in about 300 wells and summarized the fluctuations of ground-water level in an annual statement, issued in mimeographed form. In the East Mesa area between the Coachella Branch of the All American Canal and the East High Line Canal of Imperial Irrigation District, in continuation of observations begun in 1942 by the Bureau of Reclamation of the United States Department of the Interior, monthly measurements were made in about 30 observation wells by the Imperial Irrigation District in cooperation with the Division of Irrigation of the Soil Conservation Service, United States Department of Agriculture. Within the coastal plain, in Los Angeles County, more than 100 wells were measured monthly or oftener by the San Gabriel Valley Protective Association, the city of Long Beach, or the Los Angeles County Flood Control District, and 381 wells, including 70 test holes, were measured semiannually by the last-named agency; in Orange County, about 200 wells were measured monthly and about 20 wells weekly by the Orange County Flood Control District, and 16 wells in Santa Ana Gap were measured monthly by the Orange County Water District. From various agencies, the Division of Water Resources of the Department of Public Works, State of California, continued to assemble records of water levels in wells in the south coastal basin and in Antelope Valley. These assembled records for 1944 have been published in the Division's Bulletin 39-M, which continues the series beginning with Bulletin 39, published in 1932.

In the central and northern parts of California a number of substantial water-level programs were maintained by irrigation districts and local water-conservation agencies, partly through collaboration with the Division of Water Resources in the Department of Public Works, State of California. The facilities available to the Geological Survey have not been adequate to coordinate these programs for coverage into this report.

RAINFALL AND SNOWFALL

The following general summary of precipitation in California for the calendar year 1946 is quoted from the annual report of climatological data issued by the Weather Bureau:^{1/}

"For the State as a whole, total precipitation for the year was 72% of the 50-year average. It was the driest year since 1939 but we have had eight drier years in the last fifty years, including the record-breaking dry year of 1898 when precipitation was less than half the usual amount. Precipitation averaged below normal in every month except July and November. January, February, and April were outstanding for scantiness of rainfall. The only really wet month was November when precipitation was above normal throughout the State and very heavy in southern California. The greatest deficiency was in the Sacramento Basin where precipitation was only 55% of the usual amount. The southeastern portion of the State was the only one in which more than the usual amount of precipitation occurred. March and November were the only months in which snowfall in the mountains was above normal."

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 ensuing dry season the unconfined ground-water storage is depleted by natural discharge and water levels commonly recede in wells. This depletion goes on 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 mid-autumn. 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.

^{1/} U. S. Department of Commerce, Weather Bureau, Climatological data California Section, vol. 50, No. 13, 1946.

The first of two following tables shows the average monthly distribution of precipitation in California in the 50 years ending with 1946. The second table shows the relative wetness of the water year ending September 30, 1946, at 15 representative stations in the State, both in inches and in percentage of the average for the 50 years ending September 30, 1891-1940. This second table brings out that precipitation during the water-year 1945-46 was generally less than the average for the 50-year period ending with 1939-40. Precipitation along the northern coast and the Sierra Nevada was about at or slightly above the 50-year average. Over the areas for which water levels are given in this report, it ranged from about 65 percent of the average in Santa Barbara County to about 95 percent of the average in San Joaquin County.

State-wide average monthly and yearly precipitation in California, in inches, based on the 50-year period 1897-1946 ^{2/}

October	1.26	April	1.68
November	2.41	May	.95
December	3.95	June	.32
January	4.74	July	.08
February	4.56	August	.10
March	3.68	September	.43
	20.60		3.56
The year			24.16

Precipitation and relative wetness for the year ending September 30, 1946, at 15 representative climatologic stations in California

Province	Station and county	Precipitation, 1945-46	
		Inches	Percentage of 50-year average ^{2/}
Northern Coast Ranges	Eureka, Humboldt	39.30	102
Coast Ranges of central and southern California	San Francisco, San Francisco	21.72	108
	San Luis Obispo, San Luis Obispo	17.91	85
	Santa Barbara, Santa Barbara	11.33	63
	Los Angeles, Los Angeles	11.63	80
	San Bernardino, San Bernardino	12.57	77
	San Diego, San Diego	8.44	86
	Cuyamaca, San Diego	35.30	91
Great Valley (California Trough)	Red Bluff, Tehama	19.53	85
	Stockton, San Joaquin	13.18	95
Sierra Nevada	Fresno, Fresno	8.50	90
	Nevada City, Nevada	50.03	102
	West Point, Calaveras	37.53	95
Great Basin (Southwestern Bolson province)	Indio, Riverside	1.89	58
	Needles, San Bernardino	4.50	100

^{1/} Average for years ending Sept. 30, 1891 to 1940.

^{2/} From "Climatological Data", op. cit., monthly and seasonal precipitation for the season July 1945 to June 1946, inclusive, and for the season July 1946 to June 1947, inclusive.

RUNOFF

The runoff in California streams during the water year ending September 30, 1946, ranged from less than 25 percent to as much as 140 percent of normal. Representative of the runoff in the northern and central parts of the State, the year's total for Trinity River at Lewiston, in the north coastal drainage, was 140 percent of normal; for the combined flow of Sacramento and San Joaquin Rivers and tributaries, about 90 percent of normal; and for Kings River at Piedra, in the southern Sierra drainage, 101 percent of normal.

In southern California, in the higher drainage areas of the San Bernardino and eastern San Gabriel Mountains, the runoff exceeded 75 percent of the average, with the greater percentages shown for those areas in which a substantial source of runoff could have been the ground-water storage of previous seasons. In the frontal streams of these mountains and in the upper mountain areas to the west and south, the runoff ranged between 50 and 75 percent of the average; and in the belt of intermediate mountain and foothill areas from Tia Juana River, on the south, to Santa Maria River, on the north, it ranged generally between 25 and 50 percent of the average. Runoff of less than 25 percent of average occurred for the most part in the low foothill and coastal-plain areas of Santa Barbara, Orange, and San Diego Counties.

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

Coastal plain in Los Angeles and Orange Counties

Program of work

In 1946 the Geological Survey, in cooperation with the Orange County Flood Control District, the Orange County Water District, the Los Angeles County Flood Control District, and the Board of Water Commissioners of the city of Long Beach, completed its intensive investigation of the ground-water bodies that underlie the so-called Long Beach-Santa Ana area. The final two of four interpretative reports presenting the results of the study were released during the year.^{3/}

^{3/} Poland, J. F., and others, Hydrology of the Long Beach-Santa Ana area, California, with special reference to the watertightness of the Newport-Inglewood structural zone: U. S. Geol. Survey duplicated report, 198 pp., June 1946.

Piper, A. M., Garrett, A. A., and others, Chemical character of native and contaminated ground waters in the Long Beach-Santa Ana area, California: U. S. Geol. Survey duplicated report, 355 pp., August, 1946.

Although no periodic measurements of water level for wells in the Long Beach-Santa Ana area were made by the Geological Survey in 1946, extensive programs for periodic measurements of observation wells in this area are being continued 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, and the city of Long Beach.

In 1946 the Geological Survey also continued its investigation of the so-called Torrance-Santa Monica area in cooperation with the Los Angeles County Flood Control District and certain municipalities. Field work was completed and by year-end, the interpretative phases of the study were well advanced. One factual report was released during the year.^{4/}

In October, the biweekly water-level measuring program by the Geological Survey for the West Basin was brought to a close. However, water-level measurements in the wells were continued by the California State Division of Water Resources as a part of their program for collection of pertinent data to be used by that agency during adjudication of water rights within the West Basin. Records of the Division of Water Resources for these wells will be published in following annual reports.

The investigation was continued for the Corps of Engineers, United States Army, pertaining to ground-water conditions along the Rio Hondo and lower Los Angeles River, in connection with a proposed program for flood control. As part of this investigation, water-level measurements were made about monthly or oftener in 122 shallow water-table wells situated as follows: 24 wells in or near the city of El Monte; 33 wells along the Rio Hondo downstream from Whittier Narrows; and 65 wells along the Los Angeles River between the Firestone Boulevard and Willow Street bridges. Water-stage recorders were operated during most of the year at six of the wells along the Los Angeles River between the Imperial Highway and Del Amo Street bridges. The large volume of data thus obtained is not included in this report, but it is available for inspection in the files of the Geological Survey at Long Beach.

^{4/} Sinnott, Allen, and Garrett, A. A., Index of factual data for water wells in the Torrance-Santa Monica area, Los Angeles County, California: U. S. Geol. Survey duplicated report, 163 pp., December 1946.

In this water-level report, records are included for 83 wells in the areas covered by the three cooperative projects. Of these wells, records for 27 have been furnished solely by local agencies. Of the 56 wells measured by the Geological Survey, 15 were measured about quarterly, 16 were measured about monthly, and 16 were measured about every 2 weeks, for at least part of the year. In addition, 6 "permanent" observation wells were measured only at year-end, and 3 random wells were measured only once or twice.

Of the 129 wells for which records for 1945 were published in Water-Supply Paper 1028, records for 79 are continued in this report. The 50 wells discontinued at the end of 1945 are listed in the following table.

Wells in which water levels were measured by the Geological Survey
in 1945 but not in 1946

Los Angeles County				
2/14-27D1	3/13-16H2	3/13-30H3	3/14-16A3	3/14-34J1
27D2	19A1	33A1	20P1	3/15-12G2
27F3	20C1	3/14-7K1	23R3	24D1
27P2	20J2	8D2	24P1	25H1
34A3	25Q1	8G2	25L1	4/13-20K1
34C1	26D1	9N2	25N2	4/14-11F1
34K1	27N1	10A1	26D2	16L1
3/13-8C2	29A3	11C1	27J3	22D1
8G1	30A2	11G1	27P5	23J2
9N2	30G4	13E1	33F2	27Q1

Orange County

No well records discontinued.

In addition to the 79 wells continued from the 1945 water-level report, records are included here for four wells that did not appear in that report. Of these, Nos. 4/13-11L3 and 26L1 were described in Water-Supply Paper 949 and Nos. 2/12-28J2 and 4/13-24M1 are described in this report.

Of the 83 wells for which records are given in this report, 8 were discontinued before the end of the year. These are listed in the following table.

Wells in which water-level measurements were discontinued by the
Geological Survey before year-end, 1946

Los Angeles County		
3/12-8D3	4/13-11F1	4/13-33E6
28F1	26L1	36H1
3/15-25H2		

Orange County

6/10-11B2

Of the remaining 75 wells which remained in active status at the end of 1946, measurements for 30 were discontinued as of April 1, 1947. Because only two measurements were made in 1947 for most of these wells, those measurements are included below. Therefore these wells will not appear in the 1947 water-level report. The following table lists these wells.

Wells active at year-end, 1946, but for which measurements were discontinued by the Geological Survey as of Apr. 1, 1947

Los Angeles County				
1/11-21B1	2/12-33B2	3/12- 8F1	4/13-11B1	4/13-12H1
2/12-23G1	33B3	3/13-35B2	11B3	14F3
27B1	33L2	4/13- 2K1	11D2	14P1
27H2	3/12- 7A2	2P1	11K5	23F2
28J2	7N1	10F1	11L3	24M1
29R1	7P1	10R1	12E1	26P6

Hydrologic conditions and water-level fluctuations

Records published by the United States 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 on this area in the calendar year 1946 was about 10 percent above average. However, in the water year ending September 30, 1946, rainfall on the area was only about 75 percent of average. This difference in rainfall for the two largely concurrent periods was caused by unusually heavy rains in November 1946, after the end of the 1946 water year.

The following table demonstrates the relation between the amount of rainfall during the water year which spans the rainy season, and that during the calendar year, which terminates in the middle of the rainy season. Obviously use of the water year gives a more consistent approach to the relation of rainfall to runoff and to ground-water replenishment. (See tables on pages 103 and 104.) However, because water-level records are presented herein on a calendar-year basis and because the heavy rainfall in 1946 after September 30 must have raised water levels by year-end, the dual tabulation of rainfall is believed to be informative. The table shows that for the period October 1945 to December 1946 the only months in which appreciable rain fell were December 1945, March, November, and December 1946. Rainfall in the other months was too small to benefit crops appreciably or to replenish ground-water supplies.

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

Date	Normal	Current	Departure	Percent
October 1945	0.65	0.33	-0.32	-49
November	.92	.25	-.67	-73
December	2.76	4.82	+2.06	+75
January 1946	2.51	.25	-2.28	-91
February	3.00	.98	-2.02	-67
March	2.21	3.57	+1.36	+62
April	.92	.44	-.48	-52
May	.39	.03	-.36	-92
June	.07	0	-.07	-100
July	0	0	0	0
August	.04	0	-.04	-100
September	.24	.02	-.22	-92
The water-year				
1945-46	13.71	10.67	-3.04	-22
October	.65	.68	+.03	+4.6
November	.92	6.64	+5.72	+622
December	2.76	3.04	+.28	+10
The calendar-				
year 1946	13.71	15.63	+1.92	+14

a Los Angeles, Long Beach, and Santa Ana.

The following table summarizes water-level fluctuations in 36 selected observation wells in the coastal plain in Los Angeles and Orange Counties. In this table, water levels at year-end are compared to the year-end levels of 1945 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 so-called West Basin southwest of the Newport-Inglewood uplift. Within the main coastal basin, the 16 index wells in Orange County show an average rise of 0.1 foot in the year 1946 and an average rise of 13.4 feet since 1936, and the 8 index wells in Los Angeles County show an average drop of 0.2 foot in the year 1946, but an average rise of 3.3 feet since 1936. Within the West Basin of Los Angeles County, the 9 index wells show an average rise of 0.7 foot during 1946, but an average drop of 16.8 feet since 1936. The rise of nearly a foot during 1946 is probably misleading; included in the average were two wells, Nos. 3/14-3K1 and 21B1, which showed an abnormal rise. Excluding these, an average drop of about 0.6 foot would result.

Summary of water-level fluctuations in 36 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 net decline (-) in water level, in feet	
	1936	1945	1946	1936-46	1945-46
Wells in the main coastal basin--Orange County					
3/11-36Q2	18.2	35.9	36.7	+18.5	+0.8
4/9- 7B1	11.2	47.5	54.8	+43.6	+7.3
4/10-22L2	10.2	32.8	29.9	+19.7	-2.9
4/11-19K1	10.9	19.5	20.8	+9.9	+1.3
5/10- 9D1	10.0	26.4	24.5	+14.5	-1.9
5/10-28B1	7.8	18.7	18.7	+10.9	0
5/11- 2E1	4.4	19.9	22.9	+18.5	+3.0
5/11-16D2	2.0	10.8	11.2	+9.2	+4
5/11-25F1	3.5	11.9	10.1	+6.6	-1.8
5/11-28A1	-6	b 8.2	b 8.2	.....	.....
5/11-29C4		6.4	7.2	.....	+8
5/12-12F1	.9	6.3	7.0	+6.1	+7
6/10- 1E1	.2	15.3	14.6	+14.4	-7
6/10- 1L2	17.1	22.3	21.9	+4.8	-.4
6/10- 5C1	3.5	13.1	11.0	+7.5	-2.1
6/11-13G2	.8	2.0	1.9	+1.1	-.1
I-9F1	-1.8	20.8	17.7	+19.5	-3.1
Averages:	6.1	19.4	19.5	+13.4	+0.1
2/12-13A1	133.5	158.2	159.8	+26.3	+1.6
3/12- 8L3	62.6	71.3	70.1	+7.5	-1.2
3/13- 8L2	35.4	23.0	19.6	-15.8	-3.4
3/13-35B2	28.0	34.2	34.2	+6.2	0
4/11- 5D1	14.5	14.9	15.7	+1.2	+8
4/12- 8F1	-14.2	-25.2	-25.2	-11.0	0
4/12-27K2	3.5	9.5	10.4	+6.9	+9
5/12- 2B1	3.0	8.7	8.5	+5.5	-.2
Averages:	33.3	36.8	36.6	+3.3	-0.2
Wells in the West (Coastal) Basin, tapping the Silverado water-bearing zone of Pleistocene age or its equivalent					
2/15-34H1	-0.8	-0.9	-2.0	-1.2	-1.1
3/13-18G2	13.4	-34.2	-36.9	-50.3	-2.7
3/13-32F2	-24.3	-39.2	-40.0	-15.7	-.8
3/14-3K1	.....	-34	-29	.....	+5
3/14-21B1	-11	-32	-26	-15	+6
3/14-36M3	c -13.5	-18.4	-19.8	-6.3	-1.4
4/13-14L1	d .3	2.2	2.4	+2.1	+2
4/13-23G2	-34.3	-59.5	-56.8	-22.5	+2.7
4/13-33D1	-30.5	-47.6	-47.6	-17.1	0
4/14- 8E1	-8.3	-10.1	-11.1	-2.8	-1.0
4/14-13F1	-22.3	-33.4	-34.7	-12.4	-1.3
Averages:	-14.8	-32.3	-31.6	-16.8	+0.7

a Chiefly interpolated.

b Flowing; measuring point is 8.2 feet above sea-level datum of 1941; excluded from average.

c Taps shallow deposits of Pleistocene age; excluded from averages.

d Taps Gaspar water-bearing zone of Recent age; excluded from averages.

Mojave Desert region

Antelope Valley, Kern and Los Angeles Counties

Observations of water level in Antelope Valley by the Geological Survey and by the Los Angeles County Flood Control District were continued in 1946 in 134 wells. These included 20 wells of which 10 were established during 1946 and the remainder during earlier years, and for which water-level records are renewed or are given for the first time in this report. Levels in one well were measured by continuous water-stage recorder; in 20 wells measurements were made at approximately monthly intervals; and in most of the remainder one measurement only was made in the fall of the year. The measurements indicate a continuation of the downward trend in levels of the past several years. The average decline in level from the fall of 1945 to the fall of 1946 for the entire valley was about 1.5 feet.

Mojave River Basin, San Bernardino County

Observations of water level in the Mojave River Basin were continued in 1946 in 63 wells. In all of these, levels were measured only in the spring of the year. Ordinarily the water levels in this basin are measured in both the spring and fall of the year as representing the times of maximum and minimum stages, respectively. Heavy precipitation occurred in the mountain portion of the drainage area in November of 1946, and the measurements of the water levels were not made until January of 1947. Recharge of ground water from these early rains was apparent in January 1947 as far downstream as Hesperia Crossing which was approximately the lower limit of surface flow in Mojave River. For the seven wells between the Forks and Hesperia Crossing, therefore, the January 1947 observations were not representative of minimum 1946 stages. For the remainder of the basin, the measurements indicated that ground-water levels were generally about the same at the end of 1946 as they were at the end of 1945.

During the water year ending September 30, 1946, the discharge of the Mojave River near Victorville was 62 percent of the 21-year average, and there was continuous flow at Barstow from March 29 to April 28.

Measurements of water level in the 7 wells between the Forks and Hesperia Crossing indicated an average net rise for the year of 10.0 feet; in 5 wells between Hesperia Crossing and Verde Crossing, they indicated an average net decline of 0.2 foot.

Wells in the valley between Victorville and Hodge showed an average net rise in water level of 0.3 foot from the previous year. Downstream from Hodge Crossing and north to the Barstow-Mojave highway, there was an average net rise of 0.4 foot, but farther north an average net decline of 0.6 foot was indicated. In the Lenwood-Barstow area, net rises averaged 0.3 foot.

In the area between Barstow and Daggett, the water levels showed no appreciable change from the previous year.

In the sub-basin between Daggett and the Kouns-Newberry sand-dune belt, the measured water levels indicated an average net decline of 2.6 feet. No change in levels was apparent in the sand-dune area. East of the sand-dune belt, changes in water level shown by the measurements were too slight to indicate a definite trend.

Mokelumne River Basin, San Joaquin County

During 1946 the East Bay Municipal Utility District continued monthly measurements of water level in selected observation wells of the Mokelumne area, in the central part of the Great Valley. Records for 24 of these wells have been published by the Geological Survey since 1935. In these index wells 280 measurements were made during the year.

Of the 24 wells, 1 was destroyed in September and 1 was dry during the latter half of the year. The following table correlates the average yearly water-level changes in the 24 index wells (22 in 1946) with the fluctuations in yearly rainfall, beginning with 1942. In this table the accumulated changes begin with 1934 as shown in the report for 1945. The table shows that the water level in the Mokelumne area declined for the fourth consecutive year. For the period of record, 1934-46, the decline in 1946 was exceeded only by those of 1939 and 1944, and the deficiency in rainfall during 1946 for the three index stations was exceeded only by those of 1934 and 1939.

Average yearly rise or decline of water level in 24 observation wells, and yearly rainfall in the Mokelumne area, 1942-46

Year	Water level		Rainfall ^{a/}	
	Yearly rise (+) or decline (-) (feet)	Accumulated rise (+) or decline (-) ^{b/} (feet)	Excess (+) or deficiency (-) (inches)	Accumulated excess (+) or deficiency (-) ^{b/} (inches)
1942	+0.72	+3.08	+7.76	+25.14
1943	-.19	+2.89	-2.93	+22.21
1944	-2.32	+.57	+4.46	+22.67
1945	-.06	+.51	+9.50	+32.17
1946	c -2.24	c -1.73	-8.92	+23.25

a Average of rainfall at Electra, West Point, and Twin Lakes, 1906-45. Average yearly rainfall at the 3 stations in this 40-year period was 38.74 inches.

b Accumulation dates from Jan. 1, 1934.

c Average based on 22 wells.

The second table shows the average change in water level in 1946 during the periods of increasing and of diminishing withdrawal for irrigation, respectively. This table shows that recharge early in 1946 was insufficient to offset the heavy withdrawals for irrigation. During the last half of the year, recharge was only slightly in excess of withdrawals so that the net change for the year was about equal to the change during the first five months.

Seasonal changes in water level, in feet, at 22 observation wells in the Mokelumne area, 1946

Period	Greatest rise	Greatest recession	Average change
Jan. 1 to May 31 (increasing withdrawal for irrigation)	+5.31	-10.05	-2.39
June 1 to Dec. 31 (diminishing withdrawal)	+7.57	-7.64	+.15
The year	+1.01	-5.51	-2.24

San Gabriel River Basin, Los Angeles County

A continuous water-stage recorder was in operation throughout 1946 on well 1S/10-18, at Baldwin Park, in the upper San Gabriel Valley. The water level in this well rose from a mean daily stage of 304.60 feet above sea level on January 1 to a stage of 307.24 feet, the highest of the year, on March 3. Alternately declining, rising and declining, it reached a stage of 299.23 feet, the lowest of the year, on September 19. On December 31 its mean daily stage of 303.97 feet was 3.27 feet below the highest stage of the year, 4.74 feet above the lowest stage, 0.56 foot below the mean daily stage of December 31, 1945, and 25.1 feet below the record high stage of 329.1 feet on May 19, 1916.

Basins in San Diego County

The measurements of water level in 47 wells in San Diego County in 1946 indicate net declines during the year in all of the 6 principal river basins of the county. As shown in the following table, the average net decline in San Luis Rey, San Dieguito, San Diego, and Tia Juana River basins ranged from 0.30 foot in 4 wells in the Tia Juana River basin to 2.53 feet in 18 wells in the San Diego River basin. In Sweetwater and Otay River basins the net changes in water level are indicated by measurements made in one well only in each basin; well 18/2W-22, in Otay River basin, showed a net decline of 0.45 foot, and well 17/1W-19a, in Sweetwater River basin, a net decline of 17.03 feet, the greatest in any one of the measured wells in the six basins. Small net rises in water level were shown in some wells in San Luis Rey, San Dieguito, and Tia Juana River basins, of which the rise of 3.54 feet in well 17/1W-19a in San Luis Rey River basin was the greatest.

Net changes in water level, in feet, in observation wells
in San Diego County, 1946

Basin	Number of wells	Number of measure- ments	Greatest net rise	Greatest net decline	Average net change
San Luis Rey River, Monserate Narrows to Oceanside	17	121	a 3.54	5.45	-1.24
San Dieguito River, San Pasqual Valley	6	23	.04	1.58	-.73
San Diego River, El Monte Park to coast	b 18	52	0	11.12	-2.53
Sweetwater River, at Sunnyside	c 1	5	....	17.03	-17.03
Otay River, at Otay	d 1	4	....	.45	-.45
Tia Juana River, near San Ysidro	e 4	20	.36	1.06	-.30

a Rise in well 17/1W-19a.

b Wells 15/1W-23H3 and 16/2W-16 not included because of incomplete records.

c Well 17/1W-19 not included; dry at time of all 1946 observations.

d Well 18-2W-22a not included; dry at time of all 1946 observations.

e Well 19/2W-1 not included because of incomplete record.

Santa Ana River Basin, Riverside and San Bernardino Counties

San Bernardino area

Observations of water level in the San Bernardino area were continued in 1946 in 10 wells; in 8 of these, levels were measured in February, May, and August; in 1, the Williams well, at weekly intervals; and in well 1S/3W-20B1, at monthly intervals. Measurements ordinarily made in November of each year were not made in 1946, but measurements were made in January of 1947. For eight of the wells, therefore, the net change in water level during 1946 is based on comparison of the levels of February 1946 and January 1947.

The water level in well 1S/3W-17C1, the Williams well near Redlands, rose from 9.20 feet below land-surface datum on January 4 to 9.03 feet, the highest observed stage of the year, on January 12. It then declined to 14.36 feet on March 30, rose again to 11.70 feet on April 13 and 20, and then declined continuously, except for a small rise in response to a summer storm during July, to 24.86 feet, the lowest observed stage of the year, on October 26. On December 28, reflecting the early winter rains, it had risen to a stage of 11.78 feet below land-surface datum. Thus, the net change in water level for the year is indicated to have been a decline of 2.58 feet.

Measurements of water level in the other nine wells distributed over the San Bernardino area indicated an average net decline of 2.66 feet from the levels of February 1946 to those of January 1947. The net decline in water level, shown in all of the nine wells, ranged from 7.21 feet in well 1S/3W-3N1 to 1.44 feet in well 1S/3W-29K1.

The fact that the annual change in water levels is shown generally to have been a marked decline for the first time since the rising trend which began in 1938 would appear to indicate strongly that the highest stages resulting from the recent series of years of average or greater-than-average precipitation were reached during 1945, and that a continuation of the declining trend shown during 1946 may be anticipated.

San Jacinto Valley

Observations of water level in the San Jacinto Valley were continued in 1946 in eight wells which were measured during February, May, and August. Measurements ordinarily made in November of each year were not made in 1946, but measurements were made in January of 1947. For these wells, therefore, the net change in water level during 1946 is based on comparison of the levels of February 1946 and January 1947.

Excluding one well because of incomplete record, the measurements of water level in the other seven wells distributed over the valley indicated net changes from February 1946 to January 1947 ranging from a rise of 5.06 feet in well 3/2W-35Q1 to a decline of 5.02 feet in well 4/2W-7J1. Both of these wells are in the Lakeview area. Net rises in water level were shown in three wells and net declines in the other four. The average net change in level for the seven wells was a decline of 0.22 foot.

Basins in Santa Barbara County

Program of work

Periodic water-level measurements made in connection with the investigation of the geology and ground-water resources of Santa Barbara County, were continued in 1946 by the Geological Survey in cooperation with the county. These measurements, from 1941 through 1945, have been published in Water-Supply Papers 941, 949, 991, 1021, and 1028, and through 1946 have been released locally in duplicated or typewritten form. Brief descriptions of the six principal ground-water areas of the county are given in Water-Supply Paper 949. Comprehensive reports on the geology and ground-water resources of the Santa Ynez River Valley, the south-coast basins, and the Santa Maria Valley have been released in duplicated or typewritten form.^{5/} In addition, a report on the Cuyama Valley will soon be released.^{6/}

In 1946 water-level measurements were also made by the city of Santa Maria and the Santa Maria Valley Water Conservation District. These measurements have been made available to the Geological Survey and are included in this report. Of the 166 observation wells being maintained at the end of 1945, 34 were discontinued during 1946 and 3 new wells were begun, making a total of 135 at the end of 1946. During 1946 most wells were measured bimonthly; a few were equipped with automatic water-stage recorders or "high-low" float gages.

General hydrologic conditions, pumpage, and fluctuations of water level

Rainfall at two main stations in Santa Barbara County for the year ending September 30, 1946, was 62 and 77 percent of the long-term average. At Santa Barbara the rainfall was 11.33 inches as compared with the 79-year average of 18.27 inches, and at Santa Maria it was 11.08 inches compared with the 61-year average of 14.35 inches. The average rainfall at eight

^{5/} Upson, J. E., Thomasson, H. G., Jr., and others, Geology and water resources of the Santa Ynez River Valley, Santa Barbara County, California: U. S. Geol. Survey duplicated report, 1947. Upson, J. E., Thomasson, H. G., Jr., and others, Geology and ground-water resources of the south-coast basins of Santa Barbara County, California, with a section on surface-water resources: U. S. Geol. Survey typewritten report, 1947. Worts, G. F., Jr., and Thomasson, H. G., Jr., Geology and ground-water resources of the Santa Maria Valley area, Santa Barbara County, California, with a section on surface-water resources: U. S. Geol. Survey typewritten report, 1947.

^{6/} Upson, J. E., and Worts, G. F., Jr., Ground water in the Cuyama Valley, California: U. S. Geol. Survey typewritten report, 1947.

stations maintained by the Geological Survey (see Water-Supply Paper 849, p. 182) was 13.90 inches--79 percent of that for the nearly average year 1943-44. Also, at these eight stations the rainfall for the year ending September 30, 1945, was 80 to 85 percent of the long-term averages. Thus, rainfall was below average for the two consecutive water years, 1945 and 1946.

Because recharge is roughly proportional to rainfall, the low precipitation during these two years has produced little recharge to ground-water bodies in the county. During the winter months the observation wells in recharge areas reflect this condition by showing only slight rises in some areas and even marked declines in others. Low rainfall has necessitated an increase in winter pumpage for irrigation thereby placing an additional draft on ground-water bodies. As a result, in most areas there has been a substantial decline of water levels since 1944.

In 1946 the total pumpage for irrigation, and for municipal, industrial, domestic, and stock use in the county is estimated to have been about 160,000 acre-feet--about 40,000 more than that pumped in 1944. This total does not include the water consumed by the cities of Santa Barbara and Montecito whose supply is derived by the impounding and diversion of Santa Ynez River water. Pumpage for irrigation alone amounted to about 154,000 acre-feet. Because in some areas a part of the water applied to crops seeps downward and returns to storage, the figure for pumpage is not the total permanently removed from underground storage. The amount of return probably ranges from none to as much as 35 percent in the different areas. Accordingly, the net pumpage (total less the return of irrigation water) is estimated for the year 1946 as about 134,000 acre-feet. Very little of the pumpage for use other than irrigation returns to storage. Unless otherwise indicated, pumpage is estimated by dividing total kilowatt-hours of electric energy consumed in the year by factors for the number of kilowatt-hours required to pump 1 acre-foot of water. Data on electric energy consumed were very kindly supplied by The Pacific Gas and Electric Company, and The Southern California Edison Company.

Figure 10 shows water-level fluctuations in 10 wells and yearly rainfall at 3 stations for the 6-year period 1941-46. The hydrographs show that in most areas there was a general rise of water levels through 1943, and that beginning in 1944 levels have declined. Again, this can be

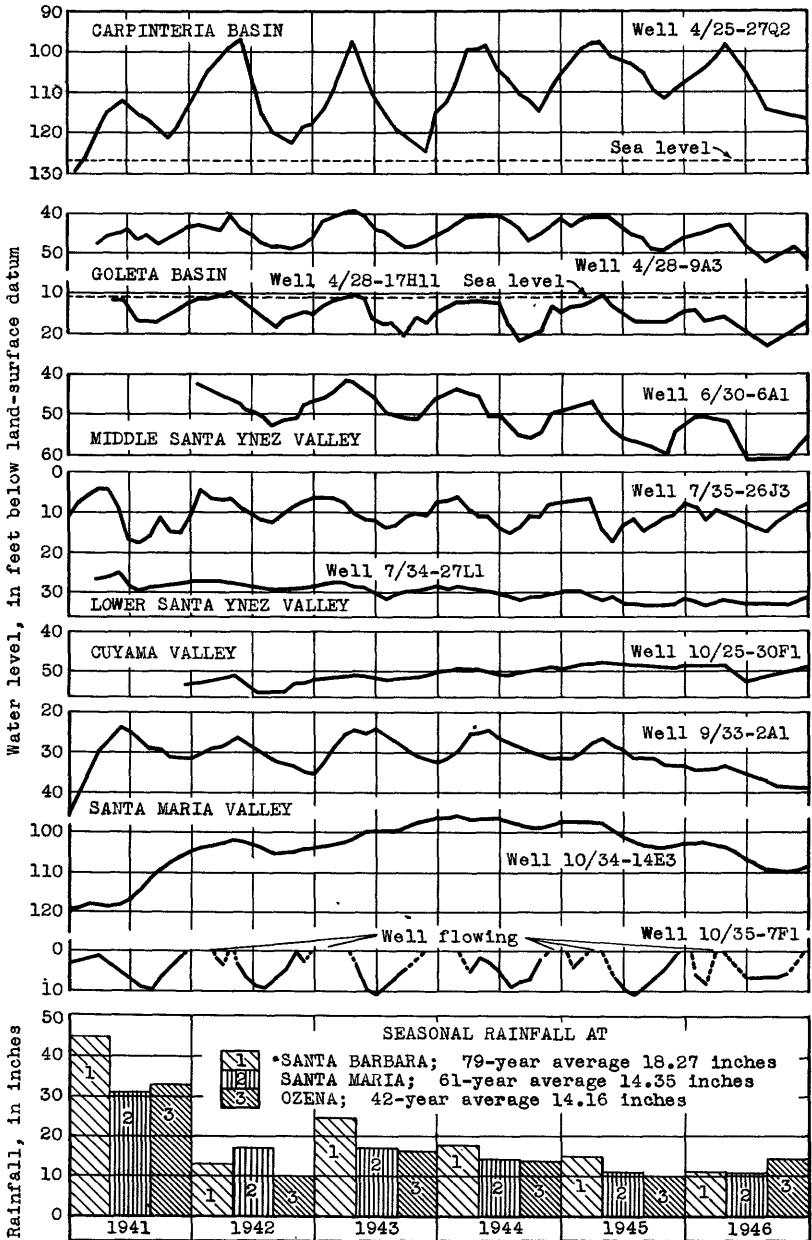


Figure 10.--Water-level fluctuations in 10 wells in Santa Barbara County, California, and yearly rainfall at Santa Barbara, Santa Maria, and Ozena for the years 1941-46.

attributed to variations in rainfall, and hence to recharge and pumpage. Because hydrologic conditions differ considerably from one ground-water basin to another, the fluctuations of water level in each are discussed separately.

Carpinteria Basin

Total pumpage in the Carpinteria Basin during 1946, based in part on the pumpage computed for preceding dry years, is estimated to be at least 3,500 acre-feet, which, because little or no irrigation water returns to storage, is also the net pumpage. This amount is more than twice the estimated perennial yield of 1,700 acre-feet. The overdraft of about 1,800 acre-feet combined with low recharge has produced a net decline of water levels throughout the basin. The net decline was greatest in the recharge area where the maximum levels in 1946 were 5 to about 20 feet below those of 1945. A comparison of year-end water levels showed about the same net decline. In the recharge area the greatest declines occurred in the north-eastern part of the basin, and the smallest in the western part. In the area of confined water, mainly the area of the alluvial plain, maximum levels of 1946 were 2 to 10 feet lower than maximum levels of 1945. It is estimated that the average areal net decline of maximum levels for the entire basin was about 5 feet. Water levels will continue to decline as long as pumpage is greater than the replenishment.

Water levels in wells in the southwestern part of the basin near the coast were locally a few feet below sea level during 1946. This condition was reported more widespread in years prior to 1941. From 1941 through 1945 nearly all "static" levels were above sea level, but since 1944 the head near the coast has decreased somewhat. At year end the "static" levels in three wells were below sea level; in one well, 4/25-29D1, the level was about 11 feet below. The pumping levels in most wells near the coast are several tens of feet below sea level. However, there have been no reports of sea-water encroachment into these wells.

A comparison of the year-end levels in 1946 with those of 1941 show an areal net decline estimated to be nearly 10 feet. The graph for well 4/25-27Q2 (fig. 10), which is in the area of confined water, shows a net decline for this period of only about 4 feet but does not indicate a year-end recovery in 1946 as in the past 5 years. The graph also shows that the peaks or maximum levels reached in the years 1942-46 are nearly the same

indicating that the head in this part of the basin has not declined appreciably through April 1946.

Goleta Basin

In the Goleta Basin total pumpage is essentially equal to the net pumpage. During 1946, based in part on the pumpage computed for preceding dry years, total pumpage is believed to have been at least twice the estimated perennial yield of 3,100 acre-feet. This overdraft combined with low recharge has produced a net decline of water levels throughout the basin, but not so great as those which occurred in the Carpinteria Basin. Net declines of maximum levels from 1945 to 1946 were about as great in the recharge area as in the area of confined water, and ranged from less than 1 foot to about 8 feet. The largest declines occurred in the north-central and northeastern parts of the area. A comparison of year-end levels in 1945 and 1946 shows net declines of about the same magnitude. In the recharge area the average areal net decline from maximum levels in 1945 to those in 1946 was nearly 3 feet indicating a perceptible depletion of storage in that part of the basin.

Throughout the southern third of the basin along the coast, water levels have remained below sea level for at least 6 years. The size of this area is expanding, and the depth of water levels below sea level is increasing. The "static" water level in well 4/29-14A3, which is at the western edge of the basin, was 23 feet below sea level on July 5, 1946--the maximum depth recorded during the year.

The net change in year-end water levels from 1941 to 1946 in the Goleta Basin is shown by the graphs for wells 4/28-9A3 and 4/28-17H11 (fig. 10). In well 9A3 the net decline was over 8 feet, and in well 17H11 it was nearly 5 feet. Both wells are in the area of confined water and heavy withdrawals. Nevertheless, the loss of head is comparable to the over-all average net decline of about 6 feet. In the recharge area the water level in well 4/28-4R2 declined more than 21 feet during this period.

In the Goleta Basin a few observation wells tap a shallow-water body from which there is essentially no pumpage. Fluctuations of water level in these wells show the natural balance between replenishment and discharge without the effect of pumping. From the maximum levels in 1945 to those in 1946 water levels had a net decline of slightly more than 1 foot; from

1941 to 1946 the net decline was about 4 feet. These figures clearly indicate a deficiency of replenishment.

Middle Santa Ynez Valley

Total pumpage in the Middle Santa Ynez Valley during 1946 is estimated to have been about 15,800 acre-feet--an increase of about 65 percent over that for 1944. In spite of the increased pumpage the water levels in wells along the river showed essentially no net change from peaks of 1945 to those of 1946. This is because, even though rainfall was below average, runoff in the Santa Ynez River was sufficient to replenish the water bodies immediately adjacent to it. On the other hand, for the ground-water body beneath the Santa Ynez Upland east of Solvang and Los Olivos, where replenishment is from rain and minor streams, there was insufficient recharge to replace the draft. This draft is increasing yearly as new irrigation wells are brought into use. The effect of this increase on water levels in 1946 was most apparent at the north edge of the upland area where maximum levels were 3 to 4 feet below those of 1945. At the south edge, where ground water is discharged over a consolidated rock barrier into the river, water levels had net declines of less than 1 foot.

The hydrograph for well 6/30-6A1 (fig. 10) illustrates the conditions in the central part of the Santa Ynez Upland for the years 1942-46. It shows that water levels recovered to about the same peak in 1943 as in 1942, but that beginning in 1944 there has been a steady over-all decline which has amounted to about 7 feet. As suggested above, this is due not only to 2 years of below-average recharge, but also to an increased draft on ground water resulting from an increase in irrigated acreage on the upland.

Lower Santa Ynez Valley

Total pumpage in the Lower Santa Ynez Valley during 1946 is estimated to have been about 14,000 acre-feet--a little more than in 1944. The maximum levels in 1946 in wells that tap the principal water body were about 1 foot below those of 1945 indicating that pumpage was somewhat in excess of replenishment for the year. In wells that tap shallow water, from which there is little pumpage, water levels had an average net decline of nearly 2 feet.

The hydrographs for well 7/34-27L1 (fig. 10), which is representative of conditions at the east end of the Lompoc Plain, and for well 7/35-26J3, which is representative of conditions at the west end, show several features. In 1941 the peak water levels reached in both wells were considerably above those in succeeding years, due to excessive recharge and prolonged high river stages in that year. In subsequent years the peaks to which the water level in well 7/35-26J3 has recovered each year have been about the same, indicating essentially no loss of head in that area. On the other hand, in well 7/34-27L1, there has been a slight but progressive over-all decrease in peak levels amounting to about 4 feet, due to declining recharge and lowered river stages together with increased pumpage. The effect of these elements has been local, however, as continuous records of water levels in other wells throughout the area, beginning in 1930, indicate that there has been little over-all net change of water levels in 16 years.

San Antonio Valley

No estimates of pumpage have been made for the San Antonio Valley principally because the valley is relatively small and pumpage low. In 1946 pumpage from the 15 to 20 irrigation wells in the valley probably did not amount to more than roughly 2,000 acre-feet. Fluctuations of water level show a net decline of less than 1 foot from the maximum levels in 1945 to those in 1946. Furthermore, from December 1943, the date of the earliest recorded measurements, to December 1946 there has been essentially no net change in water levels. Thus, the draft from San Antonio Valley probably is less than the yield.

Santa Maria Valley

Total pumpage in the Santa Maria Valley during 1946 is estimated to have been about 104,000 acre-feet. Allowing about 20 percent return of irrigation water, the net pumpage is estimated to have been about 85,000 acre-feet--about 20,000 acre-feet more than in 1944. The perennial yield of the valley has been estimated to be about 53,000 acre-feet a year. Thus, in 1946 the yield was exceeded by more than 30,000 acre-feet. This overdraft combined with low recharge caused a marked decline of water levels which, in the area of recharge, continued steadily throughout the year.

In wells along the river below Fugler's Point water levels declined as much as 12 feet from December 1945 to December 1946. In the area of confined water at the lower end of the valley the loss in head was 5 feet at the inland edge and 1 foot near the coast. However, the area of flowing wells near the coast had not contracted noticeably, and consequently, there was no threat of immediate sea-water encroachment. For the remainder of the valley water-level declines ranged from as little as 1 foot in areas remote from pumping to 5 or 6 feet in areas of heavy pumping. The net decline in well 10/34-14E3 (fig. 10) of 5.5 feet from the maximum level in 1945 to that in 1946 is probably representative of the average decline in the area of heavy pumping.

Water levels in the Santa Maria Valley have been declining for several years. As a result of above-average rainfall and, hence, large recharge in the late thirties and early forties, water levels of 1943 or 1944 in most wells were at the highest levels since the middle or late twenties. Since 1944, levels have declined progressively as a result of below-average rainfall and greatly increased pumpage. Maximum levels in 1946 in all wells were considerably below those of 1943 or 1944. In wells along the river the net decline has averaged more than 20 feet. Away from the river, as in well 10/34-14E3 (fig. 10), the water level had a net decline of about 7 feet since 1944. At well 10/35-7F1, in the area of confined water, the head has recovered sufficiently each winter to produce a flow. However, observed decreases in discharge from the well indicate the year-to-year maxima actually have been reduced, particularly during 1946.

In summation, in the Santa Maria Valley during the past 2 years net declines in water level have been greater than in any other valley or basin in the county. This continued rapid decline is highly undesirable not only because it means increased pumping lifts, and, hence, increased operational costs, but also because it represents the unwatering of highly productive water-bearing deposits and threatens the ultimate encroachment of sea water into the area.

Cuyama Valley

Total pumpage in the Cuyama Valley during 1946, based on the known acreage and estimated duty of water, is estimated to have been about 17,000 acre-feet--about 8,000 more than in 1944. Thus, pumpage has almost doubled in the last 2 years. In the heavily pumped part of the valley the maximum

levels in 1946 were less than 1 foot below those in 1945. However, in the recharge area, several miles upstream, the level in one well had a net decline of more than 7 feet.

The graph for well 10/25-30F1 (fig. 10) shows the fluctuations in the area of heavy pumping for the period 1941-46, and indicates a net rise in water level of about 4 feet for the period. Pumping for irrigation began in 1939, and, consequently, the graph nearly spans the period of draft. However, within the pumped area as a whole there has been essentially no net change.

SYMBOLS ASSIGNED TO OBSERVATION WELLS

In the following descriptions and records of water level, observation wells are identified by symbols or "numbers" that indicate their respective locations according to the rectangular system for subdivision of public land. In Water-Supply Paper 991 these symbols were assigned for the first time to all Geological Survey observation wells in the State, according to the system described in that water-supply paper and there accompanied by a cross-reference table of previous numbers and location symbols.

The descriptions and records are given by counties in alphabetical sequence, and for each county in numerical order of the location symbols. Thus, certain groups of the data each pertain to a distinct ground-water area as indicated by sub-headings in the record. However, other groups of data each span two or more ground-water areas--under this circumstance, the area is indicated in the text statements that introduce the several records of individual wells.

WELL DESCRIPTIONS AND WATER-LEVEL MEASUREMENTS

Kern County

Antelope Valley

9/12-16R1. Robert Rubeen. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 16, T. 9 N., R. 12 W., about 0.6 mile east of Rosamond, 435 feet north of Rosamond-Muroc Road, and 0.6 mile east of Sierra Highway (U. S. 6). Domestic well, equipped with wind-mill, diameter 8 inches, depth 150 feet. Measuring point, top of casing, flush with concrete floor, and 1.0 foot above land-surface datum which is about 2,350 feet above sea level. Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum: Nov. 7, 1945, 39.1; Apr. 13, 1946, 39.1.

9/12-21D1 (*991, p. 100; 1021, p. 85; 1028, p. 79). Southern Pacific Lands Agency. In Rosamond. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	a 39.6	Apr. 5	40.8	Aug. 2	44.9	Oct. 17	45.6
7	39.8	July 3	44.2	Sept. 5	45.8	Nov. 1	45.1

a By Geological Survey.

9/13-14H1. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 14, T. 9 N., R. 13 W., about 3 miles west of Rosamond, 275 feet north of east-west half-section line, and 65 feet west of 50th Street W. extended. Abandoned well. Measuring point, top of casing, at land-surface datum which is about 2,460 feet above sea level. Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum, 1946: Apr. 5, 65.8; Apr. 13, 65.8.

9/13-20H1 (*991, p. 101; 1021, p. 86; 1028, p. 79). Harry White. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	66.7	Apr. 5	67.4	Sept. 5	71.0	Nov. 1	71.4
7	66.6	July 3	70.0	Oct. 17	71.3		

9/13-20H2 (*991, p. 101; 1021, p. 86; 1028, p. 80). Harry White. Water level, in feet below land-surface datum, 1946: Jan. 3, 66.8.

9/13-35F1 (*1028, p. 80). P. D. Gaskill. Measurements by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 10, 55.1.

9/14-24K1. De Fone. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24, T. 9 N., R. 14 W., about 8.5 miles west of Rosamond, 0.4 mile north of south line of section 24, and 0.5 mile west of 100th Street W. extended. Used irrigation well, diameter 14 inches, depth 310 feet. Measuring point, hole at junction of pump base plates, near $\frac{1}{2}$ -inch pipe, 0.5 foot above land-surface datum which is about 2,490 feet above sea level. Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum: Nov. 22, 1941, 93.1; Aug. 10, 1943, 101.7; Dec. 7, 1943, 97.9; Dec. 10, 1946, 101.6.

9/14-24Q1 (*1028, p. 80). De Fone. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 10, 102.4.

9/14-29M1 (*1028, p. 80). Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 7	177.0	July 3	176.8	Dec. 11	176.9
Apr. 4	176.8	Oct. 17	177.0		

9/14-32D1 (*1028, p. 80). Sears. Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum, 1946: Jan. 7, 167.8; Dec. 11, 167.7.

Los Angeles County

Antelope Valley

5/9-6B1 (*1028, p. 80). Water level, in feet below land-surface datum, 1946: Dec. 18, 34.9.

5/9-20J1 (*1021, p. 86; 1028, p. 81). L. M. Nixon. No measurements made in 1946.

5/10-6N1 (*1028, p. 81). Little Rock Irrigation District. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 3, 88.2.

5/10-7E1 (*1028, p. 81). Calavalle. Equipped with automatic water-stage recorder. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 8	119.6	May 7	119.8	Aug. 15	124.8	Nov. 1	122.5
30	119.4	June 19	127.0	Sept. 5	125.2	Dec. 3	121.1
Mar. 6	119.3	July 2	130.8	13	128.4	14	120.9
Apr. 4	110.6	Aug. 2	124.6				

5/10-7R1 (*1028, p. 81). Tamarack Park. No measurements made in 1946.

5/10-12B1 (*1028, p. 82). Ed Sanner.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	51.2	Apr. 5	50.8	July 5	50.4	Oct. 7	50.4
Feb. 5	51.0	May 7	50.6	Aug. 6	50.4	Nov. 5	50.5
Mar. 5	50.8	June 5	50.5	Sept. 6	50.4	Dec. 18	50.7

5/10-21J1 (*1028, p. 82). Water level, in feet below land-surface datum, 1946: Dec. 19, 19.4.

5/10-26B1 (*1028, p. 82). R. J. Darling. Water level, in feet below land-surface datum, 1946: Dec. 19, 45.7.

5/11-4R1 (*1028, p. 82). Joe Martin. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 3, 142.0.

5/11-9Q1 (*1028, p. 82). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 3, 37.2.

5/11-9R1 (*1028, p. 82). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 3, 33.0.

5/11-10R1 (*1028, p. 83). Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 8	65.1	Apr. 4	70.5	Aug. 2	75.8	Nov. 1	79.2
Feb. 4	66.5	May 7	72.3	Sept. 5	77.1	Dec. 4	78.5
Mar. 6	68.5	July 3	75.0	Oct. 17	78.0		

5/11-12H1 (*1028, p. 83). Wheelock. No measurements made in 1946.

5/11-12Q1 (*1028, p. 83). Wheelock. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 3, 128.6.

5/11-13J1 (*1028, p. 83). Little Rock Irrigation District. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 3, 214.6.

6/8-10N1 (*991, p. 102; 1021, p. 86; 1028, p. 84). W. G. Baguet. Water level, in feet below land-surface datum, 1946: Nov. 27, 24.4.

6/8-18D1 (*991, p. 102; 1021, p. 86; 1028, p. 84). Hoff.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	(a)	Apr. 5	(a)	July 5	159.4	Oct. 7	158.7
Feb. 5	(a)	May 7	158.9	Aug. 6	(a)	Nov. 5	158.7
Mar. 5	159.7	June 5	(a)	Sept. 6	159.2	27	158.6

a Pumping; no measurement made.

6/8-32P1 (*1021, p. 86; 1028, p. 84). M. B. Scofield. Casing closed by pump. Measurements discontinued.

6/9-4H1 (*991, pp. 102-103; 1021, p. 87; 1028, p. 84). Wilsona School. Water level, in feet below land-surface datum, 1946: Nov. 27, 113.0.

6/9-31R1 (*1028, p. 84). Barlow. Water level, in feet below land-surface datum, 1946: Dec. 18, 29.2.

6/10-9C1 (*1028, p. 84). No measurements made in 1946.

6/10-9E1 (*1028, p. 84). Water level, in feet below land-surface datum, 1946: Nov. 26, 189.9.

6/10-9Q1 (*1028, p. 84). N. C. and O. C. Riley. Water level, in feet below land-surface datum, 1946: Nov. 26, 149.0.

6/10-10Q1 (*1028, p. 84). Water level, in feet below land-surface datum, 1946: Nov. 26, 70.8.

6/10-20P1 (*1028, p. 85). Mrs. Johnson.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	142.8	Apr. 5	147.0	July 5	148.6	Oct. 7	150.2
Feb. 5	143.8	May 7	148.9	Aug. 6	150.0	Nov. 5	151.4
Mar. 5	145.2	June 5	147.0	Sept. 6	150.3	26	150.8

6/10-27B1 (*1028, p. 85). Water level, in feet below land-surface datum, 1946: Dec. 26, 150.7.

6/10-27E3 (*1028, p. 85). No measurements made in 1946.

6/10-32E1 (*1028, p. 85). McAlester. Measuring point beginning Dec. 5, 1945, base of pump, at land-surface datum. Water level, in feet below land-surface datum, 1946: Dec. 18, 109.0.

6/10-32F1 (*1028, p. 86). McAlester. Water level, in feet below land-surface datum, 1946: Dec. 18, 113.0.

6/11-4C1 (*1028, p. 86). Lyons Bros. Water level, in feet below land-surface datum, 1946: Dec. 18, 164.0.

6/11-5A1 (*991, p. 103; 1021, p. 87; 1028, p. 86). Lyons Bros. Water level, in feet below land-surface datum, 1946: Dec. 18, 164.9.

6/11-8E1. Palmdale Irrigation District. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, T. 6 N., R. 11 W., about 3.5 miles northeast of Palmdale, 0.5 mile south of Avenue N, 100 feet east of 30th Street E. extended, and 25 feet south of airport landing strip. Abandoned well, diameter 16 inches, depth about 400 feet, drilled in 1920. Measuring point, top of casing, at land-surface datum which is about 2,512 feet above sea level. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1942-44, 1946

Date	Water level	Date	Water level	Date	Water level
Nov. 17, 1942	168.9	Dec. 13, 1943	172.3	Dec. 18, 1946	164.7
Apr. 30, 1943	171.0	May 4, 1944	174.5		

a By Geological Survey.

6/11-8R1 (*1028, p. 86). Water level, in feet below land-surface datum, 1946: Dec. 18, 192.4.

6/11-9F1 (*1028, p. 86). Elmer Benson. Water level, in feet below land-surface datum, 1946: Dec. 18, 178.0.

6/11-12M1 (*1028, p. 86). E. J. Ball. Water level, in feet below land-surface datum, 1946: Nov. 26, 185.1.

6/11-12Q1 (*1021, p. 87; 1028, p. 87). E. J. Ball. Water level, in feet below land-surface datum, 1946: Nov. 26, 181.9.

6/11-19E1 (*1028, p. 87). Palmdale Irrigation District. Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum, 1946: Apr. 4, 248.5; Dec. 4, 240.1.

6/11-20P1 (*1028, p. 87). Mrs. F. C. Smith. No measurements made in 1946.

6/11-20R2. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 20, T. 6 N., R. 11 W., about 3 miles northeast of Palmdale, 800 feet north of Avenue Q, and 900 feet west of 40th Street E. Irrigation well, diameter 12 inches. Measuring point, top of casing, 0.7 foot above land-surface datum which is about 2,580 feet above sea level. Water level, in feet below land-surface datum, 1946: Dec. 18, 233.2.

6/11-26R1 (*1028, p. 87). Measuring point beginning Dec. 5, 1945, at land-surface datum. Water level, in feet below land-surface datum, 1946: Dec. 18, 110.8.

6/11-28N1 (*1028, p. 87). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 4, 96.7.

6/11-32P1 (578, p. 366, well 111; *1028, p. 88). Palmdale Rancho. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 4, 172.9.

6/11-33Q1. Pete Mikalivnas. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 33, T. 6 N., R. 11 W., about 4 miles southeast of Palmdale, 25 feet north of Avenue S, and 200 feet west of Pear Blossom Highway. Used domestic well, diameter 10 inches for 250 feet, and 8 inches for 45 feet, total depth 295 feet. Measuring point, concrete pump base, 0.5 foot above land-surface datum which is about 2,680 feet above sea level. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1941-43, 1946

Date	Water level	Date	Water level	Date	Water level
Apr. 28, 1941	131.9	Nov. 28, 1942	134.7	Dec. 4, 1946	136.2
Dec. 2	133.4	29, 1943	136.1		

6/11-33R1 (*1028, p. 87). Thornberg. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 4, 117.8.

6/12-25N1 (*1021, p. 87; 1028, p. 87). Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 8	286.8	Mar. 6	286.8	May 7	288.1
Feb. 4	286.8	Apr. 4	287.8		

6/13-12J1 (*1028, p. 87). Glick. Water level, in feet below land-surface datum, 1946: Dec. 12, 247.4.

7/9-17N1 (*1028, p. 87). Ernest Koch.

Water level, in feet below land-surface datum, 1946

Jan. 3	128.6	Apr. 5	129.2	Nov. 7	136.1
Feb. 5	127.8	May 7	140.3	26	133.9

7/9-28N1 (*1028, p. 87). Tygeson. Measuring point beginning Nov. 27, 1946, top of wooden clamp, 0.4 foot above top of casing, and 0.7 foot above land-surface datum (from resurvey). Water level, in feet below land-surface datum, 1946: Nov. 27, 138.4.

7/10-5M1 (*991, p. 103; 1021, p. 87; 1028, p. 88). Ella E. Cunningham. Water level, in feet below land-surface datum, 1946: Nov. 26, 86.6.

7/10-5N3 (*1028, p. 89). Ella E. Cunningham. Water level, in feet below land-surface datum, 1946: Nov. 26, 104.1.

7/10-6R1 (*1028, p. 89). Mrs. Jessie Hollingsworth. Water level, in feet below land-surface datum, 1946: Nov. 26, 105.6.

7/10-7B1 (*991, p. 104; 1021, p. 88; 1028, p. 89). Boege. Water level, in feet below land-surface datum, 1946: Nov. 26, 75.4.

7/10-12H1 (*1028, p. 89). Water level, in feet below land-surface datum, 1946: Nov. 27, 118.8.

7/10-21A1 (*1028, p. 89). Water level, in feet below land-surface datum, 1946: Dec. 17, 144.4.

7/10-30G1. E. J. Ball. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 30, T. 7 N., R. 10 W., about 10 miles east of Lancaster, 10 feet north of quarter-section line, and 1,800 feet west of 90th Street E. Irrigation well, diameter 14 inches, depth 450 feet. Measuring point, underside of pump base, east side, 1.5 feet above land-surface datum which is about 2,488 feet above sea level. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1940-43, 1946

Date	Water level	Date	Water level	Date	Water level
Nov. 29, 1940	143.1	Dec. 4, 1942	152.0	Nov. 26, 1946	al70.4
Dec. 2, 1941	144.9	15, 1943	155.2		

a By Geological Survey.

7/10-31B1 (*991, p. 105; 1021, p. 88; 1028, p. 89). Measurements discontinued.

7/10-31N1 (*1028, p. 89). H. O. Bakken. Water level, in feet below land-surface datum, 1946: Nov. 26, 182.1.

7/11-1Q1 (*1021, p. 88; 1028, p. 89). H. L. Gordon. Water level, in feet below land-surface datum, 1946: Nov. 26, 98.9.

7/11-8P1 (*991, p. 105; 1021, p. 88; 1028, p. 89). MacAvery. Water level, in feet below land-surface datum, 1946: Nov. 25, 66.4.

7/11-16B1 (*1028, p. 89). Water level, in feet below land-surface datum, 1946: Nov. 26, 91.9.

7/11-19N1 (*1028, p. 89). Water level, in feet below land-surface datum, 1946: Dec. 17, 128.7.

7/11-23L1 (*1028, p. 90). Barnes. Water level, in feet below land-surface datum, 1946: Nov. 26, 128.0.

7/11-24C1 (*991, p. 105; 1021, p. 88; 1028, p. 90). Stevenson.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 5	122.1	May 7	130.9	Aug. 6	134.5	Nov. 5	137.9
Mar. 5	124.5	June 5	131.8	Sept. 6	136.0	26	132.3
Apr. 5	125.4	July 5	al33.4	Oct. 7	136.4		

a Windmill pumping intermittently.

7/11-28E1 (*1028, p. 90). Leshin. Water level, in feet below land-surface datum, 1946: Dec. 17, 134.8.

7/11-28H1 (*1028, p. 90). Leshin. Well plugged; measurements discontinued.

7/11-28L1 (*991, p. 106; 1021, p. 88; 1028, p. 90). Water level, in feet below land-surface datum, 1946: Dec. 17, 122.2.

7/12-4H1 (*1028, p. 90). Well obstructed. Measurements discontinued.

7/12-4F1 (*1028, p. 90). Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum, 1946: Apr. 5, 8.0; Oct. 17, 13.2; Dec. 9, well plugged at 6.3 feet. Measurements discontinued.

7/12-4F2 (*1028, p. 91). Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum, 1946: Jan. 7, 4.6; Apr. 5, 3.8; July 3, 15.2; Dec. 9, 8.4.

7/12-6D1 (*1028, p. 91). No measurements made in 1946.

7/12-6M1 (*1028, p. 91). Measurement made by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 11, 17.5.

7/12-8D1 (*1028, p. 91). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 9, 7.8.

7/12-10P1. Antelope Valley Laundry. SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 10, T. 7 N., R. 12 W., in Lancaster, 250 feet north of Avenue I, 930 feet west of property line of Sierra Highway (U. S. 6), at rear of 318 West Avenue I. Laundry well, diameter 8 inches for 250 feet, and 6 inches for 253 feet, total depth 503 feet. Measuring point, hole, east side of pump housing 0.6 foot above concrete floor, and 0.6 foot above land-surface datum which is about 2,338 feet above sea level. Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum: Dec. 8, 1943, 23.4; Dec. 9, 1946, 49.1.

7/12-15F1 (*1028, p. 91). A. H. Powell. In Lancaster. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 7	34.0	July 3	54.6	Dec. 9	40.2
Apr. 5	37.8	Oct. 17	48.0		

7/12-15F2 (*1028, p. 91). Los Angeles County Water District 4. No measurements made in 1946.

7/12-22J1 (*1028, p. 92). F. La Horgue. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 9, 103.1.

7/12-29F1 (*1028, p. 92). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 134.7.

7/12-32J1 (*991, p. 106; 1021, p. 88; 1028, p. 92). Lord. Measurements discontinued.

7/12-32R1 (*991, p. 106; 1021, p. 88; 1028, p. 92). Measurements discontinued.

7/12-34E1 (*1021, p. 88; 1028, p. 92). G. Lane. No measurements made in 1946.

7/12-34H1 (*991, p. 106; 1021, p. 88; 1028, p. 92). Morrison. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	181.5	Apr. 4	182.4	July 3	183.0	Oct. 17	185.3
Feb. 4	180.8	May 7	181.9	Aug. 2	183.6	Nov. 1	185.5
Mar. 6	181.4	June 5	182.4	Sept. 5	184.4	Dec. 4	185.4

7/13-3D1 (*1028, p. 92). F. Gorrindo. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 59.7.

7/13-3D2 (*1028, p. 92). F. Gorrindo. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 48.7.

7/13-6A1 (*991, p. 107; 1021, p. 88; 1028, p. 92). No measurements made in 1946.

7/13-11C1 (*1028, p. 92). Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum, 1946: Jan. 7, 26.2; Feb. 4, 27, poor measurement, new pump.

7/13-11D1 (*1028, p. 93). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 4.8.

7/13-11D2 (*1028, p. 93). Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum, 1946: Jan. 8, 36.5; Feb. 4, 35.0; Apr. 5, well destroyed. Measurements discontinued.

7/13-11M1 (*991, p. 107; 1021, p. 88; 1028, p. 93). John Payne. No measurements made in 1946.

7/13-16B1 (*1028, p. 93). J. R. Harris. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 34.8.

7/13-16B2 (*1028, p. 93). J. R. Harris. No measurements made in 1946.

7/13-17D1 (*991, p. 108; 1021, p. 88; 1028, p. 93). G. Zaro. No measurements made in 1946.

7/13-21J1 (*1028, p. 93). L. H. Benson. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 78.5.

7/13-21J2 (*1028, p. 93). L. H. Benson. No measurements made in 1946.

7/13-21J3. L. H. Benson. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 21, T. 7 N., R. 13 W., about 7 miles west of Lancaster, 1,600 feet north of Avenue K, 800 feet west of 70th Street W., 160 feet northwest of house, and 8 feet north of well 7/13-21J2. Drilled domestic well, diameter 6 inches, depth about 600 feet. Measuring point, top of iron clamp, 0.15 foot above top of casing, and 1.4 feet above land-surface datum which is about 2,372 feet above sea level. Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum: Nov. 24, 1942, 67.0; Dec. 1, 1943, 67.0; May 9, 1944, 84.6; Dec. 12, 1946, 78.5.

7/13-23N1 (*1028, p. 93). No measurements made in 1946.

7/13-27N1 (*1028, p. 94). Measurement made by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 134.6.

7/13-28P1 (*1028, p. 94). Crenmer. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 187.1.

7/13-34H1 (*991, p. 108; 1021, p. 88; 1028, p. 94). E. P. Wieman. No measurements made in 1946.

7/13-35E1 (*991, p. 108; 1021, p. 88; 1028, p. 94). George Lane. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 176.0.

7/14-10F1 (*1028, p. 94). F. A. Ullman. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 7	186.2	July 5	185.0	Dec. 11	186.4
Apr. 4	186.6	Oct. 17	186.6		

8/9-4N1 (*1021, p. 89; 1028, p. 94). United States Army Reservation. No measurements made in 1946.

8/9-4N2 (*1028, p. 94). United States Army Reservation. Water level, in feet below land-surface datum, 1946: Nov. 26, 13.4..

8/9-4P1 (*1028, p. 94). United States Army Reservation. Water level, in feet below land-surface datum, 1946: Nov. 26, 23.2.

8/9-6N1 (*1028, p. 94). United States Army Reservation. Water level, in feet below land-surface datum, 1946: Nov. 26, 12.2.

8/9-6R1 (*1028, p. 95). United States Army Reservation. Water level, in feet below land-surface datum, 1946: Nov. 26, 11.9.

8/10-2P1 (*1028, p. 95). United States Army Reservation. Water level, in feet below land-surface datum, 1946: Nov. 26, 14.2.

8/10-9M1 (*991, p. 109; 1021, p. 89; 1028, p. 95). J. M. Hamilton.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Apr. 5	21.8	July 5	22.2	Sept. 6	22.4	Nov. 5	22.4
May 7	22.0	Aug. 6	22.3	Oct. 7	22.4	26	22.3
June 5	22.1						

8/10-19Q1 (*991, p. 109; 1021, p. 89; 1028, p. 95). Union Trust & Savings Bank. New measuring point, beginning Nov. 26, 1946, small oval hole in side of pump base, 0.6 foot above land-surface datum. Water level, in feet below land-surface datum, 1946: Nov. 26, 66.1.

8/11-8P1 (*1028, p. 95). Water level, in feet below land-surface datum, 1946: Nov. 25, 5.8.

8/11-10N1 (*1028, p. 95). E. R. Siple. Water level, in feet below land-surface datum, 1946: Nov. 25, 16.1.

8/11-20L1 (*1028, p. 95). Water level, in feet below land-surface datum, 1946: Nov. 25, 28.2.

8/11-22N2 (*991, p. 110; 1021, p. 89; 1028, p. 95). Lewis Prothro. Water level, in feet below land-surface datum, 1946: Nov. 25, 58.9.

8/11-22N3 (*991, p. 110; 1021, p. 89; 1028, p. 96). Lewis Prothro. Water level, in feet below land-surface datum, 1946: Nov. 25, 54.1.

8/11-30R1 (*1028, p. 96). Water level, in feet below land-surface datum, 1946: Nov. 25, 35.4.

8/12-4K1 (*1028, p. 96). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 9, 7.6.

8/12-20B1 (*1028, p. 96). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 9, 13.2.

8/12-21C1. Hoffman Gun Club. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 21, T. 8 N., R. 12 W., about 5.5 miles north of Lancaster, 60 feet south of Avenue D, and 0.5 mile west of Sierra Highway (U. S. 6). Unused well, diameter 8 inches. Measuring point through Nov. 24, 1941, top of 1-inch elbow in suction line, 1.7 feet above land-surface datum; thereafter, top of casing, 0.3 foot above land-surface datum which is about 2,306 feet above sea level. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1941-46

Date	Water level	Date	Water level	Date	Water level
Nov. 24, 1941	2.4	Dec. 26, 1942	2.1	Nov. 7, 1945	(b)
Apr. 24, 1942	1.2	4, 1943	3.4	Dec. 9, 1946	6.4
July 31	a 3.6	May 2, 1944	(b)		

- a Nearby well pumping.
- b Pumping; no measurement made.

8/12-22A2 (*1028, p. 96). I. B. Wibigler, Antelope Valley Gun Club. No measurements made in 1946.

8/12-22D1 (*1028, p. 96). Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	(a)	Apr. 5	(a)	Aug. 2	9.2	Nov. 1	9.9
Feb. 4	(a)	May 7	.3	Sept. 5	11.2	Dec. 9	2.6
Mar. 6	(a)	July 3	7.5	Oct. 17	12.6		

- a Flowing.

8/12-22M1 (*1028, p. 96). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 9, 2.0.

8/12-22M2 (*1028, p. 97). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 9, 1.5.

8/12-22R2. I. B. Wibigler, Antelope Valley Gun Club. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 22, T. 8 N., R. 12 W., about 4.5 miles north of Lancaster, 250 feet north of Avenue E, and 175 feet west of Division Street. Domestic well, diameter 8 inches, depth 115 feet. Measuring point, top of casing, at land-surface datum which is about 2,300 feet above sea level. Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum: Dec. 5, 1941, 1.4; Mar. 1, 1945, 0.6; Nov. 7, 1945, 4.8; Dec. 7, 1946, 1.6.

8/12-24R1 (*1028, p. 97). Water level, in feet below land-surface datum, 1946: Nov. 25, 15.8.

8/12-30Q1 (*1028, p. 97). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 9, 12.8.

8/13-2C1 (*1028, p. 97). No measurements made in 1946.

8/13-7H1. Lone Butte Ranch. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 7, T. 8 N., R. 13 W., about 10.5 miles northwest of Lancaster, 0.5 mile south of Avenue B, and 30 feet west of 90th Street W. Used irrigation well. Measuring point, bottom of pump base, east side, at land-surface datum which is about 2,442 feet above sea level. Measurements by Los Angeles County Flood Control District.

8/13-7H1--Continued.

Water level, in feet below land-surface datum, 1940-44, 1946

Date	Water level	Date	Water level	Date	Water level
Dec. 6, 1940	96.0	July 31, 1942	(a)	Dec. 6, 1943	103.2
Apr. 9, 1941	93.1	Sept. 25	(a)	May 4, 1944	(a)
Jan. 31, 1942	96.6	Nov. 24	(a)	Dec. 9, 1946	111.0

a Pumping; no measurement made.

8/13-8C1 (*1028, p. 97). A. Boulin. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 7	98.9	July 3	(a)	Dec. 10	104.0
Apr. 5	98.8	Oct. 17	105.8		

a Pumping; no measurement made.

8/13-8D1 (*991, p. 110; 1021, p. 89; 1028, p. 97). Rogers School. No measurements made in 1946.

8/13-20M1 (*1028, p. 97). O. T. Kelly & Son. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 10, 110.0.

8/13-22K1 (*1028, p. 97). A. G. Andrews. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 63.8.

8/13-23M1 (*1028, p. 98). A. G. Andrews. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 12, 58.4.

8/13-32N1 (*1028, p. 98). Pedro Lizarraga. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 10, 106.0.

8/13-33Q1 (*1028, p. 98). Well destroyed. Measurements discontinued.

8/14-2R1 (*1028, p. 98). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 10, 130.6.

8/14-12A1 (*1028, p. 98). H. G. Ranch No. 1. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 10, 123.5.

8/14-12D1 (*1028, p. 98). H. G. Ranch No. 1. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 10, 131.0.

8/14-14R1 (*1028, p. 98). Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 10, 143.6.

8/14-17Q1. Marl Craven, Tibola. SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 17, T. 8 N., R. 14 W., about 4 miles northeast of Fairmont, 0.38 mile west of 140th Street W., 200 feet north of Avenue D. Domestic well, equipped with windmill, diameter 8 inches, depth 200 feet. Measuring point, hole in tin cover at top of casing, 1.5 feet above land-surface datum which is about 2,590 feet above sea level. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 28	160.0	Apr. 30	159.3	June 19	159.4	Oct. 4	(c)
Mar. 18	(a)	May 14	(c)	July 5	(c)	Dec. 30	159.2
Apr. 13	158.3	31	159.8	15	(c)	Dec. 11	159.2
18	164.3	June 5	(c)				

a Casing wet; no measurement made.

b Windmill shut down prior to measurement.

c Pumping; no measurement made.

8/14-23A1 (*1028, p. 98). No measurements made in 1946.

8/14-25C1 (*1028, p. 99). No measurements made in 1946.

8/14-25C2 (*1028, p. 99). No measurements made in 1946.

8/14-25D1. NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 25, T. 8 N., R. 14 W., about 6 miles east of Fairmont, 25 feet south of Avenue E, and 25 feet east of 110th Street W. Irrigation well, equipped with electric turbine pump, in corrugated-iron pump house. Measuring point, top of casing, south side, under pump base, 2.0 feet above land-surface datum which is about 2,483 feet above sea level. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 10, 143.2.

8/15-10P1 (*1028, p. 99). Scott. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 23	141.7	May 14	141.4	June 19	142.0	Oct. 4	(b)
Feb. 28	141.8	31	141.3	July 5	(b)	Dec. 18	(b)
Mar. 18	(a)	June 5	(b)	15	(b)		

a Casing wet; no measurement made.

b Pumping; no measurement made.

8/15-17R1. Canfield. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 17, T. 8 N., R. 15 W., about 4.5 miles northwest of Fairmont, 187 feet north of Avenue D, and west of 200th Street W. extended. Abandoned well in desert brush land near sandpile, diameter 14 inches. Measuring point, top of casing, 1.5 feet below land-surface datum which is about 2,800 feet above sea level. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 23	129.1	Apr. 13	127.9	June 19	127.1	Oct. 17	125.5
Feb. 27	128.5	May 14	127.4	July 5	126.9	30	125.4
Mar. 6	128.4	31	127.3	15	126.8	Dec. 11	124.7
18	128.2	June 1	127.3	Oct. 4	125.6	18	124.6
Apr. 4	128.1	5	127.3				

8/15-20N1. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 20, T. 8 N., R. 15 W., about 4.5 miles northwest of Fairmont, 50 feet south of Avenue E, and 700 feet east of 210th Street W., between Avenue E and State Highway 138. Unused well, originally drilled as oil well, diameter 8 inches. Measuring point, hole in top of 3-inch plug, 0.7 foot above land-surface datum which is about 2,905 feet above sea level. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 23	159.3	Apr. 30	159.0	June 19	158.6	Oct. 4	158.0
Feb. 28	159.2	May 6	158.8	26	158.5	30	158.0
Mar. 18	159.1	31	158.8	July 5	158.4	Dec. 11	157.7
Apr. 13	158.8	June 5	158.7	15	158.4	18	157.7
18	159.2	13	158.7				

8/15-22N1. Barnes. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 22, T. 8 N., R. 15 W., about 3 miles northwest of Fairmont, 300 feet north of Avenue E, and 300 feet east of 190th Street W., on west side of wooden tankhouse south of residence. Domestic well, equipped with plunger pump and gas engine. Measuring point, bolt hole in south side of pump base, at land-surface datum which is about 2,817 feet above sea level. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Feb. 27	184.6	May 31	183.4	June 19	183.1	Oct. 4	181.0
Mar. 18	184.2	June 1	183.4	July 5	188.0	Dec. 18	183.5
May 14	183.5	5	183.4	15	182.7		

8/15-24B1 (*1021, p. 89, published incorrectly as 8/15-24D1; 1028, p. 99). C. L. Schneider. Casing collapsed at about 63 feet. Measurements discontinued.

8/15-24B2. C. L. Schneider. NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 24, T. 8 N., R. 15 W., about 2.5 miles north of Fairmont, 600 feet south of Avenue D, 0.7 mile east of 170th Street W., and 300 feet south of well 8/15-24B1. Used domestic well, equipped with windmill and small gas engine, diameter 10 inches, depth 250 feet, drilled in March 1946. Measuring point, top of casing, northwest side, 1.0 foot above land-surface datum which is about 2,670 feet above sea level. Measurements by Los Angeles County Flood Control District. Water levels, in feet below land-surface datum, 1946: Apr. 4, 150.0; July 3, 151.0.

8/15-27R1 (*1028, p. 99). I. T. Brandt. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 23	143.4	May 6	142.3	June 19	142.2	Oct. 4	141.6
Feb. 28	142.8	14	142.2	July 5	142.3	Dec. 11	141.4
Mar. 28	142.7	31	142.2	15	141.9	18	141.4

8/15-29M1 (*1028, p. 99). Soil Conservation Service, U. S. Dept. of Agriculture. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 28	(a)	May 21	(a)	June 19	174.0	Oct. 4	(a)
Mar. 18	(a)	June 1	(a)	26	174.3	30	(a)
Apr. 13	(a)	5	178.3	July 5	175.2	Dec. 11	(a)
May 6	(a)	13	174.6	15	176.4	18	(a)
14	(a)						

a Dry at 189 feet.

8/15-33G1. Correll. SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, T. 8 N., R. 15 W., about 2.5 miles west of Fairmont, 100 feet north of east-west half-section line, and 0.4 mile west of 190th Street W. Domestic well, equipped with windmill, diameter 12 inches, depth 400 feet. Measuring point, top of casing, 1.0 foot above land-surface datum which is about 2,930 feet above sea level. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 23	194.0	Apr. 30	194.9	July 5	195.7	Oct. 30	196.4
Feb. 28	194.2	May 14	195.0	15	195.7	Dec. 11	197.1
Mar. 18	194.4	31	195.2	Oct. 4	196.0	18	197.4
Apr. 18	194.7	June 19	195.4				

8/15-36M1 (*1021, p. 89; 1028, p. 99). Fairmont School. No measurements made in 1946.

8/16-5N1 (*1021, p. 89; 1028, p. 99). Carpy (International Harvester Co.). Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 8	203.1	July 5	201.6	Dec. 11	200.4
Apr. 4	202.4	Oct. 17	200.8		

8/16-14K1. Snyder. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 14, T. 8 N., R. 16 W., about 7 miles northwest of Fairmont, 0.33 mile north of Neenach Road (Avenue D), and 0.4 mile north of south section line north of ruins of old buildings. Unused well, diameter 7 inches, depth 123 feet. Measuring point, top of casing, 1.5 feet above land-surface datum which is about 2,855 feet above sea level. Measurements by Los Angeles County Flood Control District.

8/16-14E1--Continued.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Apr. 27	105.9	June 19	106.4	July 15	107.2	Oct. 30	107.4
30	106.0	July 5	106.4	Oct. 4	107.6	Dec. 11	107.3
May 14	106.4						

8/16-14E1 (*1028, p. 99). Snyder. Measurements by Los Angeles County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 8	106.0	Apr. 18	102.4	June 5	106.8
Feb. 28	110.9	June 1	106.7	Dec. 11	(b)

a Windmill shut down 10 minutes prior to measurement.

b Pumping; no measurements made.

8/16-18E1 (*1021, p. 90; 1028, p. 99). Neenach School. Measurement by Los Angeles County Flood Control District. Water level, in feet below land-surface datum, 1946: Dec. 11, 93.3.

8/17-14E1 (*1028, p. 99). P. M. Barnes. No measurements made in 1946.

San Gabriel River Basin

1S/10-18 (*817, pp. 9-11; 840, pp. 28-29; 845, pp. 17-18; 886, pp. 23-24; 911, p. 119; 941, pp. 90-91; 949, pp. 64-65; 991, pp. 111-113; 1021, pp. 90-92; 1028, p. 100). Key well U. S. 75. At Baldwin Park. Equipped with water-stage recorder.

Water level, in feet, 1946

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	82.40	304.60	80.37	306.63	79.83	307.17	80.10	306.90
2	82.34	304.66	80.36	306.64	79.79	307.21	80.12	306.88
3	82.26	304.74	80.34	306.66	79.76	307.24	80.05	306.95
4	82.25	304.75	80.38	306.62	79.85	307.15	80.03	306.97
5	82.11	304.89	80.39	306.61	79.95	307.05	80.04	306.96
6	82.13	304.87	80.30	306.70	79.96	307.04	80.00	307.00
7	82.06	304.94	80.26	306.74	79.93	307.07	80.03	306.97
8	81.98	305.02	80.30	306.70	79.97	307.03	80.06	306.94
9	81.95	305.05	80.26	306.74	80.00	307.00	80.04	306.96
10	81.86	305.14	80.18	306.82	79.97	307.03	80.03	306.97
11	81.76	305.24	80.14	306.86	80.09	306.91	80.05	306.95
12	81.70	305.30	80.21	306.79	80.18	306.82	80.09	306.91
13	81.56	305.44	80.19	306.81	80.11	306.89	80.11	306.89
14	81.50	305.50	80.11	306.89	80.17	306.83	80.15	306.85
15	81.43	305.57	80.05	306.95	80.16	306.84	80.18	306.82
16	81.32	305.68	80.05	306.95	80.14	306.86	80.20	306.80
17	81.25	305.75	80.03	306.97	80.20	306.80	80.21	306.79
18	81.18	305.82	79.97	307.03	80.21	306.79	80.22	306.78
19	81.09	305.91	79.94	307.06	80.17	306.83	80.24	306.76
20	80.99	306.01	79.93	307.07	80.18	306.82	80.27	306.73
21	80.93	306.07	79.92	307.08	80.19	306.81	80.28	306.72
22	80.86	306.14	79.91	307.09	80.16	306.84	80.29	306.71
23	80.77	306.23	79.90	307.10	80.12	306.98	80.37	306.63
24	80.68	306.32	79.89	307.11	80.11	306.89	80.43	306.57
25	80.59	306.41	79.82	307.18	80.12	306.88	80.51	306.49
26	80.56	306.44	79.82	307.18	80.12	306.88	80.50	306.50
27	80.51	306.49	79.82	307.18	80.11	306.89	80.51	306.49
28	80.50	306.50	79.81	307.19	80.12	306.88	80.54	306.46
29	80.50	306.50			80.10	306.90	80.58	306.42
30	80.50	306.50			80.11	306.89	80.63	306.37
31	80.44	306.56			80.14	306.86		

1S/10-18--Continued.

Water level, in feet, 1946								
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	80.66	306.34	81.18	305.82	82.81	304.19	84.79	302.21
2	80.65	306.35	81.20	305.80	82.86	304.14	84.90	302.10
3	80.70	306.30	81.29	305.71	82.87	304.13	84.99	302.01
4	80.72	306.28	81.33	305.67	82.91	304.09	85.02	301.98
5	80.72	306.28	81.38	305.62	83.00	304.00	85.13	301.87
6	80.80	306.20	81.41	305.59	83.05	303.95	85.18	301.82
7	80.85	306.15	81.53	305.47	83.07	303.93	85.21	301.79
8	80.84	306.16	81.58	305.42	83.16	303.84	85.34	301.68
9	80.91	306.09	81.62	305.38	83.20	303.80	85.44	301.56
10	80.96	306.04	81.69	305.31	83.25	303.75	85.49	301.51
11	80.94	306.06	81.74	305.26	83.33	303.67	85.52	301.48
12	80.88	306.12	81.73	305.27	83.40	303.60	85.57	301.43
13	80.90	306.10	81.84	305.16	83.51	303.49	85.63	301.37
14	80.92	306.08	81.88	305.12	83.54	303.46	85.69	301.31
15	80.89	306.11	81.94	305.06	83.63	303.37	85.76	301.24
16	80.90	306.10	81.99	305.01	83.68	303.32	85.85	301.15
17	80.91	306.09	82.05	304.95	83.72	303.28	85.93	301.07
18	80.93	306.07	82.10	304.90	83.85	303.15	85.97	301.03
19	80.93	306.07	82.13	304.87	83.92	303.08	86.04	300.96
20	80.91	306.09	82.16	304.84	83.97	303.03	86.12	300.88
21	80.90	306.10	82.22	304.78	84.04	302.96	86.22	300.78
22	80.96	306.04	82.34	304.66	84.09	302.91	86.28	300.72
23	81.02	305.98	82.39	304.61	84.21	302.79	86.37	300.63
24	80.99	306.01	82.35	304.65	84.27	302.73	86.46	300.54
25	81.00	306.00	82.39	304.61	84.32	302.68	86.48	300.52
26	81.01	305.99	82.47	304.53	84.36	302.64	86.56	300.44
27	81.03	305.97	82.58	304.42	84.45	302.55	86.63	300.37
28	81.07	305.93	82.62	304.38	84.50	302.50	86.67	300.33
29	81.09	305.91	82.70	304.30	84.55	302.45	86.73	300.27
30	81.10	305.90	82.74	304.26	84.63	302.37	86.76	300.24
31	81.12	305.88			84.72	302.28	86.85	300.15

Water level, in feet, 1946								
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	86.88	300.12	86.96	300.04	87.14	299.86	86.84	300.16
2	86.92	300.08	86.86	300.14	87.19	299.81	86.78	300.22
3	86.97	300.03	86.76	300.24	87.25	299.75	86.71	300.29
4	87.03	299.97	86.71	300.29	87.29	299.71	86.64	300.36
5	87.10	299.90	86.65	300.35	87.32	299.68	86.56	300.44
6	87.14	299.86	86.60	300.40	87.34	299.66	86.45	300.55
7	87.19	299.81	86.55	300.45	87.36	299.64	86.36	300.64
8	87.24	299.76	86.52	300.48	87.39	299.61	86.25	300.75
9	87.33	299.67	86.52	300.48	87.44	299.56	86.14	300.86
10	87.43	299.57	86.54	300.46	87.42	299.58	85.99	301.01
11	87.46	299.54	86.57	300.43	87.40	299.60	85.86	301.14
12	87.52	299.48	86.56	300.44	87.41	299.59	85.72	301.28
13	87.61	299.39	86.61	300.39	87.37	299.63	85.57	301.43
14	87.64	299.36	86.73	300.27	87.38	299.62	85.43	301.57
15	87.65	299.35	86.81	300.19	87.39	299.61	85.26	301.74
16	87.64	299.36	86.80	300.20	87.36	299.64	85.09	301.91
17	87.63	299.37	86.79	300.21	87.34	299.66	84.92	302.08
18	87.70	299.30	86.74	300.26	87.32	299.68	84.76	302.24
19	87.77	299.23	86.75	300.25	87.29	299.71	84.60	302.40
20	87.75	299.25	86.76	300.24	87.28	299.72	84.46	302.54
21	87.67	299.33	86.78	300.22	87.30	299.70	84.41	302.59

1S/10-18--Continued.

Water level, in feet, 1946								
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
22	87.58	299.42	86.81	300.19	87.28	299.72	84.19	302.81
23	87.52	299.48	86.83	300.17	87.22	299.78	84.08	302.92
24	87.45	299.55	86.92	300.08	87.18	299.82	83.97	303.03
25	87.43	299.57	86.94	300.06	87.17	299.83	83.83	303.17
26	87.36	299.64	86.96	300.04	87.11	299.89	83.71	303.29
27	87.27	299.73	87.02	299.98	87.04	299.96	83.63	303.37
28	87.21	299.79	87.05	299.95	86.99	300.01	83.56	303.44
29	87.13	299.87	87.11	299.89	86.93	300.07	83.38	303.62
30	87.07	299.93	87.13	299.87	86.89	300.11	83.23	303.77
31			87.12	299.88			83.03	303.97

Coastal plain

1S/11-21B1 (*1028, p. 102). Selbach. In El Monte. Measurements discontinued.

Water level, in feet below land-surface datum, 1946-47					
Date	Water level	Date	Water level	Date	Water level
Jan. 4, 1946	15.47	May 3, 1946	14.71	Oct. 4, 1946	18.34
Feb. 4	14.91	June 5	15.65	Jan. 1, 1947	12.84
Mar. 13	14.74	Aug. 8	18.28	Apr. 4	14.70
Apr. 5	14.22				

2S/12-13A1 (*941, p. 105; 949, p. 89; 991, p. 113; 1021, p. 92; 1028, p. 102). Lycan Bros. About 1 mile east of Montebello. Records furnished by San Gabriel Valley Protective Association.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	22.61	Apr. 3	19.89	July 3	21.10	Oct. 2	24.90
9	22.28	10	19.74	10	21.40	9	24.51
16	21.71	17	19.70	17	21.74	16	24.49
23	21.24	24	19.70	24	22.20	23	24.45
30	20.84	May 1	19.81	31	22.69	30	24.49
Feb. 6	20.51	8	19.83	Aug. 7	23.27	Nov. 6	24.55
13	20.28	15	19.87	14	23.81	13	24.46
20	20.14	22	19.71	21	24.28	20	24.11
27	20.09	29	19.80	28	24.78	27	23.70
Mar. 6	20.14	June 5	19.97	Sept. 4	25.50	Dec. 4	23.23
13	20.24	12	20.08	11	25.84	11	22.62
20	20.28	19	21.06	18	25.93	18	22.00
27	20.04	26	20.69	25	25.43	28	21.35

2S/12-23G1 (*1028, p. 102). Hadley Ranch Co. About 1 mile southeast of Montebello. Measurements discontinued.

Water level, in feet below land-surface datum, 1946-47					
Date	Water level	Date	Water level	Date	Water level
Jan. 4, 1946	34.31	Apr. 30, 1946	29.75	Dec. 5, 1946	29.73
Feb. 1	27.32	June 5	30.68	31	27.22
28	a29.74	Aug. 9	b38.84	Feb. 19, 1947	28.56
28	b29.24	Oct. 3	.32.92	Apr. 4	28.67
Apr. 2	29.28				

a Pump shut off about 10 minutes prior to measurement.

b Pump shut off about 15 minutes prior to measurement.

2S/12-27E1 (*1028, p. 102). Bell Cooperative Association. About 1 mile south of Montebello. Measurements discontinued Apr. 4, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	30.66	Apr. 30, 1946	25.75	Dec. 5, 1946	26.45
Feb. 1	26.24	June 5	29.16	31	23.90
28	26.03	Aug. 8	34.89	Feb. 19, 1947	24.27
Apr. 2	23.58	Oct. 3	30.18	Apr. 4	25.49

a Pumping recently.

2S/12-27H2 (*1028, p. 103). S. E. Locke. About 1.5 miles southeast of Montebello. Measurements discontinued Apr. 4, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	28.84	Apr. 30, 1946	23.16	Dec. 5, 1946	26.17
Feb. 1	25.56	June 5	25.46	31	22.70
28	24.13	Aug. 7	29.93	Feb. 19, 1947	22.47
Apr. 2	23.27	Oct. 3	27.53	Apr. 4	23.01

2S/12-28J2. J. K. Tweedy. California Division of Water Resources serial No. C-829q and location No. 1563D, Los Angeles County Flood Control District location No. 1563C, Los Angeles Department of Water and Power No. 12-B-18. About 1.8 miles north of Downey, about 340 feet south of east end of former bridge over Rio Hondo and 75 feet west of Foster Bridge Boulevard, in frame pump house just west of dwelling. Drilled domestic well, reported depth 97 feet. Measuring point, top of 1-inch pipe coupling, east side of pump, 0.8 foot above concrete floor, 1.5 feet above land-surface datum, and 132.95 feet above mean sea level (altitude by Los Angeles Department of Water and Power). Additional measurements made about monthly 1930-41 by Los Angeles Department of Water and Power, and about monthly 1937-42, and semiannually since 1943 by Los Angeles County Flood Control District. Measurements discontinued Apr. 4, 1947.

Water level, in feet below land-surface datum, 1945-47

Date	Water level	Date	Water level	Date	Water level
Feb. 28, 1945	28.67	Feb. 28, 1946	34.66	Oct. 3, 1946	44.51
Nov. 26	40.84	Apr. 2	32.62	Dec. 5	37.31
Dec. 4	40.19	30	34.55	31	33.85
Jan. 3, 1946	37.06	June 5	38.84	Feb. 19, 1947	33.05
Feb. 1	34.91	Aug. 7	45.80	Apr. 4	34.22

2S/12-29R1 (*1028, p. 103). V. Marino. About 2 miles northwest of Downey. Measurements discontinued Apr. 4, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	30.18	Apr. 30, 1946	38.98	Dec. 5, 1946	31.91
Feb. 1	29.62	June 5	30.93	31	29.98
Mar. 1	29.00	Aug. 7	35.03	Feb. 19, 1947	28.54
Apr. 2	28.65	Oct. 3	(a)	Apr. 4	28.73

a Water level below obstruction which is about 34 feet below land-surface datum.

2S/12-33E2 (*1028, p. 103). Tide Water Associated Oil Co. About 1.5 miles northwest of Downey. Measurements discontinued Apr. 4, 1947

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	36.96	Apr. 30, 1946	37.93	Dec. 5, 1946	38.54
31	37.01	June 5	43.45	31	35.19
Mar. 1	35.81	Aug. 7	50.88	Feb. 19, 1947	34.56
Apr. 2	34.03	Oct. 3	46.46	Apr. 4	36.56

2S/12-33B3 (*1028, p. 103). E. McDonnell. About 1.5 miles northwest of Downey. Measurements discontinued Apr. 4, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	30.89	Apr. 30, 1946	28.47	Dec. 5, 1946	32.27
31	29.83	June 5	30.33	31	30.01
Mar. 1	28.90	Aug. 7	34.48	Feb. 19, 1947	28.31
Apr. 2	28.48	Oct. 3	35.19	Apr. 4	28.42

2S/12-33I2 (*1028, p. 104). H. Rigg. About 1 mile northwest of Downey. Measurements discontinued Apr. 4, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	26.73	Apr. 30, 1946	26.14	Dec. 5, 1946	28.42
31	26.39	June 5	28.27	31	26.61
Mar. 1	25.77	Aug. 7	32.70	Feb. 19, 1947	25.32
Apr. 2	25.21	Oct. 3	32.23	Apr. 4	25.65

2S/15-34H1 (*1028, p. 105). Don Benschopf. About 2.5 miles northwest of El Segundo. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 28	132.24	Apr. 9	132.25	June 17	132.46	Aug. 26	132.71
Feb. 11	132.18	22	132.27	July 1	132.52	Sept. 23	132.79
25	132.20	May 6	132.34	15	132.58	Oct. 28	132.86
Mar. 11	132.22	20	132.26	29	132.63	Nov. 29	a133.9
25	132.28	June 3	132.40	Aug. 12	132.69	Dec. 27	a133.4

a By California Division of Water Resources.

3S/12-7A2 (*1028, p. 107). J. W. Urmston. About 2 miles northeast of Lynwood. Measurements discontinued Apr. 1, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	21.59	May 1, 1946	26.43	Dec. 2, 1946	23.66
30	23.72	June 3	30.76	30	22.22
Mar. 1	23.65	Aug. 7	37.39	Feb. 18, 1947	22.73
Apr. 2	21.38	Oct. 2	32.35	Apr. 1	24.12

3S/12-7N1 (*1028, p. 107). Frank Goforth. About 2 miles northeast of Compton. Measurements discontinued Apr. 1, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	16.30	May 1, 1946	22.91	Dec. 4, 1946	18.54
31	19.41	June 4	27.54	31	17.12
Mar. 1	19.55	Aug. 6	33.14	Feb. 18, 1947	17.62
Apr. 1	16.80	Oct. 2	28.10	Apr. 1	19.41

3S/12-7P1 (*1028, p. 107). A. E. Perry. About 2 miles northeast of Compton. Measurements discontinued Apr. 1, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	23.35	May 1, 1946	28.97	Dec. 4, 1946	25.05
31	25.13	June 4	36.01	31	21.19
Mar. 1	25.64	Aug. 6	46.92	Feb. 18, 1947	21.29
Apr. 1	21.72	Oct. 2	39.25	Apr. 1	25.49

3S/12-8D3 (*1028, p. 107). F. G. Newton. About 1 mile southeast of South Gate. Measurements discontinued after May 1.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 3	22.79	Mar. 1	24.80	May 1	27.91
30	24.94	Apr. 2	22.54		

3S/12-8F1 (*1028, p. 108). Los Angeles County Farm. About 2 miles southeast of South Gate. Measurements discontinued Apr. 1, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1946	22.82	June 3, 1946	c34.18	Dec. 4, 1946	c25.07
30	a24.69	Aug. 7	c43.39	30	c21.81
Feb. 28	b24.44	Sept. 3	a37.78	Feb. 18, 1947	c22.00
Apr. 2	20.76	Sept. 3	b37.1	Apr. 1	25.04
30	c28.62				

a Pump shut off 5 minutes prior to measurement.

b Pump shut off 10 minutes prior to measurement.

c Pumping recently.

3S/12-8L3 (*941, p. 107; 949, p. 89; 991, p. 113; 1021, p. 92; 1028, p. 108). Los Angeles County Farm. About 2 miles southwest of Downey. Records furnished by Sen Gabriel Valley Protective Association.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	21.26	Apr. 8	21.09	July 8	34.20	Oct. 7	31.74
14	20.93	15	24.13	15	36.13	14	32.46
21	21.63	22	23.63	22	35.58	21	30.63
28	23.10	29	25.80	29	37.50	28	29.74
Feb. 4	22.59	May 5	28.32	Aug. 5	37.42	Nov. 4	39.65
11	21.98	13	27.39	12	37.14	11	28.55
18	22.59	20	28.33	19	37.05	18	25.90
25	23.10	27	28.49	26	36.98	25	24.65
Mar. 4	21.58	June 3	30.98	Sept. 2	34.69	Dec. 2	23.74
11	26.37	10	34.41	9	34.59	9	23.35
18	28.15	17	34.39	16	35.68	16	22.92
25	23.10	24	34.22	23	35.11	23	22.67
Apr. 1	21.58	July 1	34.92	30	34.40	30	22.03

3S/13-8L2 (*1028, p. 109). H. W. Edison. About 2 miles southwest of Watts.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	104.40	Apr. 8	105.08	June 17	110.74	Aug. 26	114.02
28	104.66	15	105.83	July 1	111.28	Sept. 23	114.34
Feb. 11	104.34	22	106.22	15	112.27	Oct. 28	112.50
25	103.75	May 6	108.21	29	113.16	Nov. 29	110.5
Mar. 11	105.77	20	107.88	Aug. 12	114.06	Dec. 27	1108.5
25	105.69	June 3	109.47				

a By California Division of Water Resources.

3S/13-18G2 (*1028, p. 110). Union Oil Co. About 2 miles northeast of Gardena. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	165.64	Apr. 15	166.87	June 17	171.91	Aug. 26	174.00
28	163.84	22	166.54	July 4	172.41	Sept. 23	174.00
Feb. 11	164.53	May 6	167.93	15	172.79	Oct. 28	172.46
25	165.95	20	168.53	29	173.98	Nov. 29	170.5
Mar. 11	167.01	June 3	170.39	Aug. 12	173.97	Dec. 27	168.7

a By California Division of Water Resources.

3S/13-20H4 (*1021, p. 92; 1028, p. 111). East Gardena Water Co. About 2 miles west of Compton.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	79.15	Apr. 8	76.24	June 17	a 95.39	Aug. 26	a102.33
28	77.51	22	82.13	July 1	a 97.83	Sept. 23	92.04
Feb. 11	75.06	May 6	87.03	15	a100.71	Oct. 28	89.90
25	a 83.15	20	87.53	29	abl03.58	Nov. 29	c 87.8
Mar. 11	85.03	June 3	90.45	Aug. 12	a100.74	Dec. 27	c 77.5
25	78.09						

a Well 100 feet northeast pumping.

b Below sea level.

c By California Division of Water Resources.

3S/13-28P1 (*1021, p. 93; 1028, p. 113). Gardena Syndicate, Inc. About 2 miles southwest of Compton. Well capped, measurements discontinued Mar. 5.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 14	93.20	Feb. 11	93.16	Mar. 5	96.39
28	95.23	25	94.31		

3S/13-32F2 (*949, p. 90; 991, p. 113; 1021, p. 93; 1028, p. 113). John Larronde. About 1.5 miles southeast of Gardena. All water levels are below sea level.

3S/13-32F2--Continued.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	86.55	Mar. 25	90.01	June 3	94.23	Aug. 12	98.14
28	88.75	Apr. 8	88.24	17	96.05	26	95.91
Feb. 11	87.19	22	88.21	July 1	95.53	Sept. 23	98.26
25	88.57	May 3	91.64	15	97.12	Nov. 29	a 89.5
Mar. 11	92.44	20	90.16	29	95.38	Dec. 27	a 88.5

a By California Division of Water Resources.

3S/13-35B2 (*949, p. 90; 991, p. 114; 1021, p. 93; 1028, p. 114).

H. Y. Sasaki. About 1.5 miles south of Compton.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 14, 1946	20.67	May 6, 1946	22.62	Aug. 27, 1946	29.17
28	20.70	20	23.89	Sept. 23	28.54
Feb. 11	20.18	June 3	25.12	Oct. 28	28.06
25	20.34	17	27.03	Nov. 29	a 23.1
Mar. 11	21.75	July 1	27.70	Dec. 27	a 21.2
25	21.08	15	28.39	Jan. 2, 1947	20.94
Apr. 8	19.97	29	28.89	Feb. 18	20.30
22	20.47	Aug. 12	29.59	Apr. 1	22.28

a By California Division of Water Resources.

3S/14-3K1 (*1028, p. 114). Southern California Water Co., Yukon plant well 1. About 2 miles southeast of Inglewood. Records furnished by Southern California Water Co. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 1	108	Apr. 15	112	July 1	125	Oct. 1	127
22	109	May 1	120	15	129	Nov. 1	117
Mar. 7	122	15	112	Aug. 1	125	15	108
Apr. 1	110	June 15	122	Sept. 1	123	Dec. 1	110

3S/14-21B1 (*1028, p. 117). Southern California Water Co., Rosecrans plant well 1. About 1 mile south of Hawthorne. Records furnished by Southern California Water Co. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 15	93	May 15	95	Aug. 1	104	Nov. 1	101
Mar. 1	93	June 1	100	Sept. 1	104	15	98
23	94	15	102	Oct. 1	105	Dec. 1	95
Apr. 1	95	July 1	104				

3S/14-35R1 (*1021, p. 94; 1028, p. 119). Southern California Edison Co., Ltd. About 2 miles north of Torrance. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	94.88	Apr. 8	97.84	June 17	103.71	Aug. 26	105.82
28	96.42	22	97.92	July 1	104.54	Sept. 23	106.13
Feb. 11	96.63	May 6	99.40	15	104.68	Oct. 28	103.44
25	98.06	20	100.22	29	105.18	Nov. 29	a 100.0
Mar. 11	99.43	June 3	101.79	Aug. 12	105.67	Dec. 27	a 102.3
25	99.64						

a By California Division of Water Resources.

3S/14-36M3 (*139, Redondo quadrangle, well 560; *1021, p. 94; 1028, p. 119). H. T. Potomkin. About 2 miles north of Torrance. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	68.97	Apr. 8	69.30	June 17	71.73	Aug. 26	72.48
28	69.19	22	69.93	July 1	71.97	Sept. 23	72.65
Feb. 11	68.97	May 6	70.51	15	72.24	Oct. 28	71.88
25	69.25	20	70.80	29	72.33	Nov. 29	a 71.0
Mar. 11	70.15	June 3	71.42	Aug. 12	72.41	Dec. 27	a 70.5
25	69.52						

a By California Division of Water Resources.

3S/15-25A1 (*1028, p. 120). City of Manhattan Beach well 3. In Manhattan Beach. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 28	a160.58	Apr. 22	a157.92	June 17	a161.59	Aug. 26	a160.60
Feb. 11	a160.08	May 6	a162.22	July 1	a159.99	Sept. 23	a160.67
25	a158.98	13	a159.02	15	a160.81	Oct. 28	158.50
Mar. 11	a161.93	20	a158.94	29	a163.56	Nov. 29	b158.2
25	a159.90	June 3	a159.52	Aug. 12	a163.70	Dec. 27	b158.4
Apr. 8	a158.30						

a Nearby well or wells pumping.

b By California Division of Water Resources.

3S/15-25H2 (*1028, p. 121). City of Manhattan Beach well 4. In Manhattan Beach. All water levels are below sea level. Water levels, in feet below land-surface datum, 1946: May 8, 164.75; May 13, 165.15. Measurements discontinued.

4S/11-5D1 (*949, p. 91; 991, p. 114; 1021, p. 95; 1028, p. 121). V. Capovilla. About 3.5 miles south of Norwalk. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 22	27.44	Apr. 16	26.36	July 25	a 57.76	Nov. 29	30.36
Feb. 18	26.11	May 20	32.61	Aug. 20	a 58.54	Dec. 16	29.88
Mar. 22	29.22	June 21	a 49.78	Oct. 21	a 46.83		

a Below sea level.

4S/12-8P1 (138, p. 74, well 934; *941, p. 110; 949, p. 93; 991, p. 114; 1021, p. 96; 1028, p. 121). Montana Land Co. About 2 miles north of Signal Hill. Records furnished by city of Long Beach. Water levels below sea level.

Water level, in feet below land-surface datum, 1946

Jan. 7	91.38	Apr. 8	88.86	July 8	104.13	Oct. 7	110.36
14	89.45	15	90.02	15	106.23	14	110.65
21	87.83	22	92.19	22	110.54	21	109.92
28	89.33	29	93.82	29	112.26	28	109.18
Feb. 4	88.75	May 6	95.17	Aug. 5	112.63	Nov. 4	105.74
11	88.03	13	95.27	12	113.95	11	106.38
18	89.29	20	95.92	19	114.39	18	100.84
25	89.89	27	96.08	26	114.18	25	99.25
Mar. 4	90.11	June 3	97.20	Sept. 2	113.41	Dec. 2	97.41
11	92.34	10	99.08	9	112.76	9	96.34
18	92.47	17	101.51	16	112.91	16	95.58
25	91.53	24	102.89	23	112.78	23	94.57
Apr. 1	90.35	July 1	104.20	30	112.45	30	93.62

4S/12-27K2 (*949, p. 94; 991, p. 115; 1021, p. 96; 1028, p. 121). Bryant Ranch. About 2 miles east of Signal Hill. Records furnished by R. A. Shafer.

Water level, in feet below land-surface datum, 1946

Jan. 4	6.77	Apr. 4	11.12	July 5	a 19.34	Oct. 4	a 18.85
16	6.09	22	8.28	17	a 21.92	18	a 19.47
Feb. 4	5.76	May 1	11.70	Aug. 2	a 22.82	Nov. 5	14.89
15	6.23	15	14.30	19	a 23.40	Dec. 3	10.12
Mar. 5	13.43	June 4	14.90	Sept. 3	a 22.33	23	7.87
19	16.15	16	a 17.60	16	a 20.52		

a Below sea level.

4S/13-2K1 (*949, p. 97; 1028, p. 121). Del Amo Estate Co. In Dominguez Gap. Water levels, in feet below land-surface datum: Jan. 2, 1946, 22.54; Apr. 5, 1946, 21.79; Aug. 7, 1946, dry at 23.5 feet; Jan. 10, 1947, 22.31; Apr. 1, 1947, 23.15. Measurements discontinued.

4S/13-2P1 (#949, p. 97; 1028, p. 121). Del Amo Estate Co., H. R. Wilson, lessee. In Dominguez Gap. Measurements discontinued Apr. 1, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 2, 1946	27.11	May 2, 1946	27.12	Dec. 3, 1946	27.57
31	26.81	June 4	28.19	31	26.98
Mar. 4	26.60	Aug. 7	30.01	Feb. 18, 1947	26.81
Apr. 1	26.56	Oct. 2	29.16	Apr. 1	28.33

4S/13-10F1 (#949, p. 98; 1028, p. 122). Dominguez Estate Co. In Dominguez Gap. Water levels, in feet below land-surface datum: Jan. 2, 1946, 12.66; Apr. 5, 1946, 13.07; Aug. 7, 1946, 13.92; Jan. 10, 1947, 15.18; Apr. 1, 1947, 15.57. Measurements discontinued.

4S/13-10R1 (#949, p. 99; 1028, p. 122). Los Angeles County. In Dominguez Gap. Water levels, in feet below land-surface datum: Jan. 2, 1946, 19.87; Apr. 5, 1946, 19.21; Aug. 7, 1946, 20.18; Jan. 10, 1947, 18.10; Apr. 1, 1947, 18.61. Measurements discontinued.

4S/13-11B1 (#949, p. 99; 1028, p. 122). Del Amo Estate Co. In Dominguez Gap. Water levels, in feet below land-surface datum: Jan. 2, 1946, 21.93; Apr. 5, 1946, 20.66; Aug. 7, 1946, 24.38; Jan. 10, 1947, 22.71; Apr. 1, 1947, 22.78. Measurements discontinued.

4S/13-11B3 (#949, p. 99; 1028, p. 122). Los Angeles County. In Dominguez Gap. Water levels, in feet below land-surface datum: Jan. 2, 1946, 24.24; Apr. 5, 1946, 23.36; Aug. 7, 1946, dry at 26.1 feet; Jan. 10, 1947, 24.30; Apr. 1, 1947, 25.5. Measurements discontinued.

4S/13-11D2 (#949, p. 99; 1028, p. 122). Los Angeles County. In Dominguez Gap. Water levels, in feet below land-surface datum, 1946: Jan. 2, dry; Apr. 5, 27.45; Jan. 10, 1947, 28.0. Measurements discontinued.

4S/13-11F1 (#949, p. 100; 1028, p. 122). Dominguez Estate Co. In Dominguez Gap. Water levels, in feet below land-surface datum, 1946: Jan. 2, 26.70; Apr. 5, 26.09; Aug. 7, 27.29. Well destroyed. Measurements discontinued.

4S/13-11K5 (#949, p. 100; 1028, p. 122). Carson Estate Co. In Dominguez Gap. Water levels, in feet below land-surface datum: Jan. 2, 1946, 18.41; Apr. 5, 1946, 17.91; Aug. 7, 1946, dry; Jan. 10, 1947, 18.04; Apr. 1, 1947, 18.99. Measurements discontinued.

4S/13-11L3 (#949, p. 100). Los Angeles County. In Dominguez Gap. Measurements discontinued Apr. 1, 1947.

Water level, in feet below land-surface datum, 1945-47

Apr. 3, 1945	24.40	Jan. 2, 1946	(a)	Jan. 10, 1947	27.35
July 5	(a)	Apr. 5	27.36	Apr. 1	27.31
Oct. 2	(a)	Aug. 7	(a)		

a Water level below bottom of well which is 27.9 feet below land-surface datum.

4S/13-12E1 (#1028, p. 122). Virginia Country Club. In north Long Beach. Measurements discontinued.

Water level, in feet below land-surface datum, 1946-47

Jan. 14, 1946	32.70	May 6, 1946	32.60	Aug. 12, 1946	a42.25
28	33.12	20	36.79	27	a41.35
Feb. 11	32.58	June 3	36.08	Sept. 23	a38.75
25	32.64	17	a40.51	Oct. 28	37.04
Mar. 11	35.36	July 1	a41.30	Nov. 29	b35.3
25	33.42	15	a39.86	Apr. 1, 1947	34.63
Apr. 22	33.06	29	a41.18		

a Below sea level.

b By California Division of Water Resources.

4S/13-12H1 (*1028, p. 122). L. S. Whaley Co. In north Long Beach. Measurements discontinued Apr. 1, 1947.

Water level, in feet below land-surface datum, 1946-47

Date	Water level	Date	Water level	Date	Water level
Jan. 2, 1946	34.22	May 1, 1946	34.44	Dec. 30, 1946	34.94
31	33.20	June 4	36.73	Feb. 18, 1947	33.53
Mar. 4	33.50	Aug. 7	43.13	Apr. 1	34.31
Apr. 1	33.63	Oct. 3	43.22		

4S/13-14F3 (*949, p. 101; 1028, p. 123). Los Angeles County. In Dominguez Gap. Water levels, in feet below land-surface datum: Jan. 2, 1946, 21.17; Apr. 5, 1946, 20.64; Aug. 7, 1946, 20.91; Jan. 10, 1947, 20.63; Apr. 1, 1947, 20.50. Measurements discontinued.

4S/13-14L1 (*949, p. 101; 991, p. 116; 1021, p. 96; 1028, p. 123). Southern California Edison Co., Ltd. In Long Beach. Records furnished by city of Long Beach.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	26.33	Apr. 8	25.87	July 8	26.99	Oct. 14	27.21
14	27.32	15	25.87	15	27.17	21	27.14
21	26.23	22	25.83	22	27.22	28	27.05
28	26.17	29	25.97	29	27.26	Nov. 4	27.19
Feb. 4	26.09	May 6	26.09	Aug. 1	27.39	11	27.08
11	25.92	13	26.36	12	27.31	18	26.75
18	26.27	20	26.56	19	27.36	25	26.57
25	26.14	27	26.38	Sept. 2	27.38	Dec. 2	26.49
Mar. 4	26.27	June 3	26.57	9	27.33	9	26.39
11	26.48	10	26.72	16	27.27	16	26.29
18	26.68	17	27.18	23	27.34	23	26.25
25	26.26	24	27.08	30	27.29	26	27.44
Apr. 1	25.98	July 1	27.07	Oct. 7	27.20		

4S/13-14P1 (*949, p. 102; 1028, p. 123). City of Long Beach. In Dominguez Gap. Water levels, in feet below land-surface datum: Apr. 5, 1946, 25.71; Aug. 9, 1946, 26.88; water level below sea level; Jan. 10, 1947, 26.09; Apr. 1, 1947, 26.13. Measurements discontinued.

4S/13-23F2 (*949, p. 104; 1028, p. 123). City of Long Beach. In Dominguez Gap. Water levels, in feet below land-surface datum, 1946: Jan. 2, 22.75; Apr. 5, 22.57; Aug. 7, 22.89. Water levels, in feet below land-surface datum, 1947: Jan. 10, 22.03; Apr. 1, 22.18. Measurements discontinued.

4S/13-23G2 (*941, p. 115; 949, p. 105; 991, p. 116; 1021, p. 96; 1028, p. 123). City of Long Beach. Records furnished by city of Long Beach. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	80.5	Apr. 8	80.7	July 9	96.6	Oct. 14	93.2
14	80.1	15	82.5	15	93.4	21	89.0
21	82.0	22	83.7	26	94.9	Nov. 1	86.0
Feb. 1	86.1	May 1	87.6	Aug. 1	97.7	12	84.7
11	80.9	15	86.3	12	93.5	18	86.9
19	84.0	20	86.6	19	101.6	25	83.3
Mar. 1	84.3	June 1	90.4	Sept. 3	98.4	Dec. 2	82.7
9	86.9	10	93.1	9	97.5	9	82.7
18	88.6	17	95.1	23	95.0	16	81.7
23	86.6	24	92.2	Oct. 1	95.0	23	81.5
Apr. 1	86.4	July 1	93.1	7	92.0		

4S/13-24M1. City of Long Beach. In Dominguez Gap, 20 feet south of Spring Street and 78 feet west of Golden Avenue. Water-table observation well, diameter 6 inches, depth 25.0 feet. Measuring point, top of casing, 0.7 foot above land-surface datum and 21.7 feet above mean sea level (interpolated from topographic map). Miscellaneous measurements 1932-35 by city of Long Beach. Measurements by Geological Survey discontinued Apr. 1, 1947.

4S/13-24M1--Continued.

Water level, in feet below land-surface datum, 1941, 1945-47

Date	Water level	Date	Water level	Date	Water level
Oct. 2, 1941	8.90	Jan. 2, 1946	9.79	Jan. 10, 1947	9.84
July 5, 1945	9.14	Apr. 5	9.70	Apr. 1	9.85
Oct. 2	9.63	Aug. 9	9.82		

4S/13-26L1 (*949, p. 106). City of Long Beach. In Dominguez Gap. Well destroyed; measurements discontinued after Apr. 5, 1946.

Water level, in feet below land-surface datum, 1945-46

Apr. 3, 1946	14.29	Oct. 2, 1945	a 14.88	Apr. 5, 1946	a 15.11
July 5	14.58	Jan. 2, 1946	a 15.12		

a Below sea level.

4S/13-26P6 (*949, p. 107; 1028, p.124). City of Long Beach. In Dominguez Gap. All water levels are below sea level. Measurements discontinued after Apr. 1, 1947.

Water level, in feet below land-surface datum, 1946-47

Jan. 2, 1946	13.84	Aug. 7, 1946	14.24	Apr. 1, 1947	13.33
Apr. 5	13.81	Jan. 10, 1947	13.37		

4S/13-33D1 (*949, p. 100; 991, p. 116; 1021, p. 97; 1028, p.124). City of Los Angeles, Wilmington plant well 14. In Wilmington. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	79.37	Apr. 8	80.12	June 17	88.25	Aug. 26	89.16
28	80.43	22	80.76	July 1	87.77	Sept. 23	88.91
Feb. 11	a 99.32	May 6	82.47	15	87.87	Oct. 28	84.49
25	a102.20	20	82.97	29	88.79	Nov. 29	b 81.6
Mar. 11	a104.77	June 3	85.85	Aug. 12	88.99	Dec. 27	b 80.5
25	81.50						

a Pumping.

b By California Division of Water Resources.

4S/13-33E6 (*949, p. 110; 1021, p. 97; 1028, p.124). City of Los Angeles, Wilmington plant well 10. In Wilmington. All water levels are below sea level. Well capped; measurements discontinued after Sept. 23, 1946. Continuing measurements of nearby well 4S/13-33E3 by California Division of Water Resources.

Water level, in feet below land-surface datum, 1946

Jan. 14	57.43	Mar. 25	58.89	June 3	59.48	July 29	61.67
28	57.56	Apr. 8	57.70	17	60.12	Aug. 12	61.94
Feb. 11	a 62.71	22	57.63	July 1	61.11	26	62.11
25	a 62.79	May 6	58.24	15	61.10	Sept. 23	62.12
Mar. 11	a 61.23	20	58.53				

a Well 4S/13-33D1 pumping.

4S/14-8E1 (*1021, p. 97; 1028, p.124). California Water Service Co. station 3. In Redondo Beach. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	163.73	Apr. 8	163.80	June 17	164.17	Aug. 26	164.76
28	163.78	22	163.86	July 1	164.29	Sept. 23	164.96
Feb. 11	163.72	May 6	163.95	15	164.41	Oct. 28	165.05
25	163.69	8	163.94	29	164.53	Nov. 29	a164.1
Mar. 11	163.77	20	164.02	Aug. 12	164.68	Dec. 27	a164.7
25	163.84	June 3	164.12				

a By California Division of Water Resources.

4S/14-13F1 (*1021, p. 99; 1028, p.125). David E. Crutcher. About 1 mile southeast of Torrance. Water-stage recorder maintained on well from Mar. 18, 1944. to Dec. 31, 1945. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	81.90	Mar. 25	83.53	June 17	85.65	Aug. 26	86.78
28	82.15	Apr. 8	82.64	July 1	85.78	Sept. 23	87.05
Feb. 11	83.56	22	82.67	15	86.11	Oct. 28	85.68
25	84.44	May 6	83.50	29	86.43	Nov. 29	a 84.3
Mar. 5	84.92	20	83.58	Aug. 12	88.53	Dec. 27	a 83.5
11	85.28	June 3	84.33				

a By California Division of Water Resources.

4S/14-28H1 (*1028, p.126). Weston Ranch well 5a. About 1.5 miles southwest of Lomita. All water levels are below sea level.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	168.04	Apr. 8	168.40	June 17	169.88	Aug. 26	170.36
28	168.10	22	169.38	July 1	170.29	Sept. 23	170.19
Feb. 11	168.03	May 6	170.37	15	170.30	Oct. 28	170.34
25	168.13	20	169.78	29	169.60	Nov. 29	a170.4
Mar. 11	168.34	June 3	171.39	Aug. 12	171.58	Dec. 27	a170.1
25	169.22						

a By California Division of Water Resources.

4S/14-36H1 (*1028, p.126). Palos Verdes Water Co. well 1. In Wilmington. Water levels, in feet below land-surface datum, 1946: Sept. 28, 98.18, pumping; Sept. 28, 86.58, pump shut off 6 hours prior to measurement. All water levels are below sea level. Measurements discontinued.

5S/12-2B1 (*949, p. 111; 991, p. 117; 1021, p. 103; 1028, p.126). Bryant Ranch. About 2 miles north of Seal Beach. Records furnished by R. A. Shafer.

Water level, in feet with reference to land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 4	-1.0	Apr. 4	-4.1	July 17	-11.7	Oct. 18	-10.4
16	-6	May 2	-4.2	Aug. 2	-11.9	Nov. 5	-7.4
Feb. 4	+2	15	-6.5	19	-12.1	Dec. 18	-6.0
15	-8	June 4	-6.8	Sept. 3	-12.3	Dec. 3	-3.9
Mar. 5	-4.6	16	-8.5	16	-11.1	18	-2.5
19	-7.0	July 5	-10.2	Oct. 4	-11.1		

Orange County

Coastal Plain

3S/11-36Q2 (*941, p. 117; 949, p. 116; 991, p. 117; 1021, p. 100; 1028, p. 127). M. Del Giorgio. About 1 mile southeast of Buena Park. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	55.10	Apr. 3	54.58	July 3	70.22	Oct. 2	73.20
9	53.83	10	53.14	10	69.96	9	72.90
16	53.04	17	52.72	17	70.95	16	72.38
23	52.63	24	52.93	24	72.23	23	70.98
30	52.58	May 1	54.80	31	74.20	30	68.00
Feb. 6	52.22	8	56.05	Aug. 7	75.67	Nov. 6	68.62
13	52.32	15	57.89	14	77.12	13	64.30
20	51.99	22	58.79	21	76.34	21	61.00
27	52.72	29	61.80	28	74.81	27	59.48
Mar. 6	54.92	June 5	64.39	Sept. 4	75.06	Dec. 4	58.28
13	59.79	12	66.33	11	76.10	11	57.21
20	60.00	19	70.17	18	74.76	18	56.69
27	56.85	26	69.12	25	75.29	26	55.58

4S/9-7B1 (*941, p. 120; 949, p. 117; 991, p. 117; 1021, p. 100; 1028, p. 127). Dowling & Prentice. About 3 miles east of Anaheim. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	165.43	Apr. 3	155.72	July 3	158.16	Sept. 25	164.18
9	159.42	10	152.25	10	162.73	Oct. 2	164.78
16	158.47	17	153.90	17	154.47	9	169.40
23	157.36	24	153.44	24	158.21	16	170.19
30	155.47	May 1	154.66	31	161.04	23	170.31
Feb. 6	158.14	8	145.62	Aug. 7	160.78	30	171.18
13	156.10	15	145.86	14	161.82	Nov. 6	167.24
20	151.16	22	148.66	21	175.51	21	162.04
27	152.86	29	150.72	28	170.37	27	160.11
Mar. 6	150.22	June 5	154.50	Sept. 4	162.42	Dec. 4	159.99
13	152.08	12	156.03	11	163.16	11	159.34
20	153.26	19	154.30	18	164.83	26	159.21
27	156.41	26	156.31				

4S/10-22L2 (*840, p. 28; 845, p. 18; 886, p. 24; 941, p. 123; 949, p. 117; 991, p. 118; 1021, p. 100; 1028, p. 127). Halderman & Callens. About 2 miles south of Anaheim.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 14	a101.91	Apr. 9	a103.99	July 15	a108.17	Oct. 10	a114.02
31	b104.10	25	b100.92	18	b108.36	31	b111.13
Feb. 8	a101.38	May 10	ac117.26	Aug. 8	b110.25	Nov. 15	a110.01
21	b102.04	June 6	b104.23	12	ac122.10	21	b108.71
Mar. 12	ac116.13	11	ac118.09	Sept. 13	a112.56	Dec. 6	a108.82
Apr. 4	b102.35	27	b106.79	19	b112.61	13	b106.63

a By Orange County Flood Control District.

b By San Gabriel Valley Protective Association.

c Pumping.

4S/11-19K1 (138, p. 83, well 1183; *941, p. 123; 949, p. 117; 991, p. 118; 1021, p. 101; 1028, p.128). Los Alamitos Sugar Co. About 0.5 mile north of Los Alamitos. Records furnished by city of Long Beach.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	7.72	Apr. 8	9.53	July 8	26.52	Sept.30	b 28.55
14	7.20	15	8.35	15	28.24	Oct. 7	26.73
21	6.72	22	7.77	22	29.55	14	25.79
28	6.52	29	11.54	29	b 30.51	21	24.11
31	a 6.52	30	a 12.07	30	ab 30.58	28	22.53
Feb. 4	6.64	May 6	15.67	Aug. 5	b 30.40	31	a 21.54
11	6.44	13	17.42	12	b 29.98	Nov. 4	20.45
18	7.58	20	17.52	19	b 30.43	11	19.52
25	8.83	27	18.98	22	b 30.73	18	16.10
28	a 9.30	29	a 19.77	26	b 31.13	25	13.84
Mar. 4	9.27	June 3	20.42	30	ab 31.87	Dec. 2	a 11.92
11	13.23	10	22.62	Sept. 2	b 31.01	9	10.58
18	17.19	17	25.01	9	b 30.59	16	9.43
25	16.33	24	25.44	16	b 30.08	23	8.91
29	a 14.05	28	a 26.67	23	b 30.41	30	a 7.75
Apr. 1	12.25	July 1	26.48	30	ab 28.74	30	7.81

a By Geological Survey.

b Below sea level.

5S/10-9D1 (*941, p. 126; 949, p. 118; 991, p. 110; 1021, p. 101; 1028, p.128). Julio Martinez. About 1 mile south of Garden Grover. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 14	46.41	Apr. 9	48.66	July 15	62.98	Oct. 10	59.99
Feb. 8	a 47.68	May 10	53.03	Aug. 12	65.14	Nov. 15	54.31
Mar. 12	59.64	June 11	60.24	Sept.13	65.93	Dec. 6	51.94

a Pump shut off prior to measurement.

5S/10-28B1 (*949, p. 119; 991, p. 118; 1021, p. 101; 1028, p.128). John Sturtevant. About 3.5 miles southwest of Santa Ana. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 15	25.15	May 14	31.79	Aug. 13	39.07	Nov. 22	30.15
Feb. 11	27.63	June 17	37.38	Sept.13	a 48.01	Dec. 10	27.81
Apr. 11	28.69	July 18	38.98	Oct. 11	36.94		

a Below sea level.

5S/11-2E1 (*949, p. 121; 991, p. 119; 1021, p. 101; 1028, p.128). Western Trust & Savings Bank. About 1 mile north of Westminster. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 11	26.12	Apr. 8	28.62	July 11	a 51.56	Oct. 8	47.29
Feb. 7	26.01	May 9	30.99	Aug. 8	a 52.83	Nov. 19	32.03
Mar. 11	38.07	June 10	40.56	Sept.12	a 50.06	Dec. 9	28.72

a Below sea level.

5S/11-16D2 (*941, p. 127; 949, p. 124; 991, p. 119; 1021, p. 101; 1028, p. 128). Anaheim Sugar Co. About 4 miles east of Seal Beach. Records furnished by Orange County Flood Control District. Water level below sea level from July 10, to Oct. 23.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	5.07	Apr. 3	8.58	July 3	15.63	Oct. 2	20.50
9	4.17	10	6.43	10	16.40	9	20.00
16	3.49	17	5.68	17	17.59	16	18.97
23	4.31	24	5.43	24	19.13	23	17.07
30	5.65	May 1	5.96	31	18.90	30	14.43
Feb. 6	6.76	8	7.02	Aug. 7	19.68	Nov. 6	14.92
13	8.46	15	7.97	14	20.36	13	11.44
20	10.23	22	9.88	21	18.76	21	9.06
27	11.81	29	11.24	28	18.18	27	9.35
Mar. 6	13.48	June 5	12.00	Sept. 4	16.97	Dec. 4	7.67
13	14.57	12	12.85	11	18.22	11	6.43
20	13.95	19	13.69	18	19.26	18	5.85
27	11.82	26	15.11	25	18.65	26	5.18

5S/11-18N1 (*949, p. 125; 991, p. 119; 1021, p. 102; 1028, p. 129). United States Naval Depot. About 2 miles southeast of Seal Beach. Water level, in feet below land-surface datum, 1946: Dec. 28, 3.76.

5S/11-18F1 (*949, p. 126; 991, p. 120; 1021, p. 102; 1028, p. 129). United States Naval Depot. About 2 miles southeast of Seal Beach. Water level, in feet below land-surface datum, 1946: Dec. 28, 0.78.

5S/11-25F1 (*949, p. 131; 991, p. 120; 1021, p. 102; 1028, p. 129). E. J. Lecrivain. About 3.5 miles north of Huntington Beach. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 15	35.68	Apr. 11	40.71	July 18	46.10	Oct. 11	43.60
Feb. 11	40.34	May 14	39.02	Aug. 13	44.26	Nov. 22	39.46
Mar. 14	46.88	June 17	43.19	Sept. 13	46.20	Dec. 10	38.76

5S/11-28A1 (*949, p. 133; 991, p. 120; 1021, p. 102; 1028, p. 129). A. Ruoff. About 4 miles northwest of Huntington Beach. Records furnished by Orange County Flood Control District.

Water level, in feet with reference to land-surface datum, 1946

Jan. 15	(a)	Apr. 11	+2.78	Aug. 13	-4.25	Nov. 22	-2.09
Feb. 11	(a)	May 14	+6.93	Oct. 11	b -9.72	Dec. 10	+1.45
Mar. 14	-2.26	June 17	+6.18				

a Flowing.

b Below sea level.

5S/11-29C4 (*949, p. 135; 991, p. 121; 1021, p. 103; 1028, p. 129). Sunset Land & Water Co. About 1 mile southeast of Sunset Beach. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 15	0.42	Apr. 11	1.10	July 18	a 8.62	Nov. 22	4.14
Feb. 11	1.36	May 14	1.52	Aug. 13	a 10.28	Dec. 10	1.70
Mar. 14	6.10	June 17	4.90	Oct. 11	a 12.62		

a Below sea level.

5S/11-29E1 (*949, p. 136; 991, p. 121; 1021, p. 103; 1028, p. 129). United States Government. About 1 mile southeast of Sunset Beach. Water level, in feet below land-surface datum, 1946: Dec. 28, 5.49.

5S/11-29E2 (*949, p. 136; 991, p. 121; 1021, p. 103; 1028, p. 129). United States Government. About 1 mile southeast of Sunset Beach. Water level, in feet below land-surface datum, 1946: Dec. 28, 4.91.

5S/12-12F1 (*949, p. 140; 991, p. 122; 1021, p. 103; *1028, p.129).
United States Naval Depot. About 1 mile east of Seal Beach. Records
furnished by city of Long Beach.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 8	9.12	Apr. 23	9.80	July 13	15.48	Sept. 18	a 18.18
Feb. 1	8.77	May 14	11.03	17	15.93	Oct. 30	a 16.63
20	10.51	June 5	12.56	Aug. 7	a 17.40	Nov. 20	14.14
Mar. 12	13.05	26	14.59	28	a 18.00	Dec. 10	11.64
Apr. 3	11.77						

a Below sea level.

5S/12-13D1 (*949, p. 143; 991, p. 122; 1021, p. 103; 1028, p. 129).
United States Naval Depot. In Seal Beach. Water level, in feet below
land-surface datum, 1946: Dec. 28, 23.15.

5S/12-13D2 (*949, p. 144; 991, p. 122; 1021, p. 103; 1028, p. 129).
United States Naval Depot. In Seal Beach. Water level, in feet below
land-surface datum, 1946: Dec. 28, 22.76.

6S/10-1E1 (*949, p. 144; 991, p. 123; 1021, p. 104; 1028, p. 130).
Frank Ey. About 3.5 miles northeast of Costa Mesa. Records furnished by
Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 12	17.41	Apr. 12	22.62	June 29	32.60	Oct. 5	33.91
17	17.91	13	26.29	July 19	a 36.22	14	33.58
19	17.08	20	24.39	27	a 40.42	19	33.36
26	21.75	27	23.35	Aug. 10	a 40.13	26	33.00
Feb. 2	25.25	May 4	24.82	16	a 38.93	Nov. 2	30.83
9	33.96	11	25.98	17	a 37.60	9	30.55
14	34.12	13	27.28	24	a 37.32	16	28.20
16	a 36.73	18	26.79	31	a 37.38	22	26.30
23	a 37.30	25	26.97	Sept. 7	a 36.71	30	24.85
Mar. 2	a 36.25	June 1	26.98	14	a 35.66	Dec. 7	23.47
9	a 38.56	8	26.90	16	a 35.55	12	22.74
15	a 40.18	15	27.06	21	a 35.62	14	22.63
16	a 39.03	18	27.41	28	a 34.81	21	21.31
Apr. 6	30.08	22	31.05				

a Below sea level.

6S/10-1L2 (137, p. 137, Santa Ana quadrangle, well 1356; *949, p. 147;
991, p. 123; 1021, p. 104; 1028, p. 130). I. A. W. Henry. About 3.5 miles
northeast of Costa Mesa. Records furnished by Orange County Flood Control
District.

Water level, in feet below land-surface datum, 1946

Jan. 17	17.11	Apr. 12	17.72	July 19	19.74	Oct. 14	20.08
Feb. 14	18.19	May 13	17.39	Aug. 16	20.52	Nov. 22	17.96
Mar. 15	19.16	June 18	19.15	Sept. 16	19.93	Dec. 12	17.88

6S/10-5C1 (*941, p. 140; 949, p. 150; 991, p. 123; 1021, p. 104;
1028, p. 130). Robert Gisler. About 3 miles northeast of Huntington
Beach. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946

Jan. 12	5.60	Apr. 13	2.38	Sept. 21	18.78	Nov. 9	12.91
19	5.65	May 4	10.66	28	18.19	16	11.21
26	7.02	11	10.83	Oct. 5	17.17	30	9.66
Feb. 23	.72	June 1	13.93	19	15.07	Dec. 7	9.23
Mar. 2	a .97	8	14.83	26	14.87	14	8.73
9	1.00	15	16.08	Nov. 2	13.60	21	8.54
Apr. 6	2.71	Aug. 24	b 20.56				

a Above land-surface datum.

b Below sea level.

6S/10-11B2 (*1028, p. 130). United States Government. About 5 miles south of Santa Ana. Water level, in feet below land-surface datum, 1946: Jan. 29, 48.34. Measurements discontinued.

6S/11-13G2 (*949, p. 163; 991, p. 124; 1021, p. 104; 1028, p. 131). Surf Land & Water Co. About 1.5 miles east of Huntington Beach. Records furnished by Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	1.17	Apr. 3 a	6.16	July 3 a	5.19	Oct. 2 a	3.66
9	.55	10 a	4.06	10 a	5.50	9 a	2.89
16	.88	17 a	3.70	17 a	5.98	16 a	3.20
23	2.66	24	2.10	24 a	5.82	23 a	4.68
30 a	3.88	May 1	2.45	31 a	6.32	30 a	4.66
Feb. 6 a	5.44	8 a	2.96	Aug. 7 a	5.73	Nov. 6 a	4.49
13 a	9.42	15 a	3.02	14 a	6.17	13	2.35
20 a	9.26	22 a	3.93	21 a	7.01	21	.92
27 a	9.02	29 a	4.08	28 a	6.36	27	2.34
Mar. 6 a	9.38	June 5 a	4.43	Sept. 4 a	5.40	Dec. 4	2.62
13 a	10.39	12 a	4.95	11 a	5.74	11 a	2.91
20 a	10.36	19 a	5.18	18 a	4.79	18	1.68
27 a	10.82	26 a	5.71	25 a	4.47	26	1.25

a Below sea level.

I-9F1 (*941, p. 133; 949, p. 169; 991, p. 124; 1021, p. 105; 1028, p. 131). The Irvine Co. About 3 miles south of Santa Ana. Records furnished by the Orange County Flood Control District.

Water level, in feet below land-surface datum, 1946							
Jan. 2	29.64	Apr. 3	41.89	June 26	ab159.91	Sept. 18	b 52.55
9	28.84	10	ab149.61	July 3	b 46.03	25	b 51.20
16	27.82	17	39.95	10	ab159.36	Oct. 2	49.96
23	27.34	24	35.95	17	b 58.96	9	50.05
30	28.05	May 1	ab145.57	24	ab163.02	16	b 51.08
Feb. 6	29.49	8	ab149.81	31	ab171.78	23	b 52.19
13	30.65	15	39.61	Aug. 7	b 55.87	30	50.40
20	31.81	22	39.13	14	ab167.41	Nov. 6	ab163.62
27	33.52	29	ab151.29	21	b 51.94	27	41.57
Mar. 6	ab157.29	June 5	40.25	28	b 53.66	Dec. 4	39.28
13	ab151.18	12	ab152.27	Sept. 4	ab165.53	11	37.66
27	ab150.39	19	44.77	11	b 52.35	18	36.14

a Pumping

b Below sea level.

Riverside County

Santa Ana River Basin, San Jacinto Valley

3/2W-35Q1 (*1021, p. 105; 1028, p. 131). I. E. Facemire. Water levels, in feet below land-surface datum, 1946: Feb. 8, 37.10, poor measurement, wet casing; May 22, 37.08, poor measurement, wet casing; Aug. 7, 39.96.

4/2W-7J1 (*1021, p. 105; 1028, p. 131). Albert McDonald. Measuring point beginning Feb. 18, 1946, top of 1½-inch pipe plug at base of square lug at edge of tape entrance slot, at land-surface datum. Water levels, in feet below land-surface datum, 1946: Feb. 8, 71.22; May 22, 75.24; Aug. 7, 82.36.

4/3W-32E1 (*817, p. 12; 840, p. 30; 845, p. 18; 886, p. 24; 911, p. 120; 941, p. 92; 949, p. 66; 991, p. 124; 1021, p. 106; 1028, p. 131). James Malcomb. Key well. At Perris, Riverside County. Water levels, in feet below land-surface datum, 1946: Feb. 8, 64.14; May 23, 67.68; Aug. 7, 67.65.

4/4W-1L1 (*1021, p. 106; 1028, p. 131). B. H. LeCont. Water levels, in feet below land-surface datum, 1946: Feb. 8, 38.78; May 23, 38.68; Aug. 7, 38.96.

5/1W-2N1 (*1021, p. 107; 1028, p. 131). J. A. Barger. Measuring point beginning Feb. 8, 1946, top of casing, 0.8 foot (revised) above land-surface datum (from resurvey). Water levels, in feet below land-surface datum, 1946: Feb. 8, 71.14; May 23, 70.12; Aug. 7, 70.28.

5/2W-24A1 (*1021, p. 107; 1028, p. 131). L. Wilhelm. Water levels, in feet below land-surface datum, 1946: Feb. 8, pumping, no measurement made; May 23, 41.28; Aug. 7, pumping, no measurement made.

5/2W-27E2 (*1021, p. 108; 1028, p. 132). L. L. Whiting. Water levels, in feet below land-surface datum, 1946: Feb. 8, 30.05; May 23, 29.08; Aug. 7, 30.48.

6/3W-4A2 (*1021, p. 108; 1028, p. 132). Meniffee School. Water levels, in feet below land-surface datum, 1946: Feb. 8, 53.77; May 23, 54.53; Aug. 7, 53.50.

San Bernardino County

Mojave River Basin

3/3W-6E1 (*886, p. 30; 911, p. 125; 941, p. 96; 949, p. 66; 991, p. 124; 1021, p. 109; 1028, p. 132). Mike Spranger. Water level, in feet below land-surface datum, 1946: Apr. 24, 5.45.

3/4W-12J1 (*886, p. 30; 911, p. 125; 941, p. 96; 949, p. 66; 991, p. 125; 1021, p. 109, published incorrectly as 3/3W-12J1; 1028, p. 132). Water level, in feet below land-surface datum, 1946: Apr. 24, 5.42.

3/4W-13B1 (*886, p. 30; 911, p. 125; 941, p. 96; 949, p. 66; 991, p. 125; 1021, p. 109; 1028, p. 132). Olive. Measuring point beginning Apr. 24, 1946, bottom of 5/8-inch hole drilled on slant in south face of 6- by 8-inch timber set on 6-foot-square concrete slab, 0.9 foot above land-surface datum. Water level, in feet below land-surface datum, 1946: Apr. 24, 65.24.

4/2W-5N1 (*886, p. 33; 911, p. 126; 941, p. 96; 949, p. 66; 991, p. 125; 1021, p. 109; 1028, p. 132). A. B. Sheridan. Measurements discontinued.

4/3W-1M1 (*886, p. 33; 911, p. 126; 941, p. 96; 949, p. 66; 991, p. 125; 1021, p. 109; 1028, p. 132). E. D. S. Pope. Water level, in feet below land-surface datum, 1946: Apr. 25, 197.52.

4/3W-5P1 (*886, p. 34; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 125; 1021, p. 109; 1028, p. 132). Measuring point beginning Apr. 20, 1944, top of casing, 3.7 feet below land-surface datum. Water level, in feet below land-surface datum, 1946: Apr. 24, 167.82.

4/3W-6B1 (*886, p. 35; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 125; 1021, p. 109; 1028, p. 132). A. J. Lintner. Water level, in feet below land-surface datum, 1946: Apr. 24, 51.33.

4/3W-6D1 (*886, p. 35; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 125; 1021, p. 109; 1028, p. 132). A. W. Phillips. Water level, in feet below land-surface datum, 1946: Apr. 24, 51.77.

4/3W-17M1 (*886, p. 34; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 125; 1021, p. 109; 1028, p. 132). Arrowhead Reservoir & Power Co. Water level, in feet below land-surface datum, 1946: Apr. 25, 16.60.

4/3W-18E1 (*886, p. 34; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 125; 1021, p. 109; 1028, p. 132). C. O. Evans. Water level, in feet below land-surface datum, 1946: Apr. 24, 17.02.

4/3W-19G1 (*886, p. 33; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 125; 1021, p. 109; 1028, p. 132). G. W. McLister. Water level, in feet below land-surface datum, 1946: Apr. 24, 16.06.

4/3W-19R1 (*886, p. 31; 911, p. 126; 941, p. 96; 949, p. 66; 991, p. 125; 1021, p. 110; 1028, p. 132). Arrowhead Reservoir & Power Co. Water level, in feet below land-surface datum, 1946: Apr. 24, 14.92.

4/3W-20K1 (*886, p. 32; 911, p. 126; 941, p. 96; 949, p. 66; 991, p. 125; 1021, p. 110; 1028, p. 132). N. F. Marsh. No measurements made in 1946.

4/3W-20L1 (*886, p. 32; 911, p. 126; 941, p. 96; 949, p. 66; 991, p. 125; 1021, p. 110; 1028, p. 132). J. M. Allison. Water level, in feet below land-surface datum, 1946: Apr. 25, 24.90.

4/3W-21A1 (*886, p. 32; 911, p. 126; 941, p. 96; 949, p. 66; 991, p. 126; 1021, p. 110; 1028, p. 132). W. O. Wade. Water level, in feet below land-surface datum, 1946: Apr. 25, 249.2.

4/3W-30E1 (*886, p. 30; 911, p. 126; 941, p. 96; 949, p. 66; 991, p. 126; 1021, p. 110; 1028, p. 132). A. W. Cole. Water level, in feet below land-surface datum, 1946: Apr. 24, 29.14.

5/3W-9K1 (*886, p. 35; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 126; 1021, p. 110; 1028, p. 133). F. A. Fletcher. Water level, in feet below land-surface datum, 1946: Apr. 25, 88.86.

5/3W-18F1 (*886, p. 35; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 126; 1021, p. 110; 1028, p. 133). J. D. Humiston. Water level, in feet below land-surface datum, 1946: Apr. 25, 106.65.

5/4W-10M1 (*886, p. 36; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 126; 1021, p. 110; 1028, p. 133). In Victorville. No measurements made in 1946.

5/4W-11P1 (*886, p. 36; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 126; 1021, p. 110; 1028, p. 133). Lee Saul. Water level, in feet below land-surface datum, 1946: Apr. 25, 53.85.

5/4W-11P2 (*886, p. 36; 911, p. 126; 941, p. 96; 949, p. 67; 991, p. 126; 1021, p. 110; 1028, p. 133). Lee Saul. Water level, in feet below land-surface datum, 1946: Apr. 25, 46.69.

5/4W-35A1 (*886, p. 36; 911, p. 126; 941, p. 97; 949, p. 67; 991, p. 126; 1021, p. 110; 1028, p. 133). A. Sorenson. On Verde Ranch. No measurements made in 1946.

5/4W-36N1 (*886, p. 36; 911, p. 127; 941, p. 97; 949, p. 67; 991, p. 126; 1021, p. 110; 1028, p. 133). On Verde Ranch. No measurements made in 1946.

6/4W-19G1 (*886, p. 37; 911, p. 127; 941, p. 97; 949, p. 67; 991, p. 126; 1021, p. 110; 1028, p. 133). John Bennetts. No measurements made in 1946.

7/4W-30C1 (*886, p. 37; 911, p. 127; 941, p. 97; 949, p. 67; 991, p. 126; 1021, p. 110; 1028, p. 133). Water level, in feet below land-surface datum, 1946: Apr. 25, 56.88.

8/3E-3E1 (*886, p. 43; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 126; 1021, p. 110; 1028, p. 133). C. W. Beaverstock. Water level, in feet below land-surface datum, 1946: May 2, 5.39.

8/3E-3F1 (*886, p. 44; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 126; 1021, p. 110; 1028, p. 133). Water level, in feet below land-surface datum, 1946: May 2, 21.57.

8/3E-4B1 (*886, p. 43; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 126; 1021, p. 110; 1028, p. 133). Lyle Graham. Water level, in feet below land-surface datum, 1946: May 2, 2.98.

8/3E-4B2 (*886, p. 43; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 126; 1021, p. 111; 1028, p. 133). Lyle Graham. Water level, in feet below land-surface datum, 1946: May 2, 3.63.

8/3W-4M1 (*886, p. 38; 911, p. 127; 941, p. 97; 949, p. 68; 991, p. 127; 1021, p. 111; 1028, p. 133). Everett Swing. Water level, in feet below land-surface datum, 1946: Apr. 26, 13.12.

8/4E-7E1 (*1021, p. 111; 1028, p. 133). Bodine. Water level, in feet below land-surface datum, 1946: May 2, 23.30.

8/4E-12L1 (*886, p. 44; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 127; 1021, p. 111; 1028, p. 133). Mojave Camp service station. No measurements made in 1946.

8/4W-2Q1 (*886, p. 38; 911, p. 127; 941, p. 97; 949, p. 67; 991, p. 127; 1021, p. 111; 1028, p. 133). Water level, in feet below land-surface datum, 1946: Apr. 30, 23.55.

8/4W-12Q1 (*886, p. 38; 911, p. 127; 941, p. 97; 949, p. 68; 991, p. 127; 1021, p. 111; 1028, p. 133). Holcomb Bros. No measurements made in 1946.

8/4W-20N1 (*886, p. 37; 911, p. 127; 941, p. 97; 949, p. 67; 991, p. 127; 1021, p. 111; 1028, p. 134). Lord. Water level, in feet below land-surface datum, 1946: Apr. 30, 12.97.

8/4W-31D1 (*886, p. 37; 911, p. 127; 941, p. 97; 949, p. 67; 991, p. 127; 1021, p. 111; 1028, p. 134). F. H. Merrell. Water level, in feet below land-surface datum, 1946: Apr. 25, 43.59.

8/4W-31R1 (*886, p. 37; 911, p. 127; 941, p. 97; 949, p. 67; 991, p. 127; 1021, p. 111; 1028, p. 134). Water level, in feet below land-surface datum, 1946: Apr. 25, 14.10.

9/1E-2E1 (*1028, p. 134). M. L. Goodwin. No measurements made in 1946.

9/1E-12D1 (*886, p. 45; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 127; 1021, p. 111; 1028, p. 134). No measurements made in 1946.

9/1E-13E1 (*886, p. 45; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 127; 1021, p. 111; 1028, p. 134). Water level, in feet below land-surface datum, 1946: May 2, 57.20.

9/1E-13E2 (*886, p. 45; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 127; 1021, p. 111; 1028, p. 134). Water level, in feet below land-surface datum, 1946: May 2, 58.40.

9/1E-15L1 (*886, p. 45; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 128; 1021, p. 111; 1028, p. 134). C. Linguenfelder. Water level, in feet below land-surface datum, 1946: May 3, 59.44.

9/1E-18E1 (*886, p. 47; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 128; 1021, p. 112; 1028, p. 134). B. A. Funk. Water level, in feet below land-surface datum, 1946: May 1, 8.94.

9/1E-24D1 (*886, p. 47; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 128; 1021, p. 112; 1028, p. 134). Water level, in feet below land-surface datum, 1946: May 2, 63.30.

9/1W-10A1 (*886, p. 42; 911, p. 128; 941, p. 98; 949, p. 68; 991, p. 128; 1021, p. 113; 1028, p. 134). Gibbs. Measuring point, top of pump platform in underground pump house, 7.0 feet below land-surface datum. Published incorrectly in Water-Supply Paper 991 as 5.9 feet below land-surface datum. Water levels, in feet below land-surface datum, 1943 revised, superseding figures published in Water-Supply Paper 991, p. 128: May 13, 8.63; Dec. 28, 10.38. No measurements made in 1946.

9/1W-10D1 (*886, p. 42; 911, p. 128; 941, p. 98; 949, p. 68; 991, p. 128; 1021, p. 113; 1028, p. 134). R. Harlan. Well destroyed. Measurements discontinued.

9/LW-10D2 (*1028, p. 134). R. E. Hettick. Water level, in feet below land-surface datum, 1946: May 1, 5.41.

9/LW-10M1 (*886, p. 43; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 128; 1021, p. 113; 1028, p. 134). Greystone Auto Camp. Water level, in feet below land-surface datum, 1946: May 1, 48.89.

9/LW-13E1 (*886, p. 43; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 128; 1021, p. 113; 1028, p. 134). F. Ryerse. Water level, in feet below land-surface datum, 1946: May 1, 8.19.

9/2E-3A1 (*886, p. 46; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 134). Bruce McCormick. Water level, in feet below land-surface datum, 1946: May 1, 9.46.

9/2E-3A2 (*886, p. 46; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 134). Bruce McCormick. Water level, in feet below land-surface datum, 1946: May 1, 13.07.

9/2E-4D1 (*886, p. 46; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). Water level, in feet below land-surface datum, 1946: May 1, 15.68.

9/2E-8J1 (*886, p. 47; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). Annie Escholtz. No measurements made in 1946.

9/2E-12N1 (*886, p. 49; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). Hunter. Water level, in feet below land-surface datum, 1946: May 2, 2.19.

9/2E-14N1 (*886, p. 49; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). Scobel & Haimt. Water level, in feet below land-surface datum, 1946: May 2, 21.53.

9/2E-14N2 (*886, p. 49; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). Scobel & Haimt. Water level, in feet below land-surface datum, 1946: May 2, 16.70.

9/2E-14N3 (*886, p. 50; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). Scobel & Haimt. Water level, in feet below land-surface datum, 1946: May 2, 16.24.

9/2E-18F1 (*886, p. 47; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). Water level, in feet below land-surface datum, 1946: May 2, 49.23.

9/2E-20Q1 (*1021, p. 112; 1028, p. 135). Daggett Airport. Water level, in feet below land-surface datum, 1946: May 2, 42.01.

9/2W-19E1 (*886, p. 39; 911, p. 127; 941, p. 97; 949, p. 68; 991, p. 128; 1021, p. 112; 1028, p. 135). Shobel. Water level, in feet below land-surface datum, 1946: May 3, 63.25.

9/3E-3D1 (*886, p. 50; 911, p. 130; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). Water level, in feet below land-surface datum, 1946: May 3, 42.55.

9/3E-10D1 (*886, p. 50; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). Bozarth. Water level, in feet below land-surface datum, 1946: May 3, 35.34.

9/3E-12E1 (*886, p. 51; 911, p. 130; 941, p. 99; 949, p. 70; 991, p. 128; 1021, p. 112; 1028, p. 135). B. Nicholas. Water level, in feet below land-surface datum, 1946: May 3, 25.35.

9/3E-34D1 (*886, p. 48; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 128; 1021, p. 113; 1028, p. 135). Clinkenbeard. No measurements made in 1946.

9/3W-10P1 (*886, p. 39; 911, p. 127; 941, p. 97; 949, p. 68; 991, p. 129; 1021, p. 113; 1028, p. 135). Water level, in feet below land-surface datum, 1946: Apr. 26, 88.60.

9/3W-10R1 (*886, p. 40; 911, p. 127; 941, p. 97; 949, p. 68; 991, p. 129; 1021, p. 113; 1028, p. 135). Osborn. Water level, in feet below land-surface datum, 1946: Apr. 26, 9.53.

9/3W-14D1 (*886, p. 40; 911, p. 127; 941, p. 97; 949, p. 68; 991, p. 129; 1021, p. 113; 1028, p. 135). Bullock. Water level, in feet below land-surface datum, 1946: Apr. 26, 9.05.

9/3W-28A1 (*886, p. 39; 911, p. 127; 941, p. 97; 949, p. 68; 991, p. 129; 1021, p. 113; 1028, p. 135). J. Slagill. Water level, in feet below land-surface datum, 1946: Apr. 26, 4.59.

9/3W-34R1 (*886, p. 38; 911, p. 127; 941, p. 97; 949, p. 68; 991, p. 130; 1021, p. 113; 1028, p. 135). Nellie Storey. No measurements made in 1946.

9/4E-31K1 (*886, p. 44; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 130; 1021, p. 113; 1028, p. 136). A. M. Monroe. Water level, in feet below land-surface datum, 1946: May 2, 13.02.

10/1W-31C1 (*886, p. 42; 911, p. 128; 941, p. 98; 949, p. 68; 991, p. 130; 1021, p. 113; 1028, p. 136). Nelson. Water level, in feet below land-surface datum, 1946: Apr. 26, 48.18.

10/1W-33D1 (*886, p. 42; 911, p. 128; 941, p. 98; 949, p. 68; 991, p. 130; 1021, p. 113; 1028, p. 136). Sandoz. Measurements discontinued.

10/2E-32P1 (*886, p. 45; 911, p. 128; 941, p. 98; 949, p. 69; 991, p. 130; 1021, p. 113; 1028, p. 136). Yermo Mutual Water Co. Water level, in feet below land-surface datum, 1946: May 1, 23.55.

10/2E-34L1 (*886, p. 46; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 130; 1021, p. 113; 1028, p. 136). Water level, in feet below land-surface datum, 1946: May 1, 53.42.

10/2W-19P1 (*886, p. 41; 911, p. 128; 941, p. 97; 949, p. 68; 991, p. 130; 1021, p. 114; 1028, p. 136). Loftus. No measurements made in 1946.

10/2W-30R1 (*886, p. 41; 911, p. 128; 941, p. 97; 949, p. 68; 991, p. 130; 1021, p. 114; 1028, p. 136). J. D. Rich. Water level, in feet below land-surface datum, 1946: Apr. 26, 20.87.

10/3E-21A1 (*886, p. 46; 911, p. 129; 941, p. 99; 949, p. 70; 991, p. 130; 1021, p. 113; 1028, p. 136). G. F. Getty. Measurements discontinued.

10/3E-34E1 (*886, p. 50; 911, p. 130; 941, p. 99; 949, p. 70; 991, p. 130; 1021, p. 113; 1028, p. 136). Henderson. Water level, in feet below land-surface datum, 1946: May 3, 7.33.

10/3W-32C1 (*886, p. 39; 911, p. 127; 941, p. 97; 949, p. 68; 991, p. 130; 1021, p. 114; 1028, p. 136). Water level, in feet below land-surface datum, 1946: Apr. 26, 58.00.

11/3W-28R1 (*1021, p. 114; 1028, p. 136). S. F. Edwards. Water level, in feet below land-surface datum, 1946: Apr. 30, 26.09.

11/3W-34F1 (*886, p. 41; 911, p. 128; 941, p. 97; 949, p. 68; 991, p. 130; 1021, p. 114; 1028, p. 136). Water level, in feet below land-surface datum, 1946: Apr. 30, 33.26.

Santa Ana River Basin, San Bernardino area

1N/4W-28R1 (*1021, p. 114; 1028, p. 136). S. F. Kelley. Water levels, in feet below land-surface datum, 1946: Feb. 7, 43.29; May 23, 43.41; Aug. 8, 45.40.

1N/4W-36F1 (*1021, p. 115; 1028, p. 136). G. M. Cooley. Water levels, in feet below land-surface datum, 1946: Feb. 7, 42.92; May 23, 44.06; Aug. 8, 46.98.

1S/3W-3N1 (*1021, p. 115; 1028, p. 136). R. C. Gerber. Water levels, in feet below land-surface datum, 1946: Feb. 7, 77.89; May 23, 78.02; Aug. 8, 82.52.

1S/3W-16L1 (*1021, p. 116; 1028, p. 136). S. Ronzone. Measuring point beginning Feb. 7, 1946, top of 3/4-inch pipe flush with top of casing, 0.5 foot (revised) above land-surface datum (from resurvey). Water levels, in feet below land-surface datum, 1946: Feb. 7, 61.55; May 23, 67.22; Aug. 8, 74.80.

1S/3W-17C1. Known as Williams well (*817, pp. 12-16; 840, p. 30; 845, pp. 18-19; 886, p. 24; 911, pp. 119-120; 941, pp. 91-92; 949, pp. 65-66; 991, p. 131; 1021, p. 116; 1028, p. 136). Measuring point beginning Jan. 2, 1943, top of casing, 0.8 foot above land-surface datum, which was top of casing in 1896 and was 3.0 feet below original top of casing in 1892. All published records previous to 1943 are referred to measuring point 3.8 feet above land-surface datum. Records furnished by Gage Canal Co.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 4	9.20	Apr. 6	12.28	July 6	18.95	Oct. 5	24.53
12	9.03	13	11.70	13	19.53	12	24.62
19	9.45	20	11.70	20	20.70	19	24.70
26	10.03	27	11.95	27	20.62	26	24.86
Feb. 2	10.70	May 4	12.70	Aug. 3	20.86	Nov. 2	24.86
9	11.03	11	13.70	10	21.20	9	24.53
16	11.45	18	14.28	17	21.78	16	20.12
23	11.70	25	14.95	24	22.28	23	21.03
Mar. 2	11.86	June 1	15.45	31	22.88	30	17.70
9	12.20	8	15.95	Sept. 7	23.12	Dec. 7	16.70
16	12.86	15	16.70	14	23.62	14	15.20
23	13.70	22	17.36	21	24.28	21	15.03
30	14.36	29	18.36	28	24.45	28	11.78

1S/3W-20B1 (*1021, p. 116; 1028, p. 137). Emmet Martin.

Water level, in feet below land-surface datum, 1946

Feb. 1	35.8	Apr. 30	36.8	July 30	38.5	Oct. 30	38.4
Mar. 1	36.1	May 29	37.7	Aug. 29	38.9	Nov. 27	38.5
Apr. 1	36.6	July 1	38.2	Sept. 30	39.2	Dec. 30	37.8

1S/3W-28E1 (*1021, p. 117; 1028, p. 137). George Hinckley. Water levels, in feet below land-surface datum, 1946: Feb. 6, 41.02; May 23, 42.96; Aug. 8, 43.27.

1S/3W-29K1 (*1021, p. 118; 1028, p. 137). J. Yount. Water levels, in feet below land-surface datum, 1946: Feb. 6, 32.40; May 23, 33.10; Aug. 6, 33.74.

1S/3W-32C1 (*1021, p. 118; 1028, p. 137). W. H. Martin. Water levels, in feet below land-surface datum, 1946: Feb. 6, 58.77; May 23, 59.71; Aug. 6, 63.11.

1S/4W-4K1 (*1021, p. 119; 1028, p. 137). W. J. Walsh. Water levels, in feet below land-surface datum, 1946: Feb. 7, 3.07; May 23, 6.05; Aug. 8, 9.62.

San Diego County

San Luis Rey River Basin

10/3W-1 (*840, p. 35; 845, p. 42; 886, p. 27; 911, p. 123; 941, p. 94; 949, p. 73; 991, p. 131; 1021, p. 119; 1028, p. 137). On San Luis Rey Ranch. Water levels, in feet below land-surface datum, 1946: Jan. 7, 6.10; Apr. 4, 6.18; July 2, 7.55; Oct. 7, 11.67.

10/3W-1a (*840, p. 36; 845, p. 42; 886, p. 27; 911, p. 123; 941, p. 94; 949, p. 73; 991, p. 131; 1021, p. 119; 1028, p. 137). On San Luis Rey Ranch, about 4 miles west of Pala. Water levels, in feet below land-surface datum, 1946: Jan. 7, 7.69; Apr. 4, 7.71; July 2, 8.40; Oct. 7, 8.42.

10/3W-1b (*840, p. 36; 845, p. 43; 886, p. 28; 911, p. 124; 941, p. 94; 949, p. 73; 991, p. 131; 1021, p. 119; 1028, p. 137). On San Luis Rey Ranch, about 4 miles west of Pala. Water levels, in feet below land-surface datum, 1946: Jan. 7, 6.10; Apr. 4, 6.14; July 2, 6.85; Oct. 7, 6.79.

10/3W-1c (*886, p. 28; 911, p. 124; 941, p. 94; 949, p. 74; 991, p. 131; 1021, p. 120; 1028, p. 137). Fallbrook Public Utility District observation well. On San Luis Rey Ranch. Water levels, in feet below land-surface datum, 1946: Jan. 7, 6.71; Apr. 4, 6.80; July 2, 7.67; Oct. 7, 8.40.

10/3W-15 (*840, p. 35; 845, p. 42; 886, p. 28; 911, p. 124; 941, p. 94; 949, p. 74; 991, p. 132; 1021, p. 132; 1028, p. 137). On Gird Ranch, about 2.5 miles east of Bonsall. Water levels, in feet below land-surface datum, 1946: Jan. 7, 3.78; Apr. 4, 3.79; July 2, 5.35; Oct. 7, 7.38.

10/3W-16 (*845, p. 42; 886, p. 28; 911, p. 124; 941, p. 94; 949, p. 74; 991, p. 132; 1021, p. 120; 1028, p. 138). Hart, Inc. About 2 miles east of Bonsall. Water levels, in feet below land-surface datum, 1946: Jan. 7, 7.17; Apr. 4, 3.17; July 2, 6.36; Oct. 7, 6.93.

10/3W-20 (*840, p. 35; 845, p. 42; 886, p. 28; 911, p. 124; 941, p. 94; 949, p. 74; 991, p. 132; 1021, p. 120; 1028, p. 138). Bonsall School. At Bonsall. Water levels, in feet below land-surface datum, 1946: Jan. 7, 8.52; Apr. 4, 8.27; Oct. 7, 10.10.

10/3W-20a (*991, p. 132; 1021, p. 120; 1028, p. 138). Sickler Ranch. At Bonsall. Water levels, in feet below land-surface datum, 1946: Jan. 7, 15.21; Apr. 4, 14.91; July 2, 17.26; Oct. 7, 16.78.

10/3W-30 (*886, p. 28; 911, p. 124; 941, p. 94; 949, p. 74; 991, p. 132; 1021, p. 120; 1028, p. 138). Fallbrook Public Utility District observation well. On property of San Diego County Water Co. Water levels, in feet below land-surface datum, 1946: Jan. 7, 10.50; Apr. 4, 10.26; July 2, 11.16; Oct. 7, 12.06.

11/4W-5 (*886, p. 28; 911, p. 124; 941, p. 94; 949, p. 74; 991, p. 132; 1021, p. 120; 1028, p. 138). City of Oceanside observation well. On Stokes property. Measurements by city of Oceanside.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	10.11	Apr. 8	6.44	July 10	9.90	Oct. 12	13.81
7	8.94	May 14	6.82	Aug. 12	11.65	Nov. 11	14.94
Feb. 9	7.07	June 10	8.48	Sept. 14	13.40	Dec. 14	14.81
Mar. 13	7.02						

11/4W-8 (*886, p. 29; 911, p. 124; 941, p. 95; 949, pp. 74-75; 991, p. 133; 1021, p. 120; 1028, p. 138). Carlsbad Mutual Water Co. observation well. At San Luis Rey. Measurements by Carlsbad Mutual Water Co. Water levels, in feet below land-surface datum, 1946: Jan. 1, 7.20; Apr. 6.28; July 2, 8.50; Oct. 10, 12.10.

11/4W-9F1 (*911, p. 125; 941, p. 95; 949, p. 74; 991, p. 133; 1021, p. 120; 1028, p. 138). City of Oceanside observation well. On Williams Ranch. Measurements by city of Oceanside.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	8.33	Apr. 8	4.60	July 10	8.43	Oct. 12	12.60
7	6.77	May 14	5.56	Aug. 12	10.60	Nov. 11	14.35
Feb. 9	5.93	June 10	6.68	Sept. 14	12.27	Dec. 14	14.10
Mar. 13	6.10						

11/4W-18 (*886, p. 29; 911, p. 125; 941, p. 95; 949, p. 75; 991, p. 133; 1021, p. 120; 1028, p. 136). Carlsbad Mutual Water Co. observation well. Near San Luis Rey. Measurements by Carlsbad Mutual Water Co. Water levels, in feet below land-surface datum, 1946: Jan. 1, 19.16; Apr., 21.90; July 2, 28.20; Oct. 10, 28.20.

11/5W-13a (*886, p. 29; 911, p. 125; 941, p. 95; 949, p. 75; 991, p. 133; 1021, p. 121; 1028, p. 138). City of Oceanside. On city property, about 2 miles northeast of Oceanside. Measurements by city of Oceanside.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	10.97	Apr. 8	6.66	July 10	13.25	Oct. 12	16.50
7	9.75	May 14	12.50	Aug. 12	14.58	Nov. 11	12.17
Feb. 9	9.58	June 10	11.97	Sept. 14	14.50	Dec. 14	11.96
Mar. 13	12.12						

11/5W-13b (*886, p. 29; 911, p. 125; 941, p. 95; 949, p. 75; 991, p. 133; 1021, p. 121; 1028, p. 138). City of Oceanside. On city property, about 2 miles northeast of Oceanside. Measurements by city of Oceanside.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	12.81	Apr. 8	9.88	July 10	11.83	Oct. 12	13.41
7	12.25	May 14	10.25	Aug. 12	12.41	Nov. 11	13.75
Feb. 9	10.67	June 10	11.00	Sept. 14	12.75	Dec. 14	13.00
Mar. 13	10.67						

11/5W-13c (*886, p. 29; 911, p. 125; 941, p. 95; 949, p. 75; 991, p. 133; 1021, p. 121; 1028, p. 139). City of Oceanside. On city property, about 2 miles north of Oceanside. Measurements by city of Oceanside.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	9.68	Apr. 8	9.25	July 10	11.25	Oct. 12	13.33
7	8.08	May 14	12.33	Aug. 12	12.09	Nov. 11	11.91
Feb. 9	10.50	June 10	8.58	Sept. 14	12.44	Dec. 14	11.83
Mar. 13	11.50						

11/5W-15 (*886, p. 29; 911, p. 125; 941, p. 95; 949, p. 75; 991, p. 133; 1021, p. 121; 1028, p. 139). City of Oceanside. On city property, north of Oceanside. Measurements by city of Oceanside.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	4.68	Apr. 8	2.58	July 10	6.67	Oct. 12	7.96
7	3.91	May 14	4.17	Aug. 12	6.73	Nov. 11	6.90
Feb. 9	3.50	June 10	5.50	Sept. 14	7.33	Dec. 14	5.91
Mar. 13	4.50						

San Dieguito River Basin

12/1W-31H2. Formerly well G17b (*840, pp. 38-39; 845, p. 42; 886, p. 27; 911, p. 123; 941, p. 93; 949, p. 73) and well 12/1W-31a (*991, p. 134; 1021, p. 121; 1028, p. 139). City of San Diego. Measuring point beginning Jan. 12, 1944, top of casing, 1.94 feet below land-surface datum.

Water level, in feet below land-surface datum, 1944^a/1946

Date	Water level	Date	Water level	Date	Water level
Jan. 12, 1944	7.55	Aug. 25, 1944	9.27	Jan. 7, 1946	6.72
Mar. 30	6.85	Oct. 25	9.54	May 22	7.69
June 7	7.72	Dec. 7	8.04	Sept. 9	10.12

^a A Revised, superseding figures published in Water-Supply Paper 1021.

12/1W-32 (*991, p. 134; 1021, p. 121; 1028, p. 139). County Road Station. Water levels, in feet below land-surface datum, 1946: Jan. 7, 22.28; Mar. 25, 17.71; May 22, 21.82; Sept. 9, 19.40.

12/1W-33 (*840, p. 39; 845, p. 42; 886, p. 27; 911, p. 123; 941, p. 93; 949, p. 73; 991, p. 134; 1021, p. 121; 1028, p. 139). H. G. Fenton. Just west of San Pasqual. Water levels, in feet below land-surface datum, 1946: Jan. 7, 14.65; Mar. 25, 14.30; May 22, 14.70; Sept. 9, 16.66.

12/1W-33a (*991, p. 134; 1021, p. 122; 1028, p. 139). F. B. Gierman. Water levels, in feet below land-surface datum, 1946: Jan. 7, 1.16; Mar. 25, 1.32; May 22, 1.58; Sept. 9, 4.37.

12/1W-35K1 (*1028, p. 139). June Chase. Water levels, in feet below land-surface datum, 1946: Jan. 7, 7.66; Mar. 25, 6.78; May 22, 6.17; Sept. 9, 10.08.

12/1W-36D1 (*1028, p. 139). Jorgensen. Water levels, in feet below land-surface datum, 1946: Jan. 7, 8.49; Mar. 25, 8.07; May 22, 8.23; Sept. 9, 16.19.

San Diego River Basin

15/1E-2 (*845, p. 26; 886, p. 25; 911, p. 121; 941, p. 92; 949, p. 71; 991, p. 135; 1021, p. 122; 1028, p. 139). San Diego County. At El Monte Park. Water levels, in feet below land-surface datum, 1946: Mar. 13, 29.24; June 12, 32.22; Sept. 10, 35.23.

15/1E-7 (*845, p. 28; 886, p. 25; 911, p. 122; 941, p. 93; 949, p. 71; 991, p. 135; 1021, p. 122; 1028, p. 139). J. F. Rickerts. At Lakeside. Water levels, in feet below land-surface datum, 1946: Mar. 13, 9.35; June 12, 9.86; Sept. 10, 11.28.

15/1E-16C1 (*845, p. 26; 886, p. 25; 911, p. 121; 941, p. 92; 949, p. 71; 991, p. 135; 1021, p. 122; 1028, p. 139). Pratt test well. About 0.3 mile east of El Monte pumping plant. Water levels, in feet below land-surface datum, 1946: Mar. 13, 11.26; June 12, 11.78; Sept. 10, 12.89.

15/1E-17a (*845, p. 27; 886, p. 25; 911, p. 121; 941, p. 93; 949, p. 71; 991, p. 135; 1021, p. 122; 1028, p. 140). On Dr. Irely Ranch, east of Lakeside. Water levels, in feet below land-surface datum, 1946: Mar. 13, 10.57; June 12, 11.49; Sept. 10, 12.90.

15/1E-17b (*845, p. 27; 886, p. 25; 911, p. 121; 941, p. 93; 949, p. 71; 991, p. 135; 1021, p. 122; 1028, p. 140). In San Diego County yard, east of Lakeside. Water levels, in feet below land-surface datum, 1946: Mar. 13, 10.11; June 12, 11.10; Sept. 10, 12.54.

15/1E-17B1 (*845, p. 26; 886, p. 25; 911, p. 121; 941, p. 93; 949, p. 71; 991, p. 135; 1021, p. 122; 1028, p. 140). On Truttman Ranch, about 0.5 mile northwest of El Monte pumping plant. Water levels, in feet below land-surface datum, 1946: Mar. 13, 9.42; June 12, 10.21; Sept. 10, 11.45.

15/1E-17H6 (*845, p. 26; 886, p. 25; 911, p. 121; 941, p. 92; 949, p. 71; 991, p. 135; 1021, p. 122; 1028, p. 140). Irrigation District well. About 0.2 mile north of El Monte pumping plant. Water levels, in feet below land-surface datum, 1946: Mar. 13, 8.79; June 12, 9.33; Sept. 10, 10.62.

15/1E-19 (*845, p. 32; 886, p. 26; 911, p. 122; 941, p. 35; 949, p. 71; 991, p. 136; 1021, p. 123; 1028, p. 140). Mr. Langdon. Near Benedict Avenue, Lakeside. Water levels, in feet below land-surface datum, 1946: Mar. 13, 11.32; June 12, 12.16; Sept. 10, 14.26.

15/1W-13N2 (*845, p. 34; 886, p. 26; 911, p. 122; 941, p. 93; 949, p. 72; 991, p. 136; 1021, p. 123; 1028, p. 140). Riverview well 3. At Riverview. Water levels, in feet below land-surface datum, 1946: Mar. 13, 4.70; June 12, 5.31; Sept. 10, 7.50.

15/1W-13R5 (*845, pp. 32-33; 886, p. 26; 911, p. 122; 941, p. 93; 949, p. 71; 991, p. 136; 1021, p. 123; 1028, p. 140). Mr. Levi. Water levels, in feet below land-surface datum, 1946: Mar. 13, 12.32; June 12, 13.73; Sept. 10, 16.57.

15/1W-23H2 (*845, p. 35; 886, p. 26; 911, p. 122; 941, p. 93; 949, p. 72; 991, p. 136; 1021, p. 123; 1028, p. 140). Riverview well 1. At Riverview. Well plugged. Measurements discontinued. Replaced by well 15/1W-23H3.

15/1W-23H3. City of San Diego. SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 23, T. 15 S., R. 1 W., at Riverview, 400 feet east of well 15/1W-23H2. Diameter 8 inches, depth 26.5 feet. Measuring point, top of casing, 5.6 feet above land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 13, 3.98; June 12, 4.62; Sept. 10, 6.30.

15/1W-24a (*1028, p. 141). E. G. Squires. At Riverview. Water levels, in feet below land-surface datum, 1946: Mar. 13, 9.55; June 12, 11.13; Sept. 10, 14.74.

15/1W-24D7 (*845, p. 33; 886, p. 26; 911, p. 122; 941, p. 93; 949, p. 72; 991, p. 136; 1021, p. 123; 1028, p. 141). Riverview well 2. At Riverview. Water levels, in feet below land-surface datum, 1946: Mar. 13, 4.83; June 12, 7.50; Sept. 10, 11.21.

15/1W-27 (*845, p. 36; 886, p. 26; 911, p. 122; 941, p. 93; 949, p. 72; 991, p. 137; 1021, p. 123; 1028, p. 141). On County Farm. At Santee. Water levels, in feet below land-surface datum, 1946: Mar. 13, 6.89; June 12, 7.46; Sept. 10, 8.89.

15/1W-28 (*845, p. 36; 886, p. 26; 911, p. 122; 941, p. 93; 949, p. 72; 991, p. 137; 1021, p. 123; 1028, p. 141). Dr. Good. On El Cajon land grant. At Santee. Water levels, in feet below land-surface datum, 1946: Mar. 13, adjacent land being irrigated, well flooded; June 12, 11.68; Sept. 10, adjacent land being irrigated, well flooded.

16/2W-16 (*845, p. 37; 886, p. 26; 911, p. 122; 941, p. 93; 949, p. 72; 991, p. 137; 1021, p. 123; 1028, p. 141). Mr. Jaussaud. About 0.25 mile east of Old Mission San Diego, near Grantville. Measuring point beginning June 12, 1946, top of wood curb, north side, at land-surface datum. Water levels, in feet below land-surface datum, 1946: Mar. 13, 12.26; June 12, 13.44; Sept. 10, 15.09.

16/2W-16a (*845, p. 38; 886, p. 26; 911, p. 122; 941, p. 93; 949, p. 72; 991, p. 137; 1021, p. 124; 1028, p. 141). Mr. Jaussaud. About 0.25 mile east of Old Mission San Diego, near Grantville. Water levels, in feet below land-surface datum, 1946: Mar. 13, 12.47; June 12, 13.18; Sept. 10, 14.84.

16/3W-22 (*845, p. 39; 886, p. 27; 911, p. 123; 941, p. 93; 949, p. 72; 991, p. 137; 1021, p. 124; 1028, p. 141). H. Tatreau. On south side of Mission Valley. Water levels, in feet below land-surface datum, 1946: Mar. 13, 12.26; June 12, 12.66; Sept. 10, 14.09.

16/3W-23 (*845, p. 39; 886, p. 27; 911, p. 123; 941, p. 93; 949, p. 72; 991, p. 137; 1021, p. 124; 1028, p. 141). S. H. McIntosh. In Mission Valley, near Murray Canyon Road. Water levels, in feet below land-surface datum, 1946: Mar. 13, 5.95; June 12, 6.39; Sept. 10, 7.85.

16/3W-24 (*845, p. 38; 886, p. 26; 911, p. 123; 941, p. 93; 949, p. 72; 991, p. 137; 1021, p. 124; 1028, p. 141). R. I. Officer. About 0.3 mile west of city of San Diego pumping plant. Water levels, in feet below land-surface datum, 1946: Mar. 13, 8.95; June 12, 9.32; Sept. 10, 10.90.

Sweetwater River Basin

17/1W-19 (*845, p. 25; 886, p. 25; 911, p. 121; 941, p. 92; 949, p. 75; 991, p. 138; 1021, p. 124; 1028, p. 142). L. C. Kincaid. At Sunnyside. Well dry on Jan. 2, Mar. 5, June 5, Sept. 3, Dec. 30.

17/1W-19a (*991, p. 138; 1021, p. 124; 1028, p. 142). L. C. Kincaid. At Sunnyside, in river bed, 200 yards south of well 17/1W-19.

17/1W-19a--Continued.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 2	14.69	June 5	15.13	Dec. 30	31.72
Mar. 5	14.52	Sept. 3	24.50		

Otay River Basin

18/2W-22 (*845, p. 23; 886, p. 25; 911, p. 121; 941, p. 92; 949, pp. 70-71; 991, p. 138; 1021, p. 124; 1028, p. 142). G. W. St. Clair. At Otay.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 2	21.97	June 5	22.80	Dec. 30	22.42
Mar. 5	21.44	Sept. 3	(a)		

a Pumping; no measurement made.

18/2W-22a (*845, p. 23; 886, p. 25; 911, p. 121; 941, p. 92; 949, p. 70; 991, p. 138; 1021, p. 124; 1028, p. 142). N. Bard. At Otay. Well dry on Jan. 2, June 5, Sept. 3, Dec. 30.

Tia Juana River Basin

18/2W-33 (*845, p. 20; 886, p. 24; 911, p. 120; 941, p. 92; 949, p. 76; 991, p. 138; 1021, p. 125; 1028, p. 142). On Hewitt Bros. Hog Ranch.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 2	a 11.40	June 5	a 10.34	Dec. 30	b 11.04
Mar. 5	10.06	Sept. 3	13.42		

a Nearby well pumping.

b New well being drilled about 20 feet northeast.

18/2W-34 (*845, p. 20; 886, p. 24; 911, p. 120; 941, p. 92; 949, p. 76; 991, p. 138; 1021, p. 125; 1028, p. 142). G. R. Smalley. Formerly owned by Owens Ranch.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 2	12.00	June 5	11.13	Dec. 30	12.20
Mar. 5	11.07	Sept. 3	15.41		

18/2W-34a (*845, p. 21; 886, p. 25; 911, p. 120; 941, p. 92; 949, p. 76; 991, p. 139; 1021, p. 125; 1028, p. 142). On Evans Ranch. Near San Ysidro.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 2	6.91	June 5	8.51	Dec. 30	7.97
Mar. 5	7.16	Sept. 3	9.96		

19/2W-1 (*845, p. 22; 886, p. 25; 911, p. 120; 941, p. 92; 949, p. 76; 991, p. 139; 1021, p. 125; 1028, p. 142). Mrs. A. W. Jackson. At San Ysidro. Water levels, in feet below land-surface datum, 1946: Jan. 2, 3.65; Mar. 5, well destroyed, measurements discontinued.

19/2W-4 (*845, p. 21; 886, p. 25; 911, p. 120; 941, p. 92; 949, p. 76; 991, p. 139; 1021, p. 125; 1028, p. 142). At Nestor Bridge.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 2	6.55	June 5	7.45	Dec. 30	6.87
Mar. 5	7.08	Sept. 3	12.15		

San Joaquin County

Mokelumne River Basin

3N/6-3K3 (*840, p. 45; 845, p. 44; 886, p. 53; 911, p. 132; 941, p. 137; *949, p. 171; 991, p. 139; 1021, p. 125; 1028, p. 142). F. B. Mills.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	16.00	Mar. 1	15.89	May 31 ab	16.68	Nov. 1	16.49
Feb. 1	15.73	Apr. 1	16.57	Oct. 1 ab	17.60	Dec. 2 a	16.31

a Water leaking into well.

b Estimated.

3N/6-17D1 (*840, p. 45; 845, p. 44; 886, p. 53; 911, p. 132; 941, p. 137; 949, p. 172; 991, p. 139; 1021, p. 125; 1028, p. 142). Otto Helmie.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	12.94	Apr. 1	11.71	July 1	16.42	Oct. 1	17.39
Feb. 1	12.29	May 1	14.39	Aug. 1	18.47	Nov. 1	15.86
Mar. 1	11.91	31	12.81	Sept. 3	19.55	Dec. 2	15.13

3N/6-36R2 (*619, p. 311; *777, p. 28; *817, p. 18; 840, p. 46; 845, p. 44; 886, p. 53; 911, p. 133; 941, p. 138; *949, p. 172; 991, p. 139; 1021, p. 125; 1028, p. 143). Leland W. Bunch.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	20.29	Apr. 1	20.44	July 1	21.49	Oct. 1	22.72
Feb. 1	19.93	May 1	20.28	Aug. 1	22.07	Nov. 1	22.30
Mar. 1	20.07	31	20.46	Sept. 4	22.86	Dec. 2	21.74

3N/7-3C1 (*777, p. 28; *817, p. 18; 840, p. 46; 845, p. 44; 886, p. 53; 911, p. 133; 941, p. 138; *949, p. 172; 991, p. 139; 1021, p. 126; 1028, p. 143). Jacob Knoll.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 5	34.13	Apr. 1	35.44	July 1	31.37	Oct. 1	35.13
Feb. 1	33.84	May 1	32.68	Aug. 1	33.39	Nov. 1	35.87
Mar. 1	34.51	31	28.82	Sept. 3	34.02	Dec. 2	36.23

3N/7-6M8 (*777, p. 28; *817, p. 18; 840, p. 46; 845, p. 44; 886, p. 53; 911, p. 133; 941, p. 138; *949, p. 172; 991, p. 140; 1021, p. 126; 1028, p. 143). R. E. and Ruth F. Coker.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	22.79	Apr. 1	23.72	July 1	23.42	Oct. 1	25.40
Feb. 1	22.10	May 1	25.80	Aug. 1	24.40	Nov. 1	25.48
Mar. 1	22.12	31	23.00	Sept. 3	25.21	Dec. 2	25.22

3N/7-7M1 (*777, p. 29; *817, p. 19; 840, p. 46; 845, p. 45; 886, p. 54; 911, p. 133; *941, p. 138; *949, p. 172; 991, p. 140; 1021, p. 126; 1028, p. 143). J. and Rachel Goetken.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	28.82	Apr. 1	31.54	July 1	36.84	Oct. 1	34.25
Feb. 1	28.50	May 1	37.35	Aug. 1	35.72	Nov. 1	33.19
Mar. 1	28.74	31	35.37	Sept. 3	35.16	Dec. 2	32.39

3N/7-10L3 (*777, p. 29; *817, p. 19; 840, p. 46; 845, p. 45; 886, p. 54; 911, p. 133; 941, p. 138; *949, p. 172; 991, p. 140; 1021, p. 126; 1028, p. 143). Edward Preszler.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 5	39.69	Apr. 30 a	51.66	July 1	47.92	Oct. 1	46.90
Feb. 1	39.24	May 1 a	51.69	Aug. 1 a	43.74	Nov. 1	44.89
Mar. 1	40.49	31	47.56	Sept. 3	48.73	Dec. 2	43.49
Apr. 1 a	49.34						

a Nearby well pumping.

3N/7-10L4 (*777, p. 29; *817, p. 19; *840, p. 46; 845, p. 45; 886, p. 54; 911, p. 133; 941, p. 138; *949, p. 172; 991, p. 140; 1021, p. 126; 1028, p. 143). Edward Preszler.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 5	38.71	Apr. 1	a 59.69	May 31	48.76	Oct. 1	45.39
Feb. 1	38.57		30 a 61.83	July 1	48.45	Nov. 1	43.66
Mar. 1	40.51	May 1	a 61.78	Sept. 3	48.02	Dec. 2	42.26

a Nearby well pumping.

3N/7-15P2 (*777, p. 29; *817, p. 19; 840, p. 47; 845, p. 45; 886, p. 54; 911, p. 133; 941, p. 138; *949, p. 172; 991, p. 140; 1021, p. 126; 1028, p. 143). Eugene R. Hieb.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 4	41.71	Apr. 1	41.17	July 1	47.90	Oct. 1	48.79
Feb. 1	41.24	May 1	a 48.97	Aug. 1	50.55	Nov. 1	46.33
Mar. 1	40.86		31 48.12	Sept. 3	50.23	Dec. 2	45.33

a Nearby well pumping.

3N/7-19D2 (*777, p. 30; *817, p. 19; 840, p. 47; 845, p. 45; 886, p. 54; 911, p. 133; 941, p. 138; *949, p. 173; 991, p. 140; 1021, p. 126; 1028, p. 144). C. M. Ferdun. Well destroyed, measurements discontinued after Sept. 3.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	30.15	Apr. 1	29.21	May 31	31.61	Aug. 1	(a)
Feb. 1	29.59	May 1	26.92	July 1	33.77	Sept. 3	(a)
Mar. 1	28.86						

a Dry at 34.5 feet.

3N/7-27F3 (*777, p. 30; *817, p. 20; 840, p. 47; 845, p. 45; 886, p. 54; 911, p. 133; 941, p. 139; *949, p. 173; 991, p. 141; 1021, p. 127; 1028, p. 144). John F. Heitzmann.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 4	38.50	May 1	38.29	July 1	(a)	Oct. 1	(a)
Feb. 1	37.98		31 (a)	Aug. 1	(a)	Nov. 1	(a)
Mar. 1	37.40	June 1	39.95	Sept. 3	(a)	Dec. 2	(a)
Apr. 1	38.16						

a Dry at 39.9 feet.

3N/7-30E2 (*619, p. 322; *777, p. 30; *817, p. 20; 840, p. 47; 845, p. 45; 886, p. 54; 911, p. 133; 941, p. 139; *949, p. 173; 991, p. 141; 1021, p. 127; 1028, p. 144). W. L. Flanigan.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	23.93	May 2	28.24	Sept. 4	31.66	Nov. 5	28.18
Feb. 1	23.17	Aug. 2	33.96	Oct. 17	29.23	Dec. 3	27.05
Mar. 1	22.85						

4N/6-12R1 (*619, p. 337; *777, p. 31; *817, p. 20; 840, p. 47; 845, p. 46; 886, p. 54; 911, p. 134; 941, p. 139; *949, p. 173; *991, p. 141; 1021, p. 127; 1028, p. 144). G. A. Jahant.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	33.67	Apr. 1	31.23	July 1	36.64	Oct. 1	39.04
Feb. 1	32.72	May 1	31.64	Aug. 1	38.99	Nov. 1	38.09
Mar. 1	31.92		31 33.73	Sept. 3	38.74	Dec. 2	35.78

4N/6-34R1 (*619, p. 344; *777, p. 31; *817, p. 20; *840, p. 47; 845, p. 46; 886, p. 55; 911, p. 134; *941, p. 139; *949, p. 173; 991, p. 141; 1021, p. 127; 1028, p. 144). E. M. Smith.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	15.84	May 1	14.68	Aug. 1	14.95	Nov. 1	15.11
Feb. 1	15.20		31 14.74	Sept. 3	15.08	Dec. 2	14.76
Mar. 1	15.21	July 1	14.85	Oct. 1	15.07		

4N/6-36D1 (*619, p. 345; *777, p. 31; *817, p. 20; 840, p. 48; 845, p. 46; 886, p. 55; 911, p. 134; 941, p. 139; *949, p. 173; 991, p. 141; 1021, p. 127; 1028, p. 144). D. D. Smith and S. H. and I. Zimmerman.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 2	20.53	Apr. 1	22.33	July 1	24.64	Oct. 1	22.24
Feb. 1	20.63	May 1	(a)	Aug. 1	27.10	Nov. 1	21.89
Mar. 1	21.16	31	23.03	Sept. 3	22.74	Dec. 2	21.81

a Dry.

4N/7-15B3 (*777, p. 32; *817, p. 21; 840, p. 48; 845, p. 46; 886, p. 55; 911, p. 134; 941, p. 139; *949, p. 174; 991, p. 141; 1021, p. 127; 1028, p. 144). Robert L. Carter.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	51.24	Apr. 1	49.62	July 1	53.41	Oct. 1	(a)
Feb. 1	50.34	May 1	50.19	Aug. 1	(a)	Nov. 1	(a)
Mar. 1	50.01	31	51.58	Sept. 3	(a)	Dec. 2	54.16

a Dry at 54.2 feet.

4N/7-18N3 (*777, p. 32; *817, p. 21; 840, p. 48; 845, p. 46; 886, p. 55; 911, p. 134; 941, p. 139; *949, p. 174; 991, p. 142; 1021, p. 127; 1028, p. 145). Martha Eddlemon.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	35.02	Apr. 1	33.29	July 1	41.27	Oct. 1	41.56
Feb. 1	34.05	May 1	35.65	Aug. 1	(a)	Nov. 1	39.83
Mar. 1	33.48	31	38.48	Sept. 3	(a)	Dec. 2	38.35

a Dry at 42.3 feet.

4N/7-22Q4 (*777, p. 32; *817, p. 21; 840, p. 48; 845, p. 46; 886, p. 55; 911, p. 134; 941, p. 139; *949, p. 174; 991, p. 142; 1021, p. 128; 1028, p. 145). Adolphus Eddlemon.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	41.17	Apr. 1	40.23	July 1	43.89	Oct. 1	44.20
Feb. 1	40.65	May 1	a 41.33	Aug. 1	45.25	Nov. 1	43.92
Mar. 1	40.21	31	43.02	Sept. 3	45.36	Dec. 2	43.41

a Nearby well pumping.

4N/7-22Q5 (*777, p. 32; *817, p. 21; 840, p. 48; 845, p. 46; 886, p. 55; 911, p. 134; 941, p. 139; *949, p. 174; 991, p. 142; 1021, p. 128; 1028, p. 145). Adolphus Eddlemon.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	40.59	Apr. 1	41.84	July 1	49.75	Oct. 1	46.14
Feb. 1	40.50	May 1	a 48.88	Aug. 1	51.93	Nov. 1	44.71
Mar. 1	40.55	31	47.19	Sept. 3	50.00	Dec. 2	43.70

a Nearby well pumping.

4N/7-27P1 (*777, p. 33; *817, p. 21; 840, p. 48; 845, p. 46; 886, p. 55; 911, p. 134; 941, p. 140; *949, p. 174; 991, p. 142; 1021, p. 128; 1028, p. 145). Frank H. and Leonard W. Buck.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	31.54	Apr. 1	32.98	July 1	32.45	Oct. 1	35.15
Feb. 1	30.94	May 1	31.79	Aug. 1	34.40	Nov. 1	34.93
Mar. 1	32.30	31	30.68	Sept. 3	35.00	Dec. 2	34.69

4N/7-30M2 (*777, p. 33; *817, p. 22; 840, p. 48; 845, p. 46; 886, p. 55; 911, p. 134; 941, p. 140; *949, p. 174; 991, p. 142; 1021, p. 128; 1028, p. 145). Clara A. Barton.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	30.50	May 1	36.55	Aug. 1	36.68	Nov. 1	(a)
Feb. 1	29.69	31	35.33	Sept. 3	35.23	Dec. 2	(a)
Mar. 1	29.46	July 1	36.12	Oct. 1	33.95	17	31.86
Apr. 1	31.71						

a Obstruction in well 2.4 feet below land-surface datum.

4N/7-31M3 (*777, p. 33; *817, p. 22; *840, p. 49; *845, p. 47; 886, p. 55; 911, p. 135; 941, p. 140; *949, p. 174; 991, p. 142; 1021, p. 128; 1028, p. 145). Charles H. Woest.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	20.62	Apr. 1	26.76	July 1	23.56	Oct. 10	26.14
Feb. 1	22.85	May 1	27.14	Aug. 1	25.21	Nov. 1	25.92
Mar. 1	23.72	31	23.22	Sept. 3	24.89	Dec. 2	25.26

4N/7-31N5 (*777, p. 33; *817, p. 22; 840, p. 49; 845, p. 47; 886, p. 55; 911, p. 135; 941, p. 140; *949, p. 175; 991, p. 142; 1021, p. 128; 1028, p. 145). Jacob Goehring.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 3	5.64	Apr. 1	8.67	July 1	7.23	Oct. 1	9.02
Feb. 1	8.68	May 1	6.97	Aug. 1	8.17	Nov. 1	9.53
Mar. 1	9.48	31	7.94	Sept. 3	8.68	Dec. 2	10.43

4N/7-34G1 (*777, p. 34; 817, p. 22; 840, p. 49; 845, p. 47; 886, p. 55; 911, p. 135; 941, p. 140; *949, p. 175; 991, p. 143; 1021, p. 128; 1028, p. 145). John J. Schmiedt.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 5 a	1.70	Apr. 1	9.22	July 1	7.60	Oct. 1	9.69
Feb. 1	6.72	May 1	6.86	Aug. 1	9.29	Nov. 1	9.63
Mar. 1	7.74	31	5.23	Sept. 3	9.75	Dec. 2	9.41

a Adjacent land flooded.

Santa Barbara County

Carpinteria Basin

4/25-19F4 (*949, p. 189; 991, p. 143; 1021, p. 129; 1028, p. 146). M. F. Lewis.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	94.20	May 6	88.37	Sept. 6	a101.21
Mar. 1	92.12	July 5	93.83	Dec. 30	a101.66

a Nearby well pumping.

4/25-19J5 (*949, p. 190; 991, p. 143; 1021, p. 129; 1028, p. 146). Lyman & Young. Water levels, in feet below land-surface datum, 1946: Feb. 5, 55.72; May 8, 50.95; July 5, 63.10 (below mean sea level); Dec. 30, 65.45 (below mean sea level).

4/25-20Q2 (*949, p. 190; *991, p. 143; 1021, p. 129; 1028, p. 146). J. B. Romero.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	35.31	May 6	30.93	Sept. 6	ab 53.94
Mar. 1	33.49	July 5	ab 42.95	Déc. 30	b 44.38

a Nearby well pumping.

b Below mean sea level.

4/25-21N2 (*941, p. 162; *949, p. 190; 991, p. 143; 1021, p. 129; 1028, p. 146). E. S. Pillsbury. Water levels, in feet below land-surface datum, 1946: Mar. 1, 57.74 (below mean sea level; nearby well pumping); May 6, 36.86; Sept. 6, 71.12 (below mean sea level; nearby well pumping); Dec. 30, 49.06.

4/25-21R1 (*949, p. 190; 991, p. 144; 1021, p. 129; 1028, p. 146). B. Moore.

4/25-21R1--Continued.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	71.13	May 6	70.35	Sept. 6	77.93
Mar. 1	73.49	July 5	73.21	Dec. 30	81.78

4/25-26A1. Moses Mesa Associates Co. About 6.2 miles nearly east of Carpinteria, 300 feet north of Moses Mesa Road, 10 feet east of ranch road, in lemon grove. Drilled irrigation well, diameter 10 inches, reported depth 480 feet. Derives water from sand and gravel in Casitas formation. Measuring point, lower edge of 2-inch access pipe in south side of concrete pump foundation, 1.00 foot above land-surface datum and about 413 feet above mean sea level. Water levels, in feet below land-surface datum, 1946: Feb. 8, 230.09; Dec. 30, 242.86.

4/25-26C2. Shepherd Mesa Mutual Water Co. About 5.5 miles nearly east of Carpinteria, 40 feet south of Moses Mesa Road, in frame pump house beneath derrick. Drilled irrigation well, diameter 10 inches, reported depth 450 feet. Derives water from sand and gravel in Casitas formation. Measuring point, lower edge of hand hole in north side of pump base, 1.00 foot above land-surface datum and about 433 feet above mean sea level. Water levels, in feet below land-surface datum, 1946: May 6, 226.10; July 5, 244.18; Dec. 30, 245.28.

4/25-27J1 (*941, p. 163; *949, p. 191; 991, p. 144; 1021, p. 129; 1028, p. 146). J. Rock. Measurements discontinued after Dec. 30.

Water level, in feet below land-surface datum, 1946

Feb. 5	121.52	July 5	120.94	Dec. 30	133.50
Mar. 1	119.54	Sept. 6	129.36		

4/25-27Q2 (*941, p. 162; *949, p. 192; *991, p. 144; 1021, p. 130; 1028, p. 146). A. F. Heimlich.

Water level, in feet below land-surface datum, 1946

Feb. 5	104.45	May 6	98.26	Sept. 6	114.50
Mar. 1	101.88	July 5	105.05	Dec. 30	116.52

4/25-27R2 (*949, p. 193; 991, p. 145; 1021, p. 130; 1028, p. 147). W. H. Yule.

Water level, in feet below land-surface datum, 1946

Feb. 5	105.15	July 5	111.52	Dec. 30	115.40
May 6	102.51	Sept. 6	121.01		

4/25-28J1 (*949, p. 193; 991, p. 145; 1021, p. 130; 1028, p. 147). W. C. and C. A. Catlin. Water levels, in feet below land-surface datum, 1946: July 5, 79.37; Sept. 6, 87.24 (nearby well pumping); Dec. 30, 76.72.

4/25-28M1 (*941, p. 163; *949, p. 193; 991, p. 145; 1021, p. 130; 1028, p. 147). Mrs. A. Baylor.

Water level, in feet below land-surface datum, 1946

Feb. 5	29.68	May 6	25.98	Sept. 6	ab 61.01
Mar. 1	27.87	July 5	a 53.79	Dec. 30	41.34

a Nearby well pumping.

b Below mean sea level.

4/25-29A3 (*949, p. 194; 991, p. 145; 1021, p. 130; 1028, p. 147). M. Young. Measurements discontinued Dec. 30.

Water level, in feet below land-surface datum, 1946

Feb. 5	18.49	May 6	14.80	Sept. 6	ab 73.40
Mar. 1	16.90	July 5	ab 39.68	Dec. 30	27.12

a Below mean sea level.

b Nearby well pumping.

4/25-29D1 (*949, p. 194; 991, p. 145; 1021, p. 130; 1028, p. 147).
H. Sturmer.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	a 18.98	May 6	15.34	Sept. 6	ab 38.02
Mar. 1	a 18.00	July 5	ab 30.27	Dec. 30	a 28.55

a Below mean sea level.

b Nearby well pumping.

4/25-29K1 (*949, p. 194; *991, p. 145; 1021, p. 130; 1028, p. 147).
Carpinteria Union High School.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	13.54	May 6	11.26	Sept. 6	b 31.68
Mar. 1	12.51	July 5	ab 38.27	Dec. 30	19.31

a Below mean sea level.

b Nearby well pumping.

4/25-33C1 (*949, p. 195; 991, p. 146; 1021, p. 130; 1028, p. 147).
B. F. Franklin. Measurements discontinued Dec. 30.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	25.52	May 6	25.64	Sept. 6	26.10
Mar. 1	25.49	July 5	25.85	Dec. 30	26.00

4/25-35E1 (*949, p. 195; 991, p. 146; 1021, p. 131; 1028, p. 147).
R. Nichols.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	34.33	May 6	21.18	Sept. 6	a 55.48
Mar. 1	28.01	July 5	a 33.29	Dec. 30	50.08

a Nearby well pumping.

4/25-35D1 (*941, p. 164; *949, p. 196; 991, p. 146; 1021, p. 131;
1028, p. 148). W. B. Knowlton. Measurements discontinued Dec. 30.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	115.95	May 6	112.94	Sept. 6	117.70
Mar. 1	114.72	July 5	114.55	Dec. 30	119.85

4/26-24F2 (*949, p. 196; 991, p. 147; 1021, p. 131; 1028, p. 148).
A. F. Thurmond.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	7.52	May 6	6.94	Dec. 30	10.92
Mar. 1	7.00	July 5	ab 20.39		

a Below mean sea level.

b Nearby well pumping.

Goleta Basin

4/27-6N1 (*949, p. 197; 991, p. 147; 1021, p. 131; 1028, p. 148).
John McCaughy.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	89.83	July 6	89.88	Dec. 30	90.97
May 6	89.45	Sept. 6	90.41		

4/28-2N2 (*991, p. 147; 1021, p. 131; 1028, p. 148). County of Santa
Barbara, Tucker's Grove.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 8	27.39	May 6	18.69	Sept. 6	28.43
Mar. 28	26.67	July 5	24.97	Dec. 30	28.96

4/28-3E2 (*949, p. 197; 991, p. 147; 1021, p. 131; 1028, p. 148). Peter Cavalletto. Water levels, in feet below land-surface datum, 1946: Mar. 1, 11.66; May 6, 17.23 (pumping recently); July 5, 24.55, (nearby well pumping); Dec. 30, 15.25.

4/28-3M2 (*949, p. 197; 991, p. 147; 1021, p. 132; 1028, p. 148). L. W. Fowler.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Feb. 5	95.79	May 6	a 94.07	Dec. 30	a103.67
Mar. 1	a 96.62	July 5	a102.85		

a Nearby well pumping.

4/28-3F1 (*949, p. 197; 991, p. 148; 1021, p. 132; 1028, p. 149). Lynn Sexton.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Feb. 5	131.42	July 5	136.93	Dec. 30	140.24
May 6	134.06	Sept. 6	139.07		

4/28-3F4 (*1021, p. 132; 1028, p. 149). Carrigan & Sperry. Measurements discontinued Dec. 30.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Mar. 1	95.29	July 5	98.40	Dec. 30	103.04
May 6	95.58	Sept. 6	102.58		

4/28-3Q2 (*991, p. 148; 1021, p. 132; 1028, p. 149). A. J. Haverland.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Feb. 5	94.21	May 6	94.59	Sept. 6	a107.04
Mar. 1	94.22	July 5	a 98.36	Dec. 30	102.97

a Nearby well pumping.

4/28-4K4 (*949, p. 198; 991, p. 148; 1021, p. 132; 1028, p. 149). R. S. Rowe.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Feb. 5	18.19	May 6	17.66	Sept. 6	22.01
Mar. 1	16.48	July 5	19.24	Dec. 30	20.53

4/28-4F1 (*949, p. 198; 991, p. 148; 1021, p. 132; 1028, p. 149). J. Reeber. Measurements discontinued Dec. 30.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Mar. 1	a 89.26	July 5	85.27	Dec. 30	86.78
May 6	81.54	Sept. 6	88.31		

a Pumping recently.

4/28-4Q2 (*949, p. 198; 991, p. 148; 1021, p. 132; 1028, p. 149). R. S. Rowe.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Feb. 5	63.50	May 6	62.72	Sept. 6	71.18
Mar. 1	63.70	July 5	67.77	Dec. 30	70.12

4/28-4R1 (*941, p. 164; *949, p. 198; 991, p. 148; 1021, p. 133; 1028, p. 150). L. M. Cavalletto. Measurements discontinued Dec. 30.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Feb. 5	58.61	May 6	57.80	Sept. 6	63.58
Mar. 1	58.50	July 5	62.68	Dec. 30	66.48

4/28-4R2 (*941, p. 165; *949, p. 199; 991, p. 148; 1021, p. 133; 1028, p. 150). G. M. Gallagher. Measurements discontinued Dec. 30.

4/28-4R2--Continued.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	60.95	May 6	51.36	Sept. 6	a 57.21
Mar. 1	51.98	July 5	a 55.05	Dec. 30	57.75

a Nearby well pumping.

4/28-4R3 (*941, p. 165; *949, p. 199; 991, p. 149; 1021, p. 133; 1028, p. 150). Cavaletto & Gallagher. Measurements discontinued Dec. 30. Water levels, in feet below land-surface datum, 1946: Feb. 5, 64.41; May 6, 62.20; July 5, 72.41 (nearby well pumping); Dec. 30, 70.35.

4/28-5J2 (*949, p. 200; 991, p. 149; 1021, p. 133; 1028, p. 150). Harry Sexton. Measurements discontinued Dec. 30.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	8.27	May 6	11.81	Sept. 6	16.78
Mar. 1	11.80	July 5	13.75	Dec. 30	14.23

4/28-5R4 (*991, p. 149; 1021, p. 133; 1028, p. 150). F. J. Ewing.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	47.25	May 6	46.60	Dec. 30	47.92
Mar. 1	46.03	Sept. 6	49.89		

4/28-8C2 (*1028, p. 150). G. S. Cavalletto. Automatic water-stage recorder installed Jan. 7.

Water level at noon, in feet below land-surface datum, 1946

(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 7	a 56.97	Apr. 20	55.44	July 15	a 57.70	Oct. 12	a 61.20
15	56.71	25	55.37	20	a 58.12	16	a 61.38
21	56.58	30	55.27	25	a 58.26	20	a 61.54
28	56.37	May 5	55.26	31	a 58.29	25	a 61.64
Feb. 4	56.31	10	55.34	Aug. 5	a 58.40	31	a 61.58
11	55.81	15	55.13	10	a 58.34	Nov. 5	a 61.55
18	55.80	20	54.96	15	a 58.56	10	a 61.63
23	55.71	25	55.00	20	a 59.08	15	a 61.55
28	55.59	31	55.32	25	a 59.79	20	a 61.10
Mar. 5	55.54	June 5	55.33	31	a 60.22	25	a 61.11
10	56.13	10	55.49	Sept. 5	a 60.22	30	a 60.86
15	56.42	15	56.48	10	a 59.92	Dec. 5	a 60.72
21	a 57.07	20	a 57.08	15	a 59.97	10	a 60.57
25	56.55	25	a 57.36	20	a 60.14	15	a 60.46
31	56.31	30	a 57.58	25	a 60.20	20	a 60.36
Apr. 5	55.98	July 5	a 57.54	30	a 60.25	25	a 60.11
10	55.70	10	a 57.68	Oct. 5	a 60.27	31	a 60.08
15	55.62						

a Below preliminary sea-level datum of 1934.

4/28-9A3 (*941, p. 166; *949, p. 200; *991, p. 150; 1021, p. 134; 1028, p. 151). L. M. Cavaletto.

Water level, in feet below land-surface datum, 1946^a

(From float gage)

Date	Water level	Date	Water level	Date	Water level
Jan. 28	46.38	Mar. 1	45.80	July 5	49.20
	50.72		43.65		48.71
	46.40		47.15		48.71
	45.63	May 6	44.15		52.60
	49.22		42.81	Sept. 6	52.60
				Dec. 30	52.03

a Undated entries are highest and lowest levels between dates of observation.

4/28-9E1 (*991, p. 150; 1021, p. 134; 1028, p. 151). A. T. Spaulding. Water levels, in feet below land-surface datum, 1946: Feb. 5, 40.04; July 5, 45.31 (below preliminary sea-level datum of 1934); Sept. 6, 45.94 (below preliminary sea-level datum of 1934); Dec. 30, 43.97 (below preliminary sea-level datum of 1934).

4/28-10A1 (*949, p. 201; 991, p. 150; 1021, p. 134; 1028, p. 151). C. C. Lee.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 6	102.71	May 6	102.90	Sept. 6	105.70
Mar. 1	102.70	July 5	103.61	Dec. 30	106.58

4/28-10F1 (*949, p. 201; 991, p. 150; 1021, p. 134; 1028, p. 151). J. S. Edwards.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	67.77	May 6	68.01	Sept. 6	71.43
Mar. 1	67.97	July 5	70.82	Dec. 30	72.23

4/28-10K2 (*949, p. 201; 991, p. 151; 1021, p. 134; 1028, p. 151). Norman Troup. All measurements are below preliminary sea-level datum of 1934. Water levels, in feet below land-surface datum, 1946: Feb. 5, 89.85; May 6, 90.37; Sept. 6, 106.28, (pumping recently); Dec. 30, 95.55.

4/28-10N6 (*949, p. 201; 991, p. 151; 1021, p. 134; 1028, p. 151). Dr. E. O. Campbell. Measurements discontinued Dec. 30.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	22.84	May 6	23.60	Sept. 6	24.20
Mar. 1	23.84	July 5	23.90	Dec. 30	24.52

4/28-11K3 (*1028, p. 152). Giovanni Cavalli. Well destroyed; measurements discontinued.

4/28-12L4 (*941, p. 167; *949, p. 202; *991, p. 151; 1021, p. 135; 1028, p. 152). L. More. Automatic water-stage recorder removed June 4.

Water level at noon, in feet below land-surface datum, 1946
(From recorder charts until June 4)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan 1	45.36	Feb. 16	43.21	May 1	53.90	July 15	a 70.56
5	44.48	20	42.77	14	a 56.37	22	a 76.40
10	43.85	Mar. 3	a 49.60	21	a 60.97	Aug. 5	a 88.27
15	43.53	9	44.62	June 4	a 81.84	Sept. 3	a 78.73
21	43.66	25	49.92	10	a 85.38	10	a 77.45
28	a 59.77	Apr. 3	46.52	17	a 89.70	15	a 80.97
Feb. 6	43.98	8	46.85	23	a 74.84	Oct. 11	a 77.93
8	42.59	23	a 53.44	July 1	a 72.17	Dec. 13	53.13
12	43.89	26	44.25	8	a 88.26	30	50.89

a Nearby well pumping.

4/28-15E1 (*949, p. 202; 991, p. 152; 1021, p. 135; 1028, p. 152). A. J. Holloway.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	a 46.08	July 5	a 54.93	Dec. 30	a 52.54
May 6	ab 50.38	Sept. 6	a 56.37		

a Below mean sea level.

b Nearby well pumping.

4/28-15G2 (*949, p. 202; *991, p. 152; 1021, p. 135; 1028, p. 152). Ignace Mariani. Measurements discontinued Sept. 6.

4/28-15G2--Continued.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	a 54.86	May 6	ab 56.15	Sept. 6	a 64.51
Mar. 1	a 53.76	July 5	ab 65.15		

a Below mean sea level.

b Nearby well pumping.

4/28-15H2 (*1028, p. 152). E. C. Drake. Measurements discontinued Dec. 30.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	4.96	May 8	4.28	Sept. 6	4.47
Mar. 1	4.72	July 5	4.05	Dec. 30	3.70

4/28-16F2 (*991, p. 152; 1021, p. 135; 1028, p. 153). John Begg.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	a 30.78	May 6	ab 35.29	Sept. 6	ab 46.21
Mar. 1	a 30.07	July 5	ab 43.82	Dec. 30	a 36.09

a Below mean sea level.

b Nearby well pumping.

4/28-16F3 (*991, p. 152; 1021, p. 135; 1028, p. 153). John Begg.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	13.04	May 6	12.92	Sept. 6	14.28
Mar. 1	13.04	July 5	13.53	Dec. 30	13.72

4/28-16R1 (*1028, p. 153). Pacific Lighting Corporation. Water levels, in feet below land-surface datum, 1946: Feb. 5, 14.58; May 6, 19.28 (nearby well pumping); Dec. 30, 18.78.

4/28-17H3 (*941, p. 167; *949, p. 203; 991, p. 152; 1021, p. 135; 1028, p. 153). J. J. Mathews.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	5.00	May 6	5.50	Sept. 6	7.42
Mar. 1	5.41	July 5	6.54	Dec. 30	4.95

4/28-17H11 (*941, p. 168; *949, p. 203; 991, p. 153; 1021, p. 135; 1028, p. 153). Mrs. L. Oakley and Mrs. M. Bonetti.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	a 14.64	May 6	a 16.21	Dec. 30	a 17.58
Mar. 1	a 16.86	Sept. 6	ab 23.20		

a Below mean sea level.

b Pumping recently.

4/28-18G2 (*949, p. 203; 991, p. 153; 1021, p. 136; 1028, p. 153). T. B. Bishop Co. All water levels below mean sea level. Water levels, in feet below land-surface datum, 1946: Feb. 5, 22.68; Mar. 1, 22.03; May 6, 24.29; Dec. 30, 24.92.

4/28-18N3 (*949, p. 204; 991, p. 153; 1021, p. 136; 1028, p. 153). C. A. Storke.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	a 14.52	May 6	ab 16.43	Sept. 6	a 22.73
Mar. 1	a 14.47	July 5	a 22.50	Dec. 30	a 19.42

a Below mean sea level.

b Nearby well pumping.

4/29-13K2 (*949, p. 204; 991, p. 153; 1021, p. 136; 1028, p. 154).
T. B. Bishop Co.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 5	a 41.66	May 6	a 42.55	Sept. 6	a 45.47
Mar. 1	a 42.32	July 5	a 43.17	Dec. 30	a 44.07

a Below mean sea level.

4/29-14A3 (*949, p. 205; 991, p. 153; 1021, p. 136; 1028, p. 154).
Frank Baker. All water levels below mean sea level. Water levels, in feet below land-surface datum, 1946: May 6, 72.11; July 5, 74.05; Sept. 6, 74.63 (nearby well pumping); Dec. 30, 73.87.

Santa Ynez, San Antonio, Santa Maria, and Cuyama Valleys

6/30-6A1 (*949, p. 205; 991, p. 154; 1021, p. 136; 1028, p. 154).
Sam Torrence. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 1	50.75	May 3	52.00	Oct. 30	a 60.96
28	50.54	July 2	a 61.37	Dec. 28	56.03

a Nearby well pumping.

6/30-7K1 (*949, p. 205; 991, p. 154; 1021, p. 136; 1028, p. 154).
Mrs. Anderson. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 1	a 38.25	May 5	39.56	Dec. 28	40.57
28	b 39.36	Oct. 31	40.80		

a Pumping.

b Pumping recently.

6/30-9N1 (*949, p. 205; 991, p. 154; 1021, p. 136; 1028, p. 154).
San Lucas Ranch. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 1	31.19	July 2	31.72	Oct. 31	31.98
28	a 31.48	Sept. 4	31.77	Dec. 28	32.00

a Pumping recently.

6/30-29E1 (*949, p. 206; 991, p. 154; 1021, p. 137; 1028, p. 155).
Rancho Juan y Lolita. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 1	13.53	May 3	11.58	Sept. 4	20.04	Dec. 28	20.26
28	13.15	July 2	14.96	Oct. 31	21.44		

6/31-11E1 (*949, p. 207; 991, p. 155; 1021, p. 137; 1028, p. 155).
Tom Petersen. In Middle Santa Ynez Valley. Measurements discontinued.

6/31-13D1 (*949, p. 207; 991, p. 155; 1021, p. 137; 1028, p. 155).
Mrs. W. E. Parker. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 1	104.31	May 3	104.90	Oct. 31	107.44
28	104.48	July 2	105.61	Dec. 28	107.40

6/31-17F1 (*949, p. 208; *991, p. 155; 1021, p. 137; 1028, p. 155).
J. R. Orton. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 1	16.53	May 3	17.10	Oct. 31	19.57
28	17.08	July 2	a 18.26	Dec. 28	17.29

a Pumping recently.

6/31-21H2 (*991, p. 155; 1021, p. 137; 1028, p. 155). Alisal Corporation. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 1	7.78	May 3	7.80	Sept. 4	8.58	Dec. 28	8.33
28	7.94	July 2	7.82	Oct. 31	8.72		

6/32-6K1 (*949, p. 209; 991, p. 156; 1021, p. 137; 1028, p. 155). Mrs. M. Barker. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 1	16.92	May 1 a	18.95	Sept. 5	18.63	Dec. 28	16.58
Mar. 8	16.90	July 3 a	20.25	Oct. 30	17.50		

a Pumping.

6/32-9A1 (*949, p. 209; 991, p. 156; 1021, p. 137; 1028, p. 155). Owen Hollister. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 1	29.82	May 1	29.87	Sept. 5 a	32.41	Dec. 28	30.19
Mar. 8	33.91	July 3 a	32.49	Oct. 30	31.50		

a Nearby well pumping.

6/32-12J2 (*941, p. 153; *949, p. 210; 991, p. 156; 1021, p. 138; 1028, p. 155). A. Bodine. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	29.55	May 2	28.25	Sept. 14	26.87	Dec. 28	a 32.08
Feb. 28	30.96	July 2	27.42	Oct. 30	28.02		

a Nearby well pumping.

6/32-16P3 (*949, p. 210; 991, p. 157; 1021, p. 138; 1028, p. 155). Channing Peake. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 31	45.49	July 3	46.40	Dec. 28	43.89
Feb. 28	45.46	Sept. 5	47.51		

6/33-9P1 (*941, p. 154; *949, p. 211; 991, p. 157; 1021, p. 138; 1028, p. 156). Hollister Estate. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946a/
(From float gage)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
	37.80		37.28	July 3	38.24		38.80
	38.18		37.73		38.24	Oct. 30	38.79
Jan. 31	37.80	May 2	37.49		38.73		38.54
	37.61		37.49	Sept. 5	38.73		38.85
	37.81		38.24		38.73	Dec. 28	38.54
Feb. 28	37.67						

a Undated entries are highest and lowest levels between dates of observation.

6/33-12L1 (*949, p. 211; 991, p. 158; 1021, p. 138; 1028, p. 156). J. Corbillini. In Middle Santa Ynez Valley. Measurements discontinued Dec. 28. Water levels, in feet below land-surface datum, 1946: Jan. 31, 16.40 (pumping recently); July 3, 17.13; Sept. 5, 20.52; Dec. 28, 16.84.

6/34-2A1 (*941, p. 154; *949, p. 212; 991, p. 158; 1021, p. 138; 1028, p. 156). C. Madsen. In Lower Santa Ynez Valley. Water levels, in feet below land-surface datum, 1946: Jan. 31, 38.69; Feb. 27, 38.70; May 2, 39.13.

6/34-4D1 (*949, p. 212; 991, p. 158; 1021, p. 138; 1028, p. 156).
Peter Tognatti. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 31	30.13	July 3	32.84	Oct. 30	31.71
Feb. 27	a 32.85	Sept. 5	32.57	Dec. 29	30.51

a Pumping recently.

6/34-6C2 (*991, p. 158; 1021, p. 139; 1028, p. 156). Bank of America.
In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 31	a 55.68	May 2	a 59.50	Oct. 30	58.65
Feb. 27	56.34	Sept. 5	b 61.35	Dec. 29	54.96

a Pumping recently.

b Nearby well pumping.

7/24-13C1 (*949, p. 237; 991, p. 158; 1021, p. 139; 1028, p. 156).
Ventura County, Apache School District. In Cuyama Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	9.64	Apr. 30	6.64	Sept. 3	11.75	Dec. 27	11.09
Feb. 25	8.68	July 1	8.81	Nov. 11	14.97		

7/31-23P1 (*949, p. 213; 991, p. 159; 1021, p. 139; 1028, p. 156).
F. L. Mattel. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Feb. 1	15.93	May 3	17.90	Oct. 30	23.97		
28	16.28	Sept. 4	a 24.98	Dec. 28	23.14		

a Pumping recently.

7/31-25L1 (*949, p. 213; 991, p. 159; 1021, p. 139; 1028, p. 157).
Russell Smith. In Middle Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 1	62.48	May 3	63.83	Dec. 28	65.23
28	66.94	Oct. 31	66.06		

7/31-36L2 (*949, p. 213; 991, p. 159; 1021, p. 139; 1028, p. 157).
Dr. W. B. Swackhamer. In Middle Santa Ynez Valley. Measurements discontinued July 2. Water levels, in feet below land-surface datum, 1946:
Feb. 1, 18.87; Feb. 28, 18.88; May 3, 19.25; July 2, 21.26.

7/33-30C1 (*949, p. 214; 991, p. 159; 1021, p. 140; 1028, p. 157).
John Valla. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 1	150.41	July 3	150.53	Oct. 30	150.80
May 1	150.63	Sept. 5	150.73	Dec. 28	151.05

7/34-22H1 (*949, p. 215; 991, p. 160). H. E. Harris. In Lower Santa Ynez Valley. Land-surface datum is about 87 feet above mean sea level. Measurements resumed.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
May 2	a 25.12	Sept. 5	23.68	Dec. 28	23.18
July 3	24.18	Oct. 30	23.85		

a Nearby well pumping.

7/34-26A2 (*941, p. 155; *949, p. 216; 991, p. 161; 1021, p. 140; 1028, p. 158). K. McConnell. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 31	37.10	May 2	37.45	Sept. 5	38.60
Feb. 28	37.26	July 3	38.09	Oct. 30	38.71
				Dec. 28	37.94

7/34-26F1 (*941, p. 156; 991, p. 161; 1021, p. 141; 1028, p. 158). Union Sugar Co. In Lower Santa Ynez Valley. Water levels, in feet below land-surface datum, 1946: Jan. 31, 33.94; Mar. 8, 34.39. Well destroyed; measurements discontinued.

7/34-26R2 (*949, p. 216; 991, p. 163; 1021, p. 143; 1028, p. 158). W. T. McHenry. In Lower Santa Ynez Valley. Measurements discontinued Dec. 28. Water levels, in feet below land-surface datum, 1946: Mar. 8, 36.08 (nearby well pumping); July 3, 35.95; Oct. 30, 37.36; Dec. 28, 36.93.

7/34-27L1 (*949, p. 217; 991, p. 164; 1021, p. 145; 1028, p. 160). Mrs. Susan Van Clief. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 31	32.40	May 2	32.12	Sept. 5	33.34
Feb. 27	33.23	July 3	33.00	Oct. 30	33.32
				Dec. 29	31.95

7/34-27P2 (*1021, p. 145; 1028, p. 160). Mary Skaarup. In Lower Santa Ynez Valley. No measurements made in 1946.

7/34-28H2 (*949, p. 217; 991, p. 165; 1021, p. 145; 1028, p. 160). T. M. Parks. In Lower Santa Ynez Valley.

Water level at noon, in feet below land-surface datum, 1946 (From recorder charts)					
Date	Water level	Date	Water level	Date	Water level
Jan. 1	26.21	Mar. 10	27.94	May 6	26.73
4	26.13	15	27.78	July 3 a	32.20
7	27.85	Apr. 1	26.25	Sept. 5 a	30.67
31	27.57	4	26.07	11 a	28.27
Feb. 28	26.57	8	26.13	Oct. 30 a	30.12
Mar. 8 a	29.09	May 2 a	27.93	Nov. 1	27.76
				Nov. 3	27.63
				Dec. 5	26.80
				12	26.09
				29	26.26
				31	26.17

a Nearby well pumping.

7/34-28R1 (*991, p. 165; 1021, p. 145; 1028, p. 160). A. C. Zvolanek. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 31	9.16	May 2	11.92	Sept. 5	11.07
Feb. 27	7.75	July 3	13.33	Oct. 30	11.06
				Dec. 29	8.32

7/34-28R2 (*991, p. 166; 1021, p. 146; 1028, p. 160). A. C. Zvolanek. In Lower Santa Ynez Valley. Water levels, in feet below land-surface datum, 1946: Feb. 27, 6.93; May 2, 7.21; July 3, 7.83; Dec. 29, 7.90.

7/34-29E4 (*1028, p. 160). G. F. Sanor. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 31	23.00	Mar. 8	28.52	Sept. 5	23.56
Feb. 27	24.87	May 2	27.04	Oct. 30	22.47
				Dec. 29	18.48

7/34-29E5 (*1028, p. 161). G. F. Sanor. In Lower Santa Ynez Valley. Water levels, in feet below land-surface datum, 1946: Jan. 31, 18.85; Feb. 27, 18.90; Dec. 29, 19.05.

7/34-30A1 (*991, p. 166; 1021, p. 146; 1028, p. 161). G. F. Sanor. In Lower Santa Ynez Valley. Measurements discontinued Dec. 29.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Mar. 8	a 28.85	Sept. 5	23.70	Dec. 29	18.77
July 3	a 27.31	Oct. 30	22.76		

a Nearby well pumping.

7/34-30L2 (#1028, p. 161). Union Sugar Co. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 31	21.39	May 2	a 27.69	Oct. 30	22.64
Feb. 27	23.12	Sept. 5	22.02	Dec. 29	16.62

a Nearby well pumping.

7/34-30L3 (#1028, p. 161). Union Sugar Co. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	16.76	May 2	17.42	Sept. 5	a 18.69	Dec. 29	15.83
Feb. 27	17.20	July 3	a 18.52	Oct. 30	16.20		

a Nearby well pumping.

7/34-30R1 (#949, p. 218; 991, p. 166; 1021, p. 146; 1028, p. 161). Mrs. E. Manfrina. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	23.67	May 2	17.15	Oct. 30			21.83
Mar. 8	16.90	July 3	17.98	Dec. 29			18.11

7/34-31C1 (#941, p. 157; #949, p. 218; 991, p. 167; 1021, p. 146; 1028, p. 161). Union Sugar Co. In Lower Santa Ynez Valley. Measurements discontinued Dec. 29.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	a 18.11	May 2	27.00	Sept. 5	23.52	Dec. 29	17.60
Feb. 27	b 24.01	July 3	a 29.85	Oct. 30	24.60		

a Pumping recently.

b Nearby well pumping.

7/34-32R2 (#941, p. 157; #949, p. 218; 991, p. 167; 1021, p. 146; 1028, p. 162). Lewis Bros. In Lower Santa Ynez Valley. Measurements discontinued May 2. Water levels, in feet below land-surface datum, 1946: Mar. 8, 33.26 (nearby well pumping); May 2, 33.33.

7/34-34A1 (#949, p. 219; 991, p. 167; 1021, p. 147; 1028, p. 162). Mary Skaarup. In Lower Santa Ynez Valley. Measurements discontinued Dec. 29.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	35.90	May 2	a 34.75	Sept. 5	34.30	Dec. 29	32.87
Feb. 27	33.89	July 3	32.20	Oct. 30	34.55		

a Nearby well pumping.

7/34-34H1 (#949, p. 220; 991, p. 167; 1021, p. 147; 1028, p. 162). Mrs. M. Balaam. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
May 2	a 40.56	Sept. 5	40.88	Dec. 29	38.89
July 3	a 39.70	Oct. 30	41.49		

a Nearby well pumping.

7/34-34H2 (#991, p. 167; 1021, p. 147; 1028, p. 162). Mary Skaarup. In Lower Santa Ynez Valley. No measurements made in 1946.

7/34-35F2 (*991, p. 169; 1021, p. 149; 1028, p. 163). Valla Bros. In Lower Santa Ynez Valley. Water levels, in feet below land-surface datum, 1946: Jan. 31, 17.44; Dec. 28, 16.71.

7/34-35F5 (*991, p. 169; 1021, p. 149; 1028, p. 163). M. Schuyler. In Lower Santa Ynez Valley. Well destroyed; measurements discontinued Dec. 28.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 31	40.20	July 3	a 41.71	Oct. 30	44.75
Mar. 8	40.80	Sept. 5	44.08	Dec. 28	40.08

a Nearby well pumping.

7/34-35F6 (*991, p. 170; 1021, p. 150; 1028, p. 163). M. Schuyler. In Lower Santa Ynez Valley. Water levels, in feet below land-surface datum, 1946: Jan. 31, 38.85; Mar. 8, 39.64; July 3, 39.60; Dec. 28, 39.04.

7/34-35K2 (*949, p. 221; 991, p. 171; 1021, p. 151; 1028, p. 163). Mrs. M. McDonald. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	11.44	May 2	10.77	Sept. 5	a 13.82	Dec. 28	11.16
Feb. 27	10.48	July 3	a 12.72	Oct. 30	a 12.95		

a Nearby well pumping.

7/34-35L1 (*949, p. 221; 991, p. 172; 1021, p. 151; 1028, p. 164). E. Schuyler. In Lower Santa Ynez Valley. Measurements discontinued Dec. 28.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 27	39.11	July 3	37.35	Dec. 28	40.50
May 2	38.57	Oct. 30	40.56		

7/34-35P1 (*949, p. 221; 991, p. 172; 1021, p. 152; 1028, p. 164). W. P. and N. L. Robinson. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946^a/
(From float gage)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	37.05	May 2	36.74	July 3	39.01	Oct. 30	42.35
	37.67		39.02		39.01		41.82
	37.62		37.70	Sept. 5	41.46		37.37
	37.56		37.70		41.41		41.39
Feb. 27	37.97	39.04		41.41	Dec. 28	37.38	

a Undated entries are highest and lowest levels between dates of observation.

7/35-18J1 (*941, p. 158; *949, p. 222; 991, p. 173; 1021, p. 153; 1028, p. 164). War Department, Camp Cooke Military Reservation. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	1.25	May 2	2.18	Sept. 5	1.68	Dec. 29	1.52
Feb. 27	1.12	July 3	1.71	Oct. 30	1.31		

7/35-20J1 (*949, p. 223; 991, p. 173; 1021, p. 153; 1028, p. 165). War Department, Camp Cooke Military Reservation. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	7.97	May 2	7.92	Sept. 5	9.74	Dec. 29	8.35
Feb. 27	7.78	July 3	9.12	Oct. 30	9.71		

7/35-22J1 (*1028, p. 165). Union Sugar Co. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 31	9.20	Sept. 5	15.00	Dec. 29	11.71
May 2	a 13.90	Oct. 30	13.34		

a Nearby well pumping.

7/35-23E2 (*949, p. 224; 991, p. 174; 1028, p. 165). Union Sugar Co. In Lower Santa Ynez Valley. Water levels, in feet below land-surface datum, 1946: Feb. 27, 17.24; Oct. 30, 17.89; Dec. 29, 16.17.

7/35-23E3 (*1028, p. 165). Union Sugar Co. In Lower Santa Ynez Valley. Water levels, in feet below land-surface datum, 1946: Feb. 27, 16.71; May 2, 16.50 (nearby well pumping); Dec. 29, 16.98.

7/35-23N1 (*949, p. 224; 991, p. 174; 1021, p. 153; 1028, p. 165). Union Sugar Co. In Lower Santa Ynez Valley. Measurements discontinued Dec. 29.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	11.86	May 2	b 17.86	Aug. 1	c 32.39	Oct. 30	14.27
Feb. 27	a 22.21	28	b 19.12	Sept. 5	c 26.46	Dec. 5	12.84
Apr. 1	11.73	July 3	b 20.92	Oct. 1	16.12	29	12.49

a Pumping recently.

b Nearby well pumping.

c Pumping.

7/35-23N2 (*1028, p. 165). Union Sugar Co. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	11.82	May 2	12.36	Sept. 5	12.53	Dec. 29	12.43
Feb. 27	11.80	July 3	a 12.73	Oct. 29	13.08		

a Nearby well pumping.

7/35-24K2 (*949, p. 225; 991, p. 175; 1021, p. 153; 1028, p. 166). A. B. Henning. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 31	a 21.34	May 2	b 27.23	Oct. 30	22.62
Feb. 27	21.22	Sept. 5	23.38	Dec. 29	18.35

a Pumping.

b Nearby well pumping.

7/35-24K3 (*1028, p. 166). A. B. Henning. In Lower Santa Ynez Valley. Water levels, in feet below land-surface datum, 1946: Jan. 3, 20.98; Feb. 27, 20.24; Oct. 30, 22.56; Dec. 29, 20.53.

7/35-25F5 (*1028, p. 166). Union Sugar Co. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 31	ab 16.38	July 3	21.82	Oct. 30	18.54
Mar. 8	b 24.94	Sept. 5	18.46	Dec. 29	11.22

a Pumping recently.

b Nearby well pumping.

7/35-25F6 (*1028, p. 166). Union Sugar Co. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	10.79	May 2	6.09	Sept. 5	11.28	Dec. 29	10.59
Mar. 8	7.49	July 3	9.09	Oct. 30	11.33		

7/35-26J3 (*949, p. 226; 991, p. 175; 1021, p. 153; 1028, p. 166). County of Santa Barbara, Artesia School District. In Lower Santa Ynez Valley.

Water level at noon, in feet below land-surface datum, 1946
(From recorder charts)

Jan. 31	11.48	June 5	12.35	Aug. 20	14.24	Nov. 13	11.75
Feb. 4	8.86	10	15.06	26	13.30	21	9.82
20	11.98	July 1	a 16.10	Sept. 5	a 17.34	28	9.25
27	12.05	3	a 16.63	11	12.60	Dec. 5	8.75
Mar. 8	a 18.74	11	a 18.76	21	12.09	10	8.50
14	a 17.20	23	15.43	Oct. 1	13.11	15	8.36
Apr. 1	9.40	29	13.60	8	11.03	20	8.27
5	8.71	Aug. 1	a 16.32	14	11.78	25	8.11
May 2	a 20.32	5	13.86	30	a 18.17	29	8.02
28	a 16.43	14	a 18.18	Nov. 8	14.62	31	7.99

a Nearby well pumping.

7/35-27C2 (*941, p. 160; *949, p. 226; 991, p. 176; 1021, p. 154; 1028, p. 167). Southern Pacific Railroad. In Lower Santa Ynez Valley. High-low float gage removed Oct. 30.

Water level, in feet below land-surface datum, 1946^a/
(From float gage)

	10.02	Feb. 27	11.16	July 3	13.41	Sept. 5	12.13
	11.47		8.87		12.60		10.98
Jan. 31	10.34		12.78		11.93		12.17
	9.77	May 2	11.45		14.06	Oct. 30	11.49
	11.85		10.51				

a Undated entries are highest and lowest levels between dates of observation.

7/35-36E3 (*971, p. 176; 1021, p. 154; 1028, p. 167). Southern Pacific Milling Co. In Lower Santa Ynez Valley.

Water level, in feet below land-surface datum, 1946

Jan. 31	17.59	May 2	21.38	Sept. 5	24.63	Dec. 29	18.37
Feb. 27	17.65	July 3	a 26.45	Oct. 30	21.90		

a Nearby well pumping.

8/32-30K2 (*1021, p. 155; 1028, p. 167). John Parma. In San Antonio Valley.

Water level, in feet below land-surface datum, 1946

Jan. 31	1.02	May 1	0.93	Sept. 4	0.31	Dec. 28	0.96
Feb. 27	1.06	July 2	.36	Oct. 29	.77		

8/33-20K1 (*1021, p. 155; 1028, p. 167). Virginia Barca. In San Antonio Valley.

Water level, in feet below land-surface datum, 1946

Jan. 31	5.50	May 1	11.08	Sept. 4	a 28.82	Dec. 28	14.41
Feb. 27	5.74	July 2	a 29.44	Oct. 29	18.45		

a Nearby well pumping.

8/33-20R1 (*1021, p. 155; 1028, p. 167). Virginia Barca. In San Antonio Valley. Water levels, in feet below land-surface datum, 1946: Jan. 31, 25.52 (pumping recently); Feb. 27, 25.12; May 1, 30.50 (pumping recently); Dec. 28, 21.62.

8/34-23B1 (*1021, p. 156; 1028, p. 168). Josephine Harris Estate. In San Antonio Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	13.54	May 1	13.53	Sept. 4	14.34	Dec. 28	13.81
Feb. 27	13.30	July 2	13.90	Oct. 29	14.12		

9/24-19Q1 (*941, p. 146; *949, p. 237; 991, p. 177; 1021, p. 156; 1028, p. 168). W. C. Ramelli. Formerly owned by Arthur Davis. In Cuyama Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 29	a 30.94	July 1	a 33.62	Nov. 11	36.45
Feb. 25	31.46	Sept. 3	35.03	Dec. 27	36.95

a Pumping recently.

9/32-7N1 (*941, p. 147; *949, p. 228; 991, p. 177; 1021, p. 156; 1028, p. 168). Valerio Tognazzini. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 46.17	Apr. 1	a 49.00	Sept. 3	52.42	Oct. 29	52.81
29	46.87	July 1	ab 53.58	Oct. 1	ab 54.50	Dec. 27	53.50

a By Santa Maria Valley Water Conservation District.

b Pumping recently.

9/32-17G1 (*949, p. 228; 991, p. 177; 1021, p. 156; 1028, p. 168). E. C. Lyman. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 29	27.85	Apr. 30	b 27.25	Oct. 29	31.98
Feb. 26	a 45.27	July 1	b 29.10	Dec. 27	32.96

a Pumping.

b Pumping recently.

9/33-2A1 (*941, p. 147; *949, p. 229; 991, p. 178; 1021, p. 156; 1028, p. 168). Santa Maria Realty Co. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 34.33	Apr. 1	a 33.85	July 1	ab 36.67	Oct. 1	a 38.25
29	33.80	30	33.26	Sept. 3	37.34	Dec. 27	39.02
Feb. 26	34.05	July 1	35.44				

a By Santa Maria Valley Water Conservation District.

b Pumping recently.

9/34-3N3 (*941, p. 148; *949, p. 229; 991, p. 178; 1021, p. 156; 1028, p. 168). City of Santa Maria well 3. In Santa Maria Valley. Measurements by city of Santa Maria.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 31	149.0	Apr. 30	148.2	July 31	148.5	Oct. 31	150.1
Feb. 28	149.0	May 31	148.5	Aug. 31	148.5	Nov. 29	150.1
Mar. 31	148.2	June 30	148.5	Sept. 30	149.6	Dec. 31	150.1

10/25-30F1 (*949, p. 238; 991, p. 178; 1021, p. 157; 1028, p.168).
Adolph Kirschenmann. Formerly owned by H. S. Russell. In Cuyama Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 29	48.19	July 1	52.12	Dec. 27	49.05
Apr. 30	49.27	Nov. 11	50.01		

10/26-18F1 (*941; p. 146; *949, p. 238; 991, p. 178; 1021, p. 157; 1028, p. 169). William Kirschenmann Estate. Formerly owned by H. S. Russell. In Cuyama Valley. Water levels, in feet below land-surface datum, 1946: Feb. 25, 55.42; Nov. 11, 61.42; Dec. 27, 58.89.

10/26-22A1 (*941, p. 146; *949, p. 238; 991, p. 178; 1021, p. 157; 1028, p. 169). Edward Kirschenmann. Formerly owned by H. S. Russell. In Cuyama Valley.

Water level, in feet with reference to land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	+0.03	Apr. 30	-8.25	Sept. 3	a-30.10	Dec. 27	-1.18
Feb. 25	+ .40	July 1	a-16.59	Nov. 11	-2.89		

a Nearby well pumping.

10/27-12R1 (*941, p. 147; *949, p. 238; 991, p. 178; 1021, p. 157; 1028, p. 169). William Kirschenmann Estate. Formerly owned by H. S. Russell. In Cuyama Valley. Water levels, in feet below land-surface datum, 1946: Jan. 29, 40.78; Apr. 30, 39.75; Nov. 11, 45.36; Dec. 27, 43.42.

10/33-7R2 (*1021, p. 157; 1028, p. 169). P. T. Bonetti. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	91.60	Apr. 30	93.11	Sept. 3	97.88	Dec. 27	100.32
Feb. 25	a 92.07	July 1	94.72	Oct. 29	99.74		

a Pumping recently.

10/33-18C1 (*949, p. 229; 991, p. 178; 1021, p. 157; 1028, p. 169). La Brea Securities Co. well 8. In Santa Maria Valley. Measurements made by Santa Maria Valley Water Conservation District. Water levels, in feet below land-surface datum, 1946: Jan. 1, 91.75; Apr. 1, 93.90; July 1, 99.00; Oct. 1, 103.60 (pumping recently).

10/33-19B1 (*941, p. 148; *949, p. 229; 991, p. 179; 1021, p. 157; 1028, p. 169). Owen T. Rice. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 86.00	Apr. 1	a 87.58	July 1	ab 92.75	Oct. 1	a 95.75
Feb. 26	86.88	30	88.27	Sept. 3	b 97.39	Dec. 27	94.69

a By Santa Maria Valley Water Conservation District.

b Pumping recently.

10/33-20N2 (*1021, p. 158; 1028, p.169). T. B. Adam Estate. In Santa Maria Valley. Measurements discontinued Apr. 30. Water levels, in feet below land-surface datum, 1946: Jan. 29, 132.05; Feb. 26, 132.16; Apr. 30, 133.53.

10/33-21N2 (*1021, p. 158; 1028, p. 169). Frank Costa, Jr. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	80.13	Apr. 30	a 83.04	Sept. 3	a 88.30	Dec. 27	87.62
Feb. 26	80.78	July 1	a 85.16	Oct. 29	87.65		

a Nearby well pumping.

10/33-27G1 (#949, p. 230; 991, p. 179; 1021, p. 158; 1028, p. 169).
W. C. Adam. In Santa Maria Valley. Measurements by Santa Maria Valley
Water Conservation District. Water levels, in feet below land-surface
datum, 1946: Jan. 1, 49.95; Apr. 1, 50.37; July 1, 54.20 (pumping recently);
Oct. 1, 59.70.

10/33-27K1 (#941, p. 149; #949, p. 230; 991, p. 179; 1021, p. 158;
1028, p. 169). Newhall Land & Farming Co. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946^{a/}
(From float gage)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Mar. 5	48.51	July 1	52.02	Sept. 3	56.47	Oct. 29	58.45
	46.91				56.47			57.65
	49.89			51.98		58.57		58.95
Apr. 30	46.91		56.47		58.57	Dec. 27	57.65
	46.91						

a Undated entries are highest and lowest levels between dates of observation.

10/33-28A1 (#949, p. 230; 991, p. 179; 1021, p. 158; 1028, p. 170).
Joe Soares. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 54.10	Apr. 1	a 56.15	Oct. 1	ac 65.55
29	b 54.02	July 1	ac 61.05	Dec. 27	66.02

a By Santa Maria Valley Water Conservation District.
b Nearby well pumping.
c Pumping recently.

10/33-28J1 (#1028, p. 170). E. W. Boyd. In Santa Maria Valley.
Measurements discontinued Dec. 27. Water levels, in feet below land-surface
datum, 1946: July 1, 70.45; Oct. 29, 87.16; Dec. 27, 84.37.

10/33-34H1 (#1021, p. 159; 1028, p. 170). Dan Donovan Estate. In
Santa Maria Valley. Measurements discontinued Dec. 27.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	59.47	Apr. 30	59.22	Sept. 3	66.13	Dec. 27	69.95
Feb. 26	59.74	July 1	62.09	Oct. 29	68.82		

10/33-35B1 (#1021, p. 159; 1028, p. 170). Newhall Land & Farming
Co. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Feb. 26	35.82	July 1	38.83	Oct. 29	41.95
Apr. 30	30.79	Sept. 3	40.20	Dec. 27	40.05

10/33-36Q1 (#1028, p. 170). La Brea Securities Co. In Santa Maria
Valley. Measurements discontinued Dec. 27.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 29	25.36	Apr. 30	a 24.00	Dec. 27	29.62
Feb. 26	24.88	Oct. 29	29.69		

a Pumping recently.

10/34-2R1 (*949, p. 231; 991, p. 179; 1021, p. 159; 1028, p. 171).
Gracio Apalatequi. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 92.90	Apr. 1	a 94.10	July 1	97.45	Oct. 29	99.90
30	93.36	30	95.63	Oct. 1	a 99.60	Dec. 27	100.35
Feb. 26	93.45	July 1	abl03.93				

a By Santa Maria Valley Water Conservation District.

b Pumping recently.

10/34-4R1 (*1028, p. 171). Gerald Donovan. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 29	78.73	May 1	80.49	Oct. 29	86.23
Mar. 7	79.05	July 1	83.28	Dec. 28	85.04

10/34-6N1 (*949, p. 231; 991, p. 180; 1021, p. 159; 1028, p. 171).
Grisinger & Signorelli. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 53.05	Apr. 1	a 53.55	Sept. 4	60.75	Oct. 29	62.83
Feb. 26	b 56.40	July 1	ac 60.05	Oct. 1	a 60.70	Dec. 28	59.16

a By Santa Maria Valley Water Conservation District.

b Nearby well pumping.

c Pumping recently.

10/34-8Q1 (*991, p. 180; 1021, p. 159; 1028, p. 171). Sawdey & Hunt.
In Santa Maria Valley. Measurements discontinued Dec. 28.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 29	a 72.70	May 1	68.33	Sept. 3	73.45
Feb. 26	66.65	July 2	71.64	Dec. 28	71.30

a Pumping recently.

10/34-9F1 (*991, p. 180; 1021, p. 160; 1028, p. 171). Mrs. A. E. Preisker. In Santa Maria Valley. Measurements by Santa Maria Valley Water Conservation District. Water levels, in feet below land-surface datum, 1946; Jan. 1, 76.85; Apr. 1, 77.53; July 1, 81.95; Oct. 1, 85.37 (pumping recently).

10/34-14E3 (*941, p. 151; *949, p. 231; 991, p. 180; 1021, p. 160; 1028, p. 171). City of Santa Maria. In Santa Maria Valley. Measurements by city of Santa Maria, except as indicated.

Water level, in feet below land-surface datum, 1946							
Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 6	102.46	Apr. 7	103.06	July 7	106.62	Oct. 6	109.56
13	102.48	14	103.08	14	106.88	13	109.75
20	102.29	21	103.29	21	106.92	20	109.40
27	102.25	28	103.50	28	107.62	27	109.73
30	a 102.35	May 1	a 103.63	Aug. 1	a 107.69	29	a 109.70
Feb. 3	102.27	5	103.71	3	107.92	Nov. 3	109.75
10	102.25	12	104.08	11	108.12	10	109.71
17	102.25	19	104.31	18	108.40	17	109.58
24	102.29	26	104.58	25	108.71	24	109.54
27	a 102.20	28	a 104.69	Sept. 1	108.85	Dec. 1	109.38
Mar. 3	102.33	June 2	105.25	4	a 108.87	5	a 109.22
10	102.67	9	105.17	8	109.00	8	109.08
17	102.92	16	105.50	15	108.96	15	108.92
24	103.04	23	106.00	22	109.06	22	108.88
Apr. 1	103.15	30	106.21	29	109.40	27	a 108.84
1	a 103.12	July 2	a 106.33	Oct. 1	a 109.44	29	108.25

a By Geological Survey.

10/34-20H1 (*1021, p. 160; 1028, p. 172). Ulisse Tognazzini. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 29	69.95	Sept. 4	76.12	Dec. 28	74.05
Feb. 26	69.80	Oct. 29	76.51		

10/34-22R1 (*949, p. 232; 991, p. 180; 1021, p. 160; 1028, p. 172). George J. Wheat. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1 a	97.40	Apr. 1 a	97.50	July 1 a	110.50	Oct. 29	103.25
Jan. 31	97.15	May 1	98.35	Oct. 1 a	103.90	Dec. 27	102.09
Mar. 7	97.22						

- a By Santa Maria Valley Water Conservation District.
b Pumping recently.

10/34-23H1 (*949, p. 232; 991, p. 181; 1021, p. 161; 1028, p. 172). Marion E. Rice. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1 a	111.17	Apr. 1 a	111.80	July 1 a	115.50	Oct. 29	117.96
Jan. 31	110.89	May 1	111.89	Oct. 1 a	118.20	Dec. 27	117.02

- a By Santa Maria Valley Water Conservation District.
b Pumping recently.

10/34-31F1 (*1021, p. 161; 1028, p. 172). Union Sugar Co. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 29	77.86	May 1	78.13	Sept. 4	81.66
Feb. 26	77.56	July 2	80.45	Oct. 29	82.18

10/35-7F1 (*941, p. 152; *949, p. 232; 991, p. 181; 1021, p. 161; 1028, p. 172). M. J. Ellis. In Santa Maria Valley.

Water level, in feet with reference to land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	(ab)	Apr. 1 a	+0.30	July 2	-6.50	Oct. 29	-5.58
Jan. 29	-5.49	July 1 ad	-12.87	Oct. 1 a	-6.53	Dec. 28	(b)
Mar. 7 c	-8.08						

- a By Santa Maria Valley Water Conservation District.
b Flowing.
c Nearby well pumping.
d Pumping recently.

10/35-7G3 (*949, p. 233; 991, p. 181; 1021, p. 161; 1028, p. 172). John Jenkins. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946²
(From float gage)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	5.72 b 13.90 b 13.87	May 1	6.71 b 16.57 b 16.03 14.22	July 2	15.47 14.21 b 22.82	Oct. 29	b 20.68 14.42 7.12
Feb. 26	5.74 b 14.85 11.71		b 21.85	Sept. 4	b 16.89 14.19	Dec. 28	b 18.93 7.11

- a Undated entries are highest and lowest levels between dates of observation.
b Nearby well pumping.

10/35-9F1 (#941, p. 152; #949, p. 233; 991, p. 181; 1021, p. 161; 1028, p. 172). Waller-Franklin Seed Co. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 16.40	July 1	ac 33.00	Sept. 4	27.95
Mar. 7	b 45.60	2	c 29.79	Oct. 1	a 27.50
Apr. 1	a 17.75			Oct. 29	27.62
				Dec. 28	18.02

a By Santa Maria Valley Water Conservation District.

b Pumping.

c Nearby well pumping.

10/35-9N1 (#949, p. 234; 991, p. 181; 1021, p. 162; 1028, p. 173). Agnes King. In Santa Maria Valley. Measurements by Santa Maria Valley Water Conservation District. Water levels, in feet below land-surface datum, 1946: Jan. 1, 14.90; Apr. 1, 16.05; July 1, 37.55 (pumping recently); Oct. 1, 31.38.

10/35-12M1 (#949, p. 234; 991, p. 181; 1021, p. 162; 1028, p. 173). E. and G. LeRoy. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 11	a 41.70	July 1	ab 55.20	Dec. 28	45.01
Apr. 1	a 44.30	Oct. 1	ab 54.27		

a By Santa Maria Valley Water Conservation District.

b Pumping recently.

10/35-21B1 (#949, p. 234; 991, p. 182; 1021, p. 162; 1028, p. 173). C. P. Mathison. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 10.55	Apr. 1	a 16.37	Oct. 1	ab 30.80
Feb. 26	14.42	July 1	ab 26.97	29	22.55
				Dec. 28	11.90

a By Santa Maria Valley Water Conservation District.

b Pumping recently.

10/35-24B1 (#941, p. 152; #949, p. 234; 991, p. 182; 1021, p. 162; 1028, p. 173). Union Sugar Co. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 45.67	Apr. 1	a 46.00	Sept. 4	b 54.93
29	47.45	May 1	b 52.53	Oct. 1	a 54.67
Mar. 7	b 51.65	July 1	a 55.83	Oct. 29	53.42
				Dec. 28	48.46

a By Santa Maria Valley Water Conservation District.

b Nearby well pumping.

11/28-17L1 (#949, p. 238; 991, p. 182; 1021, p. 162; 1028, p. 173). Seers Ranch. In Cuyama Valley. Measurements discontinued Sept. 3.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 29	20.59	Apr. 30	19.87	Sept. 3	21.48
Feb. 25	20.08	July 1	20.06		

11/54-29F1 (#1028, p. 173). Alfred Guerra. In Santa Maria Valley. Measurements discontinued Dec. 28.

Water level, in feet below land-surface datum, 1946					
Date	Water level	Date	Water level	Date	Water level
Jan. 29	40.82	May 1	42.78	Sept. 4	46.31
Feb. 26	41.14	July 2	44.23	Oct. 29	47.42
				Dec. 28	47.62

11/34-29P1 (*949, p. 235; 991, p. 182; 1021, p. 162; 1028, p. 173). Alfred Guerra. In Santa Maria Valley. Measurements discontinued Dec. 28.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 29	54.49	May 1	a 62.84	Sept. 4	a 65.03
Feb. 26	a 55.86	July 2	57.87	Dec. 28	57.93

a Nearby well pumping.

11/34-30Q1 (*949, p. 235; 991, p. 182; 1021, p. 162; 1028, p. 174). Mary Bolton. In Santa Maria Valley. Measurements by Santa Maria Valley Water Conservation District. Water levels, in feet below land-surface datum, 1946: Jan. 1, 49.60; Apr. 1, 50.30; July 1, 55.43 (pumping recently); Oct. 1, 55.67.

11/35-20E1 (*941, p. 153; *949, p. 235; 991, p. 182; 1021, p. 163; 1028, p. 174). Union Sugar Co. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 1.60	Apr. 1	a 2.58	Oct. 1	ab 19.00
29	b 2.61	July 1	ab 40.00	Dec. 28	2.98

a By Santa Maria Valley Water Conservation District.

b Pumping recently.

11/35-25H1 (*1021, p. 163; 1028, p. 174). M. J. Mendoza. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	a 38.37	May 1	38.58	Sept. 4	40.57	Dec. 28	41.82
Feb. 26	38.22	July 2	38.98	Oct. 29	41.47		

a Nearby well pumping.

11/35-26M2 (*1021, p. 163; 1028, p. 174). Sam Tognazzini. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	a 33.61	May 1	a 37.25	Sept. 4	a 46.33	Dec. 28	32.18
Feb. 26	33.02	July 2	a 41.00	Oct. 29	a 38.94		

a Nearby well pumping.

11/35-28M1 (*949, p. 236; 991, p. 182; 1021, p. 163; 1028, p. 174). Union Sugar Co. In Santa Maria Valley. Measurements by Santa Maria Valley Water Conservation District. Water levels, in feet below land-surface datum, 1946: Jan. 1, 13.12; Apr. 1, 14.25; July 1, 32.00 (nearby well pumping); Oct. 1, 28.25 (nearby well pumping).

11/35-33G1 (*949, p. 236; 991, p. 183; 1021, p. 163; 1028, p. 174). H. E. Pezzoni. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 19.77	Mar. 7	b 27.59	July 1	ab 32.77	Oct. 1	a 29.18
29	b 24.65	Apr. 1	a 20.60	Sept. 4	b 31.89	Dec. 28	21.14
Feb. 26	b 24.23						

a By Santa Maria Valley Water Conservation District.

b Nearby well pumping.

11/35-35A1 (*949, p. 236; 991, p. 183; 1021, p. 163; 1028, p. 174). Bello Estate. In Santa Maria Valley.

Water level, in feet below land-surface datum, 1946

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	a 37.75	Apr. 1	a 38.07	July 2	c 44.72	Oct. 1	ac 45.25
29	38.17	May 1	c 40.86	Sept. 4	45.19	Dec. 28	38.64
Mar. 7	b 43.87	July 1	ad 44.75				

a By Santa Maria Valley Water Conservation District.

b Pumping.

c Nearby well pumping.

d Pumping recently.

HAWAII

By G. A. Macdonald

PROGRAM OF WORK

Cooperation was continued with the Hawaii Division of Hydrography. Systematic studies of the geology and ground-water resources were continued on Kauai, and reports completed on the islands of Molokai and Niihau. A report on the geology and ground-water resources of the island of Hawaii was published.

The total ground-water draft during 1946 for the Territory of Hawaii was 169,986 million gallons (an average of about 466 million gallons a day). This was 62,831 million gallons less than the total pumpage for 1945. All islands except Lanai showed a decrease in pumpage, due, partly, to a small increase in rainfall over that of 1945, which reduced the amount of water used for irrigation, partly to the cessation of all pumping for irrigation and factory use by the sugar industry during the strike of workers in that industry from the first of September to mid-November or even later, and partly to decrease of water use by the armed forces and other war activities.

RECORDS OF ARTESIAN HEAD, WATER LEVEL, AND PUMPAGE

The tables in this report set forth data on ground-water conditions in the Territory in 1946, such as artesian head, water level, and the chloride content of the waters. In the section on Oahu is a table listing, by name and number, the artesian areas on that island and giving the time of high and low artesian heads in each; in the records that follow, these areas are referred to by the numbers shown in this table. At the end of the report is a table showing, by pumping plants, the ground-water draft in the Territory during the year.

In the tables of well records, the measurements of artesian head or water level are given, in feet, with reference both to mean sea level and to land-surface datum. They are listed in two columns, designated A and B --those in A being referred to mean sea level and those in B to land-surface

datum. The symbol + in column B indicates that the artesian head or water level is above land-surface datum; no symbol indicates below land-surface datum. In some of the wells the measurement given is the water level; in others it is the height to which the water would rise in a casing or tube as indicated by the shut-in pressure.

ISLAND OF OAHU

During 1946 the Geological Survey made 286 water-level measurements and 294 chloride determinations on 65 wells on the island of Oahu, 22 of the wells being measured monthly. The Board of Water Supply, City and County of Honolulu, made 252 water-level measurements on 94 wells, 63 of which were measured more than once. Automatic water-stage recorders were maintained on 2 wells by the Geological Survey, and by the Board of Water Supply on 14 wells.

The drought conditions of the last several years continued during 1946, despite some months in which the rainfall exceeded the normal. The following table indicates the rainfall during each month of 1946 at 11 index stations in the Honolulu watershed area, expressed in percentage of the normal rainfall at the stations over a period beginning in 1890. The data are from a table prepared by C. K. Wentworth, geologist of the Board of Water Supply, who has listed the monthly and annual indices from 1890 through 1946.^{1/} The average for the year was only 86 percent of normal; and the 3-year moving average, which is probably more significant in considering current ground-water levels, was only 75 percent of normal.

Rainfall in the Honolulu area, in percentage of normal, in 1946

Month	Rainfall	Month	Rainfall	Month	Rainfall
January	115	May	14	September	44
February	50	June	82	October	55
March	108	July	102	November	102
April	104	August	84	December	168
Average for the year					86
3-year moving average					75

^{1/} Wentworth, C. K., Board of Water Supply, City and County of Honolulu, 11th Biennial Rept., 1945-1946, p. 180, 1947.

In wells indicative of artesian conditions in artesian areas 2, 3, 4, 7, and 8, and in some wells in area 6, the lowest water level fell below the previous all-time low level. The following table indicates the lowest head in observation wells in 1926, 1945, and 1946, and the net change involved. The average net change for the 11 wells listed is -2.02 feet. Water levels in areas 1 and 12 failed to reach the 1926 low level. Data are unavailable for areas 5, 9, 10, and 11, but in area 5 levels had already, in 1944, dropped below those of 1926, and it is probable that they declined still farther in 1945 and 1946. However, most wells show a net rise in water level from December 1945 to December 1946, at least part of the gain being attributable to the period of greatly decreased pumping during the strike in the sugar industry, from September 1 to mid-November. The effects of decrease in pumping on artesian head are strikingly indicated in figure 11, which shows variations of water level in test-boring Oahu T-26, near the western edge of Pearl Harbor. Pumping in this area for sugar irrigation and mill use normally amounts to about 150 million gallons daily, but was reduced to zero during the strike.

An unusual behavior is evidenced in well 201. The increase in head in the general area as a result of decrease of pumpage during the sugar strike is reflected in this well by a rise of static water level from 14.18 feet on August 28 to 16.29 feet on September 25, even though the draft at this well itself remained essentially unchanged. The rise in head was accompanied by an increase in chloride content from 290 to 535 parts per million. Similar increases of chloride content with rising head, and decreases of chloride content with falling head are shown in the record of this well for the past several years. The only explanation which can be offered for this behavior is that the change in rate of movement of water toward the well with change in head affects the movement through the manifold of passageways leading to the well, so that one or more of the openings which pass downward into the underlying brackish portion of the Ghyben-Herzberg lens yield water more copiously under conditions of higher head.

It is important to note that many other wells, especially in area 6, do not show any appreciable reduction of chloride content accompanying the rise of water level. Examples of this are wells 187B, 190, 193, and 244. This behavior strongly suggests that even if the high artesian head of former years is regained, the return to the former low salinity will

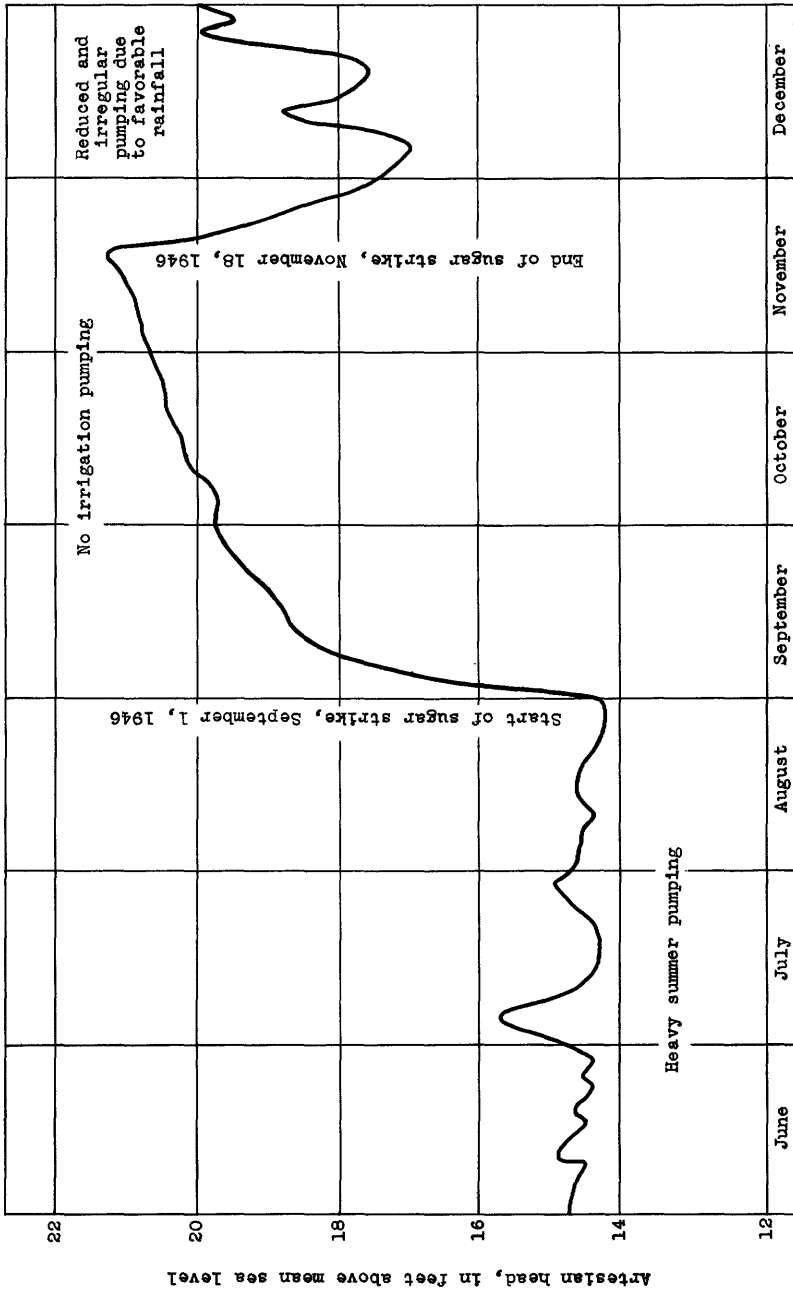


Figure 11.--Graph showing variations of water level in test boring Oahu T-26 (Kunia). (After C. K. Wentworth, 11th Bienn. Rept. of Board of Water Supply, City and County of Honolulu, p. 29, 1947.)

Artesian head, in feet, in four wells and three test borings in the Honolulu and Pearl Harbor areas, 1946
(Mean daily measurements furnished by Board of Water Supply, City and County of Honolulu, from recorder charts)

Area	1		2		3		4		5		6		6	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Well No.	83		132		124 a/		T24 b/		Shaft 7		T25 b/		T26 c/	
Jan. 1	24.01	12.99	23.02	3.98	22.90	20.10	20.49	37.91	9.11	150.89	16.01	8.39	.....	.....
8	.....	.....	23.08	3.92	22.89	20.11	20.43	37.97	9.15	150.85	15.68	8.72	.....	.....
15	.....	.....	23.16	3.84	22.91	20.09	20.35	38.05	9.05	150.95	15.39	9.01	16.95	65.25
22	.....	.....	23.14	3.86	22.89	20.11	20.28	38.12	9.02	150.98	15.35	9.05	17.10	65.10
29	24.54	12.46	.....	.....	22.93	20.07	20.44	37.96	9.09	150.91	15.98	8.42	18.45	63.75
Feb. 5	.....	.....	.....	.....	23.12	19.88	20.76	37.64	9.24	150.76	15.39	8.01	19.75	62.45
12	.....	.....	.....	.....	23.36	18.64	21.00	37.40	9.27	150.73	15.53	7.87	20.15	62.05
19	.....	.....	23.66	3.34	23.48	19.52	21.15	37.25	9.23	150.77	15.51	7.89	19.85	62.55
26	24.65	12.35	23.77	3.23	23.54	19.46	21.14	37.26	9.21	150.79	16.31	8.09	18.80	63.40
Mar. 5	.....	.....	23.77	3.23	23.49	19.51	20.97	37.43	9.13	150.87	16.05	8.35	17.55	64.65
12	24.60	12.40	23.76	3.24	23.51	19.49	20.80	37.60	8.97	151.03	15.95	8.47	17.20	65.00
19	.....	.....	23.82	3.18	23.46	19.54	20.80	37.60	8.94	151.06	15.02	8.38	17.35	64.85
26	24.22	12.78	.....	.....	23.44	19.56	20.68	37.72	8.95	151.05	15.69	8.71	16.60	65.80
Apr. 2	24.25	12.75	.....	.....	23.42	19.58	20.57	37.83	8.94	151.06	15.50	8.90	16.30	65.90
9	24.24	12.76	23.73	3.27	23.54	19.66	20.46	37.94	8.93	151.07	15.33	9.07	16.10	66.10
16	23.88	13.12	.....	.....	23.23	19.77	.....	.....	8.90	151.10	15.16	9.24	16.00	66.20
23	24.17	12.83	.....	.....	23.21	19.79	20.26	38.14	8.95	151.05	15.17	9.23	15.45	66.75
30	24.25	12.75	.....	.....	23.13	19.87	20.21	38.19	8.95	151.05	15.06	9.34	15.90	66.50
May 7	24.13	12.87	.....	.....	23.04	19.96	20.10	38.50	8.94	151.06	14.95	9.45	15.55	66.65
14	23.86	13.14	23.37	3.53	22.94	20.06	20.06	38.34	8.89	151.11	14.84	9.56	15.55	66.65
21	23.51	13.49	23.19	3.81	22.74	20.26	19.92	38.48	8.89	151.11	14.56	9.84	15.10	67.10
28	23.08	13.92	.....	.....	22.64	20.36	19.83	38.57	8.86	151.14	14.51	9.89	15.05	67.15
June 4	22.78	14.22	.....	.....	22.55	20.45	19.71	38.59	8.87	151.13	14.45	9.85	14.65	67.55
11	22.73	14.27	.....	.....	22.47	20.55	19.68	38.72	8.88	151.12	14.54	9.86	14.80	67.40
18	22.45	14.55	.....	.....	.....	.....	19.54	38.76	8.87	151.13	14.41	9.99	14.70	67.50
25	22.37	14.63	22.69	4.31	22.21	20.79	19.60	38.80	8.86	151.14	14.45	9.95	15.00	67.20
July 2	22.14	14.86	22.52	4.48	22.08	20.92	19.82	38.78	8.89	151.11	14.34	10.06	14.85	67.35
9	22.30	14.70	.....	.....	21.97	21.03	19.73	38.67	8.85	151.15	14.50	9.90	14.80	67.40
16	22.46	14.55	.....	.....	21.81	21.19	19.63	38.77	8.87	151.13	14.59	9.81	14.35	67.85
23	22.78	14.22	.....	.....	.....	.....	19.76	38.54	8.89	151.10	14.62	9.67	14.60	67.55
30	22.68	14.32	22.18	4.82	21.69	21.31	19.53	38.57	8.90	151.11	14.73	9.67	14.90	67.30
Aug. 6	22.57	14.43	22.14	4.86	21.64	21.36	19.76	38.64	8.92	151.08	14.53	9.87	14.55	67.65

* See footnotes at end of table.

Artesian head, in feet, in four wells and three test borings in the Honolulu and Pearl Harbor areas, 1946--Continued

(Mean daily measurements furnished by Board of Water Supply, City and County of Honolulu, from recorder charts)

Area	1		2		3		4		5		6			
	A	B	A	B	A	B	A	B	A	B	A	B		
Well No.	1	2	83	132	T24 a/		Shaft 7		T25 b/		T26 c/			
Aug. 13	22.50	14.50	22.14	4.86	21.63	21.97	19.70	38.70	8.91	151.09	14.51	9.89	14.65	67.55
20	.....	.....	22.21	4.79	21.77	21.23	19.72	38.68	8.94	151.06	14.45	9.95	14.40	67.80
27	22.94	14.06	22.17	4.83	21.93	21.07	19.65	38.75	8.93	151.07	14.35	10.05	14.15	67.05
Sept. 3	22.99	14.01	22.23	4.77	22.00	21.00	19.79	38.61	8.90	151.10	.....	.....	16.70	65.50
10	22.61	14.99	22.30	4.70	22.13	20.87	20.11	38.29	8.91	151.09	.....	.....	18.42	63.78
17	22.62	14.49	22.43	4.57	22.32	20.68	20.38	38.02	8.90	151.10	15.92	8.49	.....	.....
24	22.41	14.59	22.65	4.35	22.55	20.43	20.65	37.75	8.91	151.09	16.18	8.22	19.45	62.75
Oct. 1	22.48	14.53	22.89	4.11	.....	.....	20.95	37.45	8.92	151.08	16.42	7.98	19.85	62.35
8	22.68	14.32	23.07	3.93	.....	.....	21.11	37.29	8.90	151.10	16.60	7.80	.....	.....
15	23.14	13.86	23.47	3.53	23.26	19.74	.....	.....	8.97	151.03	16.77	7.63	.....	.....
22	23.13	13.87	23.66	3.34	23.48	19.52	21.60	36.80	8.99	151.01	16.90	7.50	20.40	61.80
29	23.13	13.85	23.91	3.09	.....	.....	21.77	36.63	8.99	151.01	17.00	7.40	20.50	61.70
Nov. 5	23.03	13.97	24.37	2.63	23.99	19.01	21.96	36.44	9.00	151.00	17.14	7.26	20.80	61.40
12	23.12	13.88	24.63	2.37	24.29	18.71	22.11	36.29	8.97	151.03	17.29	7.11	20.95	61.25
19	23.40	13.60	24.89	2.11	24.45	18.55	22.22	36.18	8.98	151.02	17.35	7.05	20.60	61.60
26	23.44	13.56	25.02	1.98	.....	.....	22.08	36.32	9.01	150.99	16.72	7.68	18.25	63.95
Dec. 3	23.67	13.33	25.26	1.74	.....	.....	21.89	36.51	8.97	151.03	16.46	7.94	17.15	65.05
10	23.84	13.16	25.37	1.63	.....	.....	21.83	36.57	9.03	150.97	16.66	7.74	17.80	64.60
17	.....	.....	25.46	1.54	.....	.....	21.85	36.55	9.15	150.85	16.71	7.69	17.60	64.60
24	.....	.....	.....	.....	.....	.....	22.33	36.07	9.06	150.94	17.05	7.35	19.50	62.70
31	23.5	13.5	25.4	1.6	24.9	18.1	22.53	35.87	.....	.....	17.22	7.18	20.10	62.10

a Board of Water Supply, Honolulu. In Manaiki Gulch, 0.2 mile north, 21° west of Puu Kapu; lat. 21°21'27" N., long. 157° 53' 10" W.
 b Board of Water Supply, Honolulu. Near mouth of Waialua Valley, at west side of alluvial fill, 1.38 miles north, 47° west of BM, altitude 74 feet, on old highway at Aiea; lat. 21°23'35" N., long. 157°56'48" W.
 c Board of Water Supply, Honolulu. Alongside old highway to Waianae, a short distance west of junction with Kunia Road, 0.75 mile north, 81° west of BM, altitude 5 feet at head of West Loch of Pearl Harbor, lat. 21°22'48" N., long. 156°01'50" W. Diameter 12 inches, depth 107 feet, upper 86 feet cased. Measuring point is 1 foot above land-surface datum.

probably be much slower, if it occurs at all. The situation serves to emphasize again the serious consequences of salt-water encroachment.

Total pumpage for the island of Oahu was 122,051 million gallons, 30,291 million gallons below that of 1945.

Lowest head and net change in head, in feet above sea level, in observation wells on Oahu in 1946 and 1946

Well No.	Artesian area		Head			Net change 1926-46
	No.	Name	1926	1945	1946	
2	1	St Louis Heights	20.88	21.1	22.14	+1.26
83	2	Makiki-Pacific Heights	23.52	22.3	22.14	-1.38
132	3	Kapalama	24.84	22.04	21.63	-3.21
T24	4	Moanalua	a 24.0	19.7	19.60	-4.4
201	6	Pearl Harbor	17.09	14.22	14.18	-2.91
244			17.27	14.80	14.92	-2.35
266			15.75	12.54	12.84	-2.91
326	7	Waialua	10.34	9.49	9.19	-1.15
356	8	Kahuku	13.05	9.80	9.43	-3.62
396			18.78	17.04	16.88	-1.90
308	12	Mokuleia	17.55	18.16	17.89	+3.34

a Estimated from head in well 144.

Time 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, 1946

(*777, p. 47; 817, p. 35; 840, p. 58; 845, p. 81; 886, p. 81; 911, p. 138; 941, p. 170; 949, p. 186; 1021, p. 165; 1028, p. 178).

Area	Name	Well	High	Low	Net gain or loss
1	St. Louis Heights	2	February	July	-0.5
2	Makiki-Pacific Heights	83	December	August	+2.4
3	Kapalama	132	December	August	+2.1
4	Moanalua	T-24	December	June and July	+2.08
5	Wilhelmina Rise	a Shaft 7	February	July	.0
6	Pearl Harbor	201	October	August	+1.14
		244	December	August	+1.29
		266	October	August	+0.90
7	Waialua	326	December	April	-1.1
8	Kahuku	356	October	April	+0.55
		396	December	May	-0.03
9	Kahana	405	February	October	+0.39
10	Kaaawa	406	February	October	-1.12
11	Gilbert	a T5	October	May	+0.02
12	Mokuleia	286	September	July	-0.37
		308	February	November	-1.67

a Nonartesian, but indicative of artesian conditions.

Schofield Barracks shaft 4 (*840, p. 59; 845, p. 56; 886, p. 82; 911, p. 138; 941, p. 171; 949, p. 241; 991, p. 186; 1021, p. 166; 1028, p. 178).

Water level, in feet, 1946

(From recorder charts)

Date	Water level		Date	Water level	
	A	B		A	B
Jan. 3	273.25	576.75	July 17	273.87	576.13
31	273.30	576.70	23	273.90	576.10
Feb. 9	273.21	576.79	Aug. 7	274.02	575.98
Mar. 11	273.17	576.83	19	274.13	575.87
Apr. 25	273.20	576.80	Nov. 5	274.51	575.42

Artesian head, in feet, and chloride, in parts per million, in typical wells in Oahu, 1946

Well 1B (area 5) (*777, p. 50; 817, p. 37; 840, pp. 56, 61; 845, p. 57; 886, p. 83; 911, p. 139; 941, p. 172; 949, p. 243; 991, p. 188; 1021, p. 167; 1028, p. 181). Bishop Estate. On north side of Waialae Golf Links, Kaimuki.

Date	Head		Chloride	Date	Head		Chloride
	A	B			A	B	
Jan. 24	7.82	10.40	185	Aug. 1	7.63	10.59	212
Feb. 26	8.01	10.21	188	28	7.80	10.42	199
Mar. 26	7.72	10.50	209	Sept. 26	7.78	10.44	238
Apr. 26	7.74	10.48	197	Oct. 29	7.89	10.33	222
May 29	7.60	10.62	237	Nov. 29	7.78	10.44	200
July 2	7.67	10.55	216	Dec. 26	7.86	10.36	179

Well 9 (area 1) (*777, p. 49; 817, p. 37; 940, pp. 56, 62; 845, p. 57; 886, p. 83; 911, p. 139; 941, p. 172; 949, p. 243; 991, p. 188; 1021, p. 168; 1028, p. 181). J. J. Gouveia. Kapahulu Road, Honolulu.

Jan. 24	24.11	+7.93	55	July 31	22.72	+6.64	57
Feb. 25	24.53	+8.45	56	Aug. 28	22.82	+6.74	58
Mar. 26	24.32	+8.24	56	Sept. 25	22.01	+5.93	58
Apr. 26	24.42	+8.34	56	Oct. 29	23.01	+6.93	57
May 27	23.02	+6.94	55	Nov. 27	23.50	+7.42	58
July 1	22.21	+6.13	60	Dec. 26	23.30	+7.22	56

Well 81 (area 2) (*777, p. 49; 817, p. 37; 840, pp. 56, 62; 845, p. 57; 886, p. 83; 911, p. 139; 941, p. 172; 949, p. 243; 991, p. 188; 1021, p. 168; 1028, p. 182). A. Young. Young St., Honolulu.

Jan. 24	22.98	+4.94	35	July 31	22.13	+4.09	36
Feb. 25	23.88	+5.84	37	Aug. 28	21.99	+3.95	34
Mar. 26	23.65	+5.61	38	Sept. 25	22.48	+4.44	36
Apr. 26	23.57	+5.53	39	Oct. 29	23.73	+5.69	35
May 27	22.95	+4.91	36	Nov. 27	24.78	+6.74	36
July 1	22.43	+4.39	38	Dec. 26	25.05	+7.01	35

Well 119 (area 3) (*777, p. 49; 817, p. 37; 840, pp. 56, 62; 845, p. 57; 886, p. 83; 911, p. 139; 941, p. 172; 949, p. 243; 991, p. 188; 1021, p. 168; 1028, p. 182). A. Young. Young St., Honolulu.

Jan. 22	21.67	+17.45	407	July 31	.....	.....	400
Feb. 14	23.23	+19.01	407	Aug. 27	.....	.....	381
Mar. 29	.....	.....	462	Sept. 25	.....	.....	709
Apr. 26	.....	.....	455	Oct. 29	.....	.....	425
May 29	.....	.....	787	Nov. 27	.....	.....	436
July 1	.....	.....	395	Dec. 26	.....	.....	408

Well 153 (area 4) (*777, p. 50; 817, p. 37; 840, pp. 56, 62; 845, p. 58; 886, p. 83; 911, p. 140; 941, p. 173; 949, p. 243; 991, p. 188; 1021, p. 168; 1028, p. 182). S. Damon Estate. Moanalua Gardens, Honolulu.

Jan. 23	20.32	0.06	54	Aug. 2	19.69	0.69	56
Feb. 26	21.17	+7.9	53	28	19.63	.75	51
Mar. 26	20.69	+3.1	54	Sept. 25	20.77	+3.39	50
Apr. 24	20.17	.21	55	Oct. 29	21.75	+1.37	53
May 27	19.98	.40	56	Nov. 27	22.02	+1.64	54
July 1	19.41	.97	55	Dec. 23	22.45	+2.07	52

Well 187B (area 6) (*817, p. 37; 840, pp. 56, 62; 845, p. 58; 886, p. 83; 911, p. 140; 941, p. 173; 949, p. 243; 991, p. 189; 1021, p. 168; 1028, p. 182). U. S. Navy. Near Aiea railroad station.

Jan. 15	16.70	+6.77	248	Mar. 8	17.20	+7.27	...
Feb. 12	18.00	+8.07	...	26	.....	.....	a 228
25	.....	.....	a 242	Apr. 23	16.52	+6.59	128

a Wells B and C combined.

Well 187B--Continued.

Date	Head		Chloride	Date	Head		Chloride	
	A	B			A	B		
May 27	16.07	+6.14	141	Sept. 26	18.00	+8.07	130	
July 1	15.88	+5.95	139	Oct. 29	19.01	+9.08	158	
	31	15.94	+6.01	142	Nov. 27	18.51	+8.58	155
Aug. 28	15.72	+5.79	128	Dec. 26	19.03	+9.10	166	

Well 190 (area 6) (*777, p. 51; 817, p. 37; 840, pp. 57, 62; 845, p. 58; 886, p. 83; 911, p. 140; 941, p. 173; 949, p. 243; 991, p. 189; 1021, p. 169; 1028, p. 182). C. B. Cooper. Half a mile west of Aiea.

Jan. 23	16.77	5.96	134	July 31	15.99	6.74	150
Feb. 25	18.23	4.50	145	Aug. 28	15.58	7.15	...
Mar. 26	17.48	5.25	169	Sept. 26	17.86	4.87	165
Apr. 23	16.68	6.05	164	Oct. 29	18.75	3.98	174
May 27	16.18	6.55	146	Nov. 27	18.50	4.23	177
July 1	15.98	6.75	143	Dec. 26	19.23	3.50	161

Well 193 (area 6) (*777, p. 51; 817, p. 38; 840, pp. 57, 62; 845, p. 58; 886, p. 83; 911, p. 140; 941, p. 173; 949, p. 244; 991, p. 189; 1021, p. 169; 1028, p. 183). L. L. McCandless Estate. In Waimalu Valley, 1 mile northwest of Aiea.

Jan. 23	15.94	+2.89	144	July 31	15.23	+2.18	154
Feb. 25	17.53	+4.48	150	Aug. 28	14.95	+1.90	152
Mar. 26	16.55	+3.50	159	Sept. 25	17.35	+4.30	158
Apr. 23	15.95	+2.90	161	Oct. 29	.....	.....	160
May 27	15.40	+2.35	156	Nov. 27	17.55	+4.50	167
July 1	15.12	+2.07	155	Dec. 26	18.37	+5.32	154

Well 201 (area 6) (*777, p. 52; 817, p. 38; 840, pp. 57, 62; 845, p. 58; 886, p. 83; 911, p. 140; 941, p. 173; 949, p. 244; 991, p. 189; 1021, p. 169; 1028, p. 183). Bishop Estate. In Pearl City.

Jan. 23	15.31	+6.14	397	July 31	14.41	+5.24	300
Feb. 25	16.67	+7.50	562	Aug. 28	14.18	+5.01	290
Mar. 26	15.63	+6.46	445	Sept. 25	16.29	+7.12	535
Apr. 23	14.95	+5.78	403	Oct. 29	17.20	+8.03	660
May 27	14.68	+5.51	362	Nov. 27	16.67	+7.50	676
July 1	14.35	+5.18	310	Dec. 26	16.97	+7.80	643

Well 244 (area 6) (*777, p. 52; 817, p. 38; 840, pp. 57, 62; 845, p. 58; 886, p. 84; 911, p. 140; 941, p. 173; 949, p. 244; 991, p. 189; 1021, p. 169; 1028, p. 183). Bishop Estate. In Waipahu.

Jan. 23	16.75	+6.28	116	July 31	15.01	+4.54	113
Feb. 25	18.87	+8.40	118	Aug. 28	14.92	+4.45	115
Mar. 26	16.93	+6.46	119	Sept. 25	18.91	+8.44	107
Apr. 23	15.99	+5.52	116	Oct. 29	20.11	+9.64	116
May 27	15.73	+5.26	116	Nov. 27	18.26	+7.79	118
July 1	15.32	+4.85	114	Dec. 26	19.10	+8.63	116

Well 266 (area 6) (*777, p. 52; 817, p. 38; 840, pp. 57, 62; 845, p. 58; 886, p. 84; 911, p. 140; 941, p. 173; 949, p. 244; 991, p. 190; 1021, p. 170; 1028, p. 183). Honouliuli Ranch. 1.75 miles northeast of Ewa.

Jan. 23	15.46	+2.80	218	July 31	13.26	+0.60	250
Feb. 25	17.71	+5.05	208	Aug. 28	12.84	+1.18	248
Mar. 26	15.17	+2.51	212	Sept. 25	18.40	+5.74	194
Apr. 23	13.88	+1.22	233	Oct. 29	19.77	+7.11	212
May 27	13.83	+1.17	234	Nov. 27	16.46	+3.80	204
July 1	13.46	+8.0	236	Dec. 26	18.38	+5.72	214

Well 276 (area 11) (*817, p. 38; 840, pp. 57, 63; 845, p. 58; 886, p. 84; 911, p. 140; 941, p. 174; 949, p. 244; 1021, p. 170; 1028, p. 183). Ewa Plantation Co. 4.5 miles west of Ewa. Records furnished by owner; figures are monthly averages.

Date	Head		Chloride	Date	Head		Chloride
	A	B			A	B	
Jan.	12.42	28.16	580	July	11.85	28.73	584
Feb.	13.03	27.55	554	Aug.	.....	.....	590
Mar.	12.14	28.44	582	Sept.	12.65	27.93	...
Apr.	11.77	28.81	579	Oct.	13.10	27.48	...
May	12.14	28.44	581	Nov.	13.21	27.37	578
June	.....	.....	583	Dec.	12.73	27.85	572

Well 286 (area 12) (*777, p. 54; 817, p. 38; 840, pp. 57, 63; 845, p. 59; 886, p. 84; 911, p. 141; 941, p. 174; 949, p. 244; 991, p. 190; 1021, p. 170; 1028, p. 184). Waialua Agricultural Co. In Mokuleia.

Jan. 28	17.48	+5.94	171	Aug. 1	16.97	+5.43	191
Feb. 26	17.10	+5.56	184	Aug. 27	16.82	+5.28	203
Mar. 27	16.84	+5.30	177	Sept. 24	17.49	+5.95	180
Apr. 24	16.78	+5.24	175	Oct. 28	17.48	+5.94	180
May 28	16.82	+5.28	181	Nov. 29	17.14	+5.60	182
July 2	16.66	+5.12	186	Dec. 23	17.31	+5.77	186

Well 308 (area 12) (*777, p. 54; 817, p. 38; 840, pp. 57, 63; 845, p. 59; 886, p. 84; 911, p. 141; 941, p. 174; 949, p. 244; 991, p. 190; 1021, p. 170; 1028, p. 184). J. F. Mendonca. 1.5 miles west of Waialua Mill.

Jan. 28	19.58	+11.12	118	Aug. 1	18.21	+9.75	105
Feb. 26	19.71	+11.25	116	Aug. 27	18.26	+9.80	115
Mar. 27	19.51	+11.05	111	Sept. 24	18.85	+10.39	98
Apr. 24	19.50	+11.04	116	Oct. 28	18.05	+9.59	126
May 28	18.30	+9.84	111	Nov. 29	17.89	+9.43	136
July 2	18.10	+9.64	108	Dec. 23	18.23	+9.77	139

Well 326 (area 7) (*777, p. 52; 817, p. 39; 840, pp. 58, 63; 845, p. 59; 886, p. 84; 911, p. 141; 941, p. 174; 949, p. 244; 991, p. 190; 1021, p. 170; 1028, p. 184). Waialua Agricultural Co., about 0.5 mile south of Waialua.

Jan. 28	10.64	+4.45	75	Aug. 1	9.73	+3.54	77
Feb. 26	10.14	+3.95	77	Aug. 27	9.91	+3.72	79
Mar. 27	9.77	+3.58	79	Sept. 24	10.55	+4.36	78
Apr. 24	9.19	+3.00	79	Oct. 28	10.64	+4.45	81
May 28	9.59	+3.40	72	Nov. 29	10.09	+3.90	82
July 2	9.49	+3.30	79	Dec. 23	10.84	+4.65	81

Well 337 (area 8) (*777, p. 53; *817, p. 39; 840, p. 58, 63; 845, p. 59; 886, p. 84; 911, p. 141; 941, p. 174; 949, p. 245; 991, p. 190; 1021, p. 171; 1028, p. 184). Waialeale Training School for Boys.

Jan. 28	12.45	9.00	102	Aug. 1	11.71	9.74	83
Feb. 26	12.20	9.25	84	Aug. 27	12.20	9.25	82
Mar. 27	12.05	9.40	96	Sept. 24	12.15	9.30	92
Apr. 24	11.92	9.53	79	Oct. 28	11.95	9.50	116
May 28	11.98	9.47	82	Nov. 29	12.17	9.28	120
July 2	11.75	9.70	82	Dec. 23	11.87	9.58	84

Well 356 (area 8) (*777, p. 53; 817, p. 39; 840, pp. 58, 63; 845, p. 59; 886, p. 85; 911, p. 141; 941, p. 174; 949, p. 245; 991, p. 191; 1021, p. 171; 1028, p. 184). Kahuku Plantation Co. At sugar mill in Kahuku.

Date	Head		Chloride	Date	Head		Chloride
	A	B			A	B	
Jan. 28	11.63	+2.80	171	Aug. 1	9.65	+0.82	279
Feb. 26	11.21	+2.38	177	27	9.53	+0.70	310
Mar. 27	10.13	+1.30	198	Sept. 24	12.99	+4.16	196
Apr. 24	9.43	+0.60	232	Oct. 28	13.33	+4.50	215
May 28	9.69	+0.86	273	Nov. 29	11.38	+2.55	202
July 2	9.68	+0.85	282	Dec. 23	12.48	+3.65	196

Well 396 (area 8) (*777, p. 53; 817, p. 39; 840, pp. 58, 63; 845, p. 59; 886, p. 85; 911, p. 141; 941, p. 174; 949, p. 245; 991, p. 191; 1021, p. 171; 1028, p. 185). Kahuku Plantation Co. In Hauula.

Jan. 28	18.39	+8.03	60	Aug. 1	17.75	+7.39	67
Feb. 26	18.94	+8.58	61	27	16.88	+6.52	68
Mar. 27	17.52	+7.16	63	Sept. 24	18.34	+7.98	65
Apr. 24	17.08	+6.72	63	Oct. 28	18.59	+8.23	67
May 28	17.02	+6.66	65	Nov. 29	18.51	+8.15	69
July 2	17.12	+6.76	68	Dec. 23	19.04	+8.68	65

Well 405 (area 9) (*817, p. 39; 840, pp. 58, 63; 845, p. 59; 886, p. 85; 911, p. 141; *941, p. 174; 949, p. 245; 991, p. 191; 1021, p. 171; 1028, p. 185). M. E. Foster Estate. In Kahana.

Jan. 28	15.49	+9.73	42	Aug. 1	15.21	+9.45	40
Feb. 26	16.01	+10.25	41	27	15.41	+9.65	38
Mar. 27	15.61	+9.85	43	Sept. 24	14.95	+9.19	37
Apr. 24	15.70	+9.94	44	Oct. 28	14.90	+9.14	41
May 28	15.60	+9.84	40	Nov. 29	14.99	+9.23	42
July 2	15.40	+9.64	42	Dec. 23	15.69	+9.95	40

Well 406 (area 10) (*777, p. 53; 817, p. 39; 840, pp. 58, 63; 845, p. 59; 886, p. 85; 911, p. 141; 941, p. 175; 949, p. 245; 991, p. 191; 1021, p. 171; 1028, p. 185). F. M. Swanzy. In Kaaawa Valley.

Jan. 28	12.95	+2.68	244	Aug. 1	12.37	+2.10	226
Feb. 26	13.27	+3.00	242	27	12.35	+2.08	229
Mar. 27	13.21	+2.94	244	Sept. 24	12.36	+2.09	225
Apr. 24	13.07	+2.80	236	Oct. 28	12.27	+2.00	237
May 28	12.84	+2.57	231	Nov. 29	12.57	+2.30	245
July 2	12.72	+2.45	231	Dec. 23	12.95	+2.68	254

Water levels, in feet, and chloride, in parts per million, in test borings in Oahu, 1946

Test boring Oahu T1 (tributary to area 12) (*845, p. 60; 886, p. 85; 911, p. 141; 941, p. 175; 949, p. 245; 991, p. 191; 1021, p. 172; 1028, p. 185). Waiialua Agricultural Co. In Kaukonahua Gulch, 4 miles south of Waiialua.

Date	Water level		Chloride	Date	Water level		Chloride
	A	B			A	B	
Jan. 3	15.91	257.70	31	Aug. 31	15.12	258.49	31
Mar. 2	16.12	257.49	31	Sept.	(a)	(a)	(a)
30	15.83	257.79	31	Oct.	(a)	(a)	(a)
May 1	16.48	257.13	31	Nov.	(a)	(a)	(a)
29	16.50	257.11	31	Dec.	(a)	(a)	(a)
July 30	15.16	258.45	31				

^a Measurements during the remainder of the year were prevented by the strike of workers in the sugar industry.

Test boring Oahu T2 (tributary to area 7) (*845, p. 60; 886, p. 85; 911, p. 142; 941, p. 175; 949, p. 245; 991, p. 192; 1021, p. 172; 1028, p. 186). Waialua Agricultural Co. Near Anahulu Canyon, 3.5 miles east of Haleiwa.

Date	Water level		Chloride	Date	Water level		Chloride
	A	B			A	B	
Jan. 3	6.08	335.80	135	Aug. 31	4.99	336.89	145
Mar. 1	5.61	336.27	94	Sept.	(a)	(a)	(a)
30	5.45	336.43	114	Oct.	(a)	(a)	(a)
May 1	5.21	336.67	114	Nov.	(a)	(a)	(a)
29	5.33	336.55	114	Dec.	(a)	(a)	(a)
July 30	4.91	336.97	135				

a Measurements during the remainder of the year were prevented by the strike of workers in the sugar industry.

Test boring Oahu T5 (tributary to area 11) (*886, p. 84; 911, p. 142; 941, p. 175; 949, p. 246; 991, p. 192; 1021, p. 172; 1028, p. 186). Suburban Water Works, Honolulu. 5 miles west of Ewa on main highway.

Jan. 29	4.25	74.88	107	Aug. 2	3.99	75.14	464
Feb. 27	4.37	74.76	106	29	4.01	75.12	...
Mar. 28	4.00	75.13	230	Sept. 26	4.45	74.68	480
Apr. 25	3.89	75.24	284	Oct. 30	4.66	74.47	523
May 29	3.70	75.43	388	Dec. 2	4.19	74.94	512
July 3	3.79	75.34	474	27	4.45	74.68	125

Test boring Oahu T15 (*911, p. 142; 941, p. 175; 949, p. 246; 991, p. 192; 1021, p. 172; 1028, p. 186). Suburban Water Works, Honolulu. 1.8 miles above mouth of Nanakuli Gulch.

Jan. 29	1.70	476.94	99	Aug. 2	1.63	477.01	94
Feb. 27	1.89	476.75	93	29	1.65	476.99	90
Mar. 28	1.78	476.86	97	Oct. 1	1.95	476.69	..
Apr. 25	1.80	476.84	95	30	2.07	476.57	93
May 29	1.67	476.97	96	Dec. 2	2.00	476.64	94
July 3	1.60	477.04	92	27	1.80	476.84	94

Test boring Oahu T20 (a tributary to area 6) (*949, p. 246; 991, p. 192; 1021, p. 172; 1028, p. 186). U. S. Navy. 2 miles northwest of Ewa, on main highway to Waianae.

Jan. 29	16.83	122.67	222	Aug. 2	16.02	123.48	223
Feb. 27	17.28	122.22	228	29	16.30	123.20	224
Mar. 28	16.72	122.78	228	Oct. 1	16.85	122.65	226
Apr. 25	16.77	122.73	238	30	17.30	122.20	214
May 29	16.54	122.96	221	Dec. 2	16.98	122.52	224
July 3	16.10	123.40	226	27	16.95	122.55	230

ISLAND OF MAUI

The water levels in the wells of the Hawaiian Commercial and Sugar Company, on the windward side of the island, showed small net changes both up and down, ranging from +0.30 to -0.45 foot. Net changes are uncertain in Maui Agricultural Company wells because of the uncertainty of water levels measured in recent years, and in the wells of the Pioneer Mill Company because of lack of measurements later than August.

The East Maui Irrigation Company ditch deliveries to the Isthmus during 1946 were 68,278.09 million gallons, 15,638.90 million gallons more than in 1945. Pumpage for the year on Maui showed a decrease, being 40,604 million gallons, or 29,081 million gallons less than in 1945. Pumping at all wells but one started in January, except Maui Agricultural Company pump 1 (U.S.G.S. 30), which started pumping on May 28. All continued through August, except Maui Agricultural Company pumps 1 and 5, which were stopped on July 3 and June 29, respectively. Pumping was suspended because of the strike in the sugar industry, from September 1 to November 19 at Hawaiian Commercial and Sugar Company, and Maui Agricultural Company, and from September 1 to January 2, 1947, at Pioneer Mill Company.

Data in the following table were furnished by R. E. Hughes, R. Bradley, F. E. Clendenen, and J. T. Moir, Jr.

Chloride, in parts per million, and water levels and net gain or loss in static level, in feet above sea level on Maui, 1946

(*911, p. 143; 941, p. 176; 949, p. 247; 991, p. 193; 1021, p. 174; 1028, p. 187).

Location	Geol. Survey well No.	Chloride	Date	Water level Height	Gain or loss
Hawaiian Commercial & Sugar Co.					
1 (Kihei)	14	...	.....	....	.....
2	25	390	Dec. 31	5.08	-.03
3	22	340	Dec. 31	3.65	-.25
4	24	544	Dec. 31	3.14	+1.17
5	19	447	Dec. 31	4.02	-.10
6	18	405	Dec. 31	5.00	+3.30
7	16	325	Dec. 31	5.18	+1.10
8 (Mill)	17	433	Dec. 31	4.50	-.45
3 (Kihei)	15	401	Dec. 31	6.19	-.06
Maui Agricultural Co.					
Lower Paia (pumps 1, 5, and 6)	30	619	Dec. 20	a 3.60	....
Kaheka (pumps 3 and 4)	27	297	Dec. 20	a 6.00	....
Paia School (pump 7)	28	282	Dec. 20	a 3.72	....
Mill (pumps 8 and 13)	29	447	Dec. 20	a 3.65	....
Kuau (pump 12)	31	258	Dec. 20	a 3.50	....
Pioneer Mill Co.					
Kaanapali	3	b 692	Aug. 31	c 1.56	....
Kahoma	5	b 398	Aug. 31	c 1.98	....
Lahaina	9	b 557	Aug. 31	c 2.50	....
Mill	7	b 900	Aug. 31	c 2.90	....
Olowalu	10	b 443	Aug. 31	c 3.13	....
Ukumshame	12	b 460	Aug. 31	c 5.23	....

a Water level based on U.S.G.S. mean sea level. These levels cannot be directly related to those in earlier reports, because measuring points used in former years have been lost, and at least some of them are believed to have been in error.

b Average for 8-month period, January-August.

c Later measurements were prevented by the sugar strike.

Water levels, in feet, and chloride, in parts per million,
in test borings on Maui, 1946
(Measurements furnished by Wailuku Sugar Co.)

Test boring Maui T102 (Iao Valley) (*911, p. 144; 941, p. 176; 949, p. 247; 951, p. 194; 1021, p. 174; 1028, p. 188). Geological Survey, U. S. Dept. of Interior. In Iao Valley, 1 mile west of Wailuku.

Date	Water level		Chloride	Date	Water level		Chloride
	A	B			A	B	
Jan. 15	(a)	(a)	18	July 16	26.94	426.96	17
Feb. 15	(a)	(a)	17	Aug. 16	27.26	426.64	18
Mar. 15	(a)	(a)	15	Sept. 17	27.20	426.70	17
Apr. 16	(a)	(a)	17	Oct. 19	27.65	426.25	17
May 17	(a)	(a)	16	Nov. 19	27.04	426.86	18
June 18	27.17	426.73	18	Dec. 18	27.32	426.58	16

a Measurement unreliable; wire loose and slipping inside insulation.

Test boring Maui T110 (Pu'u Hele) (*911, p. 143; 941, p. 177; 949, p. 247; 951, p. 194; 1021, p. 174; 1028, p. 188). Wailuku Sugar Co. 2 miles north of Haalaea.

Date	Water level		Chloride	Date	Water level		Chloride
	A	B			A	B	
Jan. 15	(a)	(a)	266	July 16	6.10	306.57	246
Feb. 15	(a)	(a)	266	Aug. 16	6.27	306.40	251
Mar. 15	(a)	(a)	254	Sept. 17	6.46	306.21	274
Apr. 16	(a)	(a)	249	Oct. 19	6.43	306.24	258
May 17	(a)	(a)	258	Nov. 19	6.19	306.48	251
June 18	6.08	306.59	251	Dec. 18	6.48	306.19	254

a Measurement unreliable; wire loose and slipping inside insulation.

Test boring Maui T112. Wailuku Sugar Co. 0.5 mile southwest of Wailuku Sugar Co. Latitude $20^{\circ}53'7''$ N., longitude $156^{\circ}30'47''$ W. Drilled June 1945 by W. M. Mullin. Diameter 1.5 inches, depth 477.07 feet, altitude 457.07 feet, altitude at top of casing 457.97 feet. Well penetrated 385 feet of alluvium and talus, 92 feet of West Maui basalt (Wailuku volcanic series). Measuring point is 0.9 foot above land-surface datum and 457.97 feet above sea level.

Date	Water level		Salinity	Date	Water level		Salinity
	A	B			A	B	
Jan. 15	(a)	(a)	19	July 16	26.97	430.10	16
Feb. 15	(a)	(a)	17	Aug. 16	27.11	429.96	17
Mar. 15	(a)	(a)	18	Sept. 17	27.38	429.69	12
Apr. 16	(a)	(a)	15	Oct. 19	27.27	429.80	12
May 17	(a)	(a)	17	Nov. 19	27.20	429.87	13
June 18	27.15	429.92	16	Dec. 18	27.68	429.39	11

a Measurement unreliable; wire loose and slipping inside insulation.

Test boring Maui T113. Wailuku Sugar Co. At Wailuku Mill. Latitude $20^{\circ}53'55''$ N., longitude $156^{\circ}30'05''$ W. Drilled November 1945 by W. M. Mullin. Diameter 1.5 inches, depth 705.0 feet, altitude at top of casing 181.09 feet. Well penetrated 197 feet of alluvium at the top, then 175 feet of interbedded aa and pahoehoe lava from East Maui, then 333 feet of alluvium from West Maui. Measuring point is at land-surface datum and 181.09 feet above sea level.

Date	Water level		Chloride	Date	Water level		Chloride
	A	B			A	B	
Jan. 15	(a)	(a)	49	July 16	17.00	164.09	88
Feb. 15	(a)	(a)	57	Aug. 16	17.19	163.90	89
Mar. 15	(a)	(a)	56	Sept. 17	17.35	163.74	95
Apr. 16	(a)	(a)	59	Oct. 19	17.37	163.72	98
May 17	(a)	(a)	72	Nov. 19	17.26	163.83	101
June 18	16.86	164.23	83	Dec. 18	17.17	163.92	105

a Measurement unreliable; wire loose and slipping inside insulation.

Shaft 33. Wailuku Sugar Co. 0.5 mile southwest of Wailuku, in field 63 at Wailuku Sugar Co. Latitude 20°53'7" N., longitude 156°30'47" W. Still under construction. Reached water in May 1946. Shaft inclined at approximately 30°. Altitude of land surface at shaft collar 400.00 feet. This shaft is at the same locality of Test boring Maui T112, and it is planned that water level measurements in the shaft will replace those in the test boring. (Altitude of temporary measuring point, at the level of the proposed pump-chamber floor, is 29.45 feet, 370.55 feet below land-surface datum.)

Date			Date		
Water level			Water level		
	A	B		A	B
June 19	26.45	373.55	Nov. 19	25.91	374.09
Aug. 30	26.45	373.55	Dec. 18	26.45	373.55

ISLAND OF MOLOKAI

The Ualapue and Kamalo wells showed net losses of 0.33 and 0.17 foot. Records after May 15 are not available for test boring T1.

Total pumpage for the year on Molokai decreased 0.64 million gallons, because of decreased pumpage from the Kamakana well at Kawela.

A drilled well at an altitude of 888½ feet at Kualapuu, on the western slope of East Molokai, encountered water standing 10 feet above sea level, with a chloride content of 374 parts per million. The high salinity probably results from a very low rate of recharge in this arid part of the island.

Water levels, in feet, in observation wells in Molokai, 1946
(Measurements made by Herbert Wilson)

Kamalo well (*845, p. 63; 886, p. 87; 911, p. 144; 941, p. 177; 949, p. 248; 991, p. 195; 1021, p. 176; 1028, p. 189). Half a mile northeast of Kamalo wharf.

Date			Date			Date		
Water level			Water level			Water level		
	A	B		A	B		A	B
Jan. 15	1.50	38.50	May 15	1.50	38.50	Sept. 15	1.67	38.33
Feb. 15	1.25	38.75	June 15	1.67	38.33	Oct. 15	1.83	38.17
Mar. 15	1.25	38.75	July 15	1.67	38.33	Nov. 15	1.67	38.33
Apr. 15	1.33	38.67	Aug. 15	1.75	38.25	Dec. 15	1.50	38.50

Ualapue well (*845, p. 63; 886, p. 87; 941, p. 177; 949, p. 248; 991, p. 195; 1021, p. 176; 1028, p. 189). 2.75 miles east of Kamalo well.

Date			Date			Date		
Water level			Water level			Water level		
	A	B		A	B		A	B
Jan. 15	3.58	39.42	May 15	3.42	39.58	Sept. 15	3.58	39.42
Feb. 15	3.42	39.58	June 15	3.50	39.50	Oct. 15	3.58	39.42
Mar. 15	3.42	39.58	July 15	3.42	39.58	Nov. 15	3.50	39.50
Apr. 15	3.58	39.42	Aug. 15	3.50	39.50	Dec. 15	3.42	39.58

Test boring Molokai T1 (*845, p. 62; 886, p. 87; 911, p. 144; 941, p. 177; 949, p. 248; 991, p. 195; 1021, p. 175; 1028, p. 189). Geol. Survey, U. S. Dept. of Interior. 0.75 mile east of airport.

Test boring Molokai T1--Continued.

Water level, in feet, and chloride in parts per million, 1946
(Measurements made by Solomon Hanakeawe and Damon Kamahale, Hawaiian
Homes Commission)

Date	Water level		Chloride	Date	Water level		Chloride
	A	B			A	B	
Feb. 15	5.69	391.75	620	May 15	5.06	392.38	600
Mar. 15	....	.....	...	June 15	(a)	(a)	(a)
Apr. 15	5.77	391.67	638	July 15	(a)	(a)	(a)

a Since May 1946, test boring 1 has been inaccessible for measurement having been buried by dirt bulldozed over it by the Army.

ISLAND OF LANAI

The water level in Maunalei shaft 1 varied from a low of 2.40 feet in July to a high of 2.62 feet in March.

A new well (drilled well 2) was completed for the Hawaiian Pineapple Company during February 1946. It is 1,002 feet deep and 23.5 inches in diameter. The altitude of the land surface at the well is 1,905 feet above sea level. Water level in the well, on completion, was 1,640 feet above sea level, and 265 feet below land-surface datum. As in drilled well 1, the water is held at high level in permeable compartments of basaltic lava flows between relatively impermeable dikes.

Maunalei shaft 1 (*817, p. 41; 840, p. 65; 845, p. 63; 886, p. 87; 911, p. 144; 941, p. 178; 949, p. 249; 991, p. 195; 1021, p. 176; 1028, p. 190). 4 miles north-northeast of Lanai City.

Water level, in feet, 1946
(Records furnished by Hawaiian Pineapple Co.)

Date	Water level		Date	Water level		Date	Water level	
	A	B		A	B		A	B
Jan. 1	2.61	291.39	May 1	2.50	291.50	Sept. 1	2.61	291.39
Feb. 1	2.53	291.47	June 1	2.42	291.58	Oct. 1	2.58	291.42
Mar. 2	2.62	291.38	July 1	2.40	291.60	Nov. 1	2.60	291.40
Apr. 1	2.54	291.46	Aug. 1	2.52	291.48	Dec. 1	2.62	291.38

ISLAND OF HAWAII

Water levels in the Olaa shaft varied from a low of 13.33 feet above sea level on November 17 and 24, to a high of 19.05 feet on December 22, and showed a net gain for the year of 2.54 feet. The temporary high level of December 22 was the result of a heavy rain just prior to that date. The records for the year at the Ookala (Kaiwiki) shaft are incomplete, owing to suspension of measurements during construction of a new tunnel and pump chamber to supply water to the mill and a new cane cleaning plant.

It is estimated that about 450 million gallons was pumped during 1946 from the new shaft at Paauilo. On December 31, the water level was 3.5 feet above sea level, and the average chloride content of the water during the year was 192 parts per million.

The tunnel being driven in Honokane Valley, Kohala Mountain, by the Kohala Ditch Company, had reached a length of 1,991 feet on December 31, and was discharging about 5 million gallons of water daily. Its total discharge during 1946 was approximately 2,000 million gallons.

The total amount of ground water pumped during the year on the island of Hawaii was 3,295 million gallons, 1,345 million gallons less than 1945.

Olaa shaft (*817, p. 42; 840, p. 66; 845, p. 64; 886, p. 88; 911, p. 145; 941, p. 178; 949, p. 249; 991, p. 196; 1021, p. 177; 1028, p. 191).

Water level, in feet, 1946
(Records furnished by George Duncan, Olaa Sugar Co., Ltd.)

Date			Water level			Date			Water level			Date			Water level		
			A			B						A			B		
Jan.	6	14.80	205.20	May	12	15.94	204.06	Sept.	8	.....	.....	15	13.86	206.14	
	13	14.70	205.30		19	15.86	204.14		22	13.86	206.14		22	13.86	206.14		
	20	14.26	205.74		26	15.88	204.12		29	13.82	206.18		29	13.82	206.18		
	27	14.20	205.80	June	2	15.45	204.55	Oct.	6	13.59	206.41		13	13.58	206.42		
Feb.	3	15.96	204.04		9	15.44	204.56		13	13.58	206.42		20	13.28	206.72		
	10	15.77	204.23		16	15.10	204.90		20	13.28	206.72		27	13.36	206.64		
	17	15.24	204.76		23	14.90	205.10		27	13.36	206.64		Nov.	3	13.28	206.72	
	24	15.21	204.79		30	14.98	205.02		10	13.35	206.65		17	13.33	206.67		
Mar.	3	15.15	204.85	July	7	14.44	205.56		17	13.33	206.67		24	13.33	206.67		
	10	14.92	205.08		14	14.06	205.94		Dec.	1	13.36	206.64		8	15.03	204.97	
	17	15.09	204.91		21	14.26	205.74		15	14.86	205.14		22	19.05	200.95		
	24	14.92	205.08		28	14.36	205.64		29	17.73	202.27						
Apr.	7	15.13	204.87	Aug.	4	14.11	205.89										
	14	14.71	205.29		11	14.01	205.99										
	21	15.65	204.35		18	14.26	205.74										
	28	15.68	204.32		25	14.09	205.91										
May	5	16.02	203.98	Sept.	1	.....	.....								

Ookala shaft (*840, p. 66; 845, p. 64; 886, p. 88; 911, p. 145; 941, p. 178; 949, p. 250; 991, p. 196; 1021, p. 177; 1028, p. 191). All measurements in old (domestic supply) tunnel.

Water levels, in feet, and chloride in parts per million, 1946
(Records furnished by David E. Larsen, manager, Kaiwiki Sugar Co.)

Date				Water level				Chloride			
				A		B					
Jan.	28	a	4.67	a	295.33	38	July	3	4.58	295.42	47
Feb.	1	b	5.67	b	294.33	18		25	4.67	295.33	50
	19	22	Aug.	8	4.25	295.75	48
Mar.	13	38		23	62
	26	4.67	295.33	38	Sept.	16	34
Apr.	2	4.67	295.33	37		24	b	3.25	296.75	..	
	10	4.33	295.67	68		7	b	5.00	295.00	..	
	20	4.17	295.83	64		16		5.25	294.75	..	
	27	2.92	297.08	59		30		5.17	294.83	..	
May	4	4.17	295.83	51		Nov.	4	5.33	294.67	..	
	18	3.83	296.17	39		25		3.33	296.67	..	
June	3	4.50	295.50	29		Dec.	5	3.17	296.83	..	
	24	.....	.....	33						

a Two pumps running.

b One pump running.

ISLAND OF KAUAI

Artesian heads in Kauai well 8 showed a net decline for the year of 0.53 foot; those in wells 2F and 14N showed net gains of 0.30 foot and 1.08 feet. The head in well 8 thus declined more than it had risen in 1945. However, at the end of the year the chloride content also had declined to 107 parts per million, as compared to 130 parts per million at the end of 1945. In the other wells also, the chloride content was somewhat less than the all-time highs reached in 1945.

The total ground-water pumpage on Kauai decreased from 5,930 million gallons in 1945 to 4,030 million gallons in 1946.

Artesian head, in feet, and chloride, in parts per million, in typical artesian wells in Kauai, 1946

Well 2F (*840, p. 67; 845, p. 65; 886, p. 89; 911, p. 146; 941, p. 179; 949, p. 250; 991, p. 197; 1021, p. 178; 1028, p. 192). In Kealia. Records furnished by East Kauai Water Co.

Date	Head		Chloride	Date	Head		Chloride
	A	B			A	B	
Jan. 22	9.82	+1.77	40	July 26	9.15	+1.10	45
Feb. 26	9.70	+1.65	43	Aug. 27	9.44	+1.39	42
Mar. 28	9.72	+1.68	40	Sept. 25	9.52	+1.47	43
Apr. 29	9.24	+1.19	44	Oct. 24	9.52	+1.47	43
May 23	9.40	+1.35	42	Nov. 26	9.50	+1.45	41
June 19	9.43	+1.38	40	Dec. 27	10.07	+2.02	45

Well 7 (*840, p. 68; 845, p. 65; 886, p. 89; 911, p. 146; 941, p. 179; 949, p. 250; 991, p. 197; 1021, p. 179; 1028, p. 192). In Wailua.

Jan. 25	....	.....	161	Sept. 26	....	.....	153
May 9	....	.....	152	Nov. 23	....	.....	156
July 26	....	.....	146				

Well 8 (*840, p. 68; 845, p. 65; 886, p. 89; 911, p. 146; 941, p. 179; 949, p. 250; 991, p. 197; 1021, p. 179; 1028, p. 192). In Wailua.

Jan. 25	10.00	1.95	119	Sept. 26	10.07	1.88	111
May 9	9.87	2.08	125	Nov. 23	9.52	2.43	107
July 26	9.28	2.07	118				

Well 14N (*840, p. 68; 886, p. 89; 911, p. 146; 941, p. 179; 949, p. 250; 991, p. 197; 1021, p. 179; 1028, p. 192). In Koloa. Records furnished by Koloa Sugar Co.

Jan. 31	29.94	56.08	41	July 1	30.19	55.83	42
Feb. 27	29.02	57.00	..	July 27	a 20.10	65.92	43
Mar. 31	30.19	55.83	41	Oct. 15	30.52	55.50	39
Apr. 30	30.19	55.83	41	Nov. 29	30.35	55.67	39
May 31	30.19	55.83	39	Dec. 31	30.77	55.25	42

a Pumping.

Artesian head, in feet, and chloride, in parts per million, in the Kekaha Sugar Co.'s wells on Kauai, 1946
(Records furnished by Kekaha Sugar Co.)

Well 35 (*840, p. 68; 845, p. 65; 886, p. 89; 911, p. 146; 941, p. 179; 949, p. 951; 991, p. 198; 1021, p. 179; 1028, p. 193). Near Kekaha.

Date	Head		Chloride	Date	Head		Chloride
	A	B			A	B	
Jan. 15	8.35	+0.53	382	July 16	8.32	+0.50	443
Feb. 15	8.32	+0.50	395	Aug. 17	8.40	+0.58	370
Mar. 15	8.32	+0.50	397	Sept. 17	(a)	(a)	(a)
Apr. 16	8.32	+0.50	400	Oct. 15	(a)	(a)	(a)
May 15	8.07	+0.25	461	Nov. 17	(a)	(a)	(a)
June 15	7.82	.00	451	Dec. 18	(b)	(b)	(b)

a No record for September, October, and November, because of sugar strike.

b No record; road to wells impassable.

Well 37 (*840, p. 68; 845, p. 65; 886, p. 89; 911, p. 146; 941, p. 179; 949, p. 251; 991, p. 178; 1021, p. 179; 1028, p. 193). 4 miles northwest of Kekaha.

Date	Head		Chloride	Date	Head		Chloride
	A	B			A	B	
Jan. 15	9.63	0.35	212	July 16	8.98	1.00	382
Feb. 15	9.51	.47	248	Aug. 17	9.31	.67	370
Mar. 15	9.24	.74	276	Sept. 17	(a)	(a)	(a)
Apr. 16	8.88	1.10	303	Oct. 15	(a)	(a)	(a)
May 15	9.04	.94	395	Nov. 17	(a)	(a)	(a)
June 15	8.98	1.00	376	Dec. 18	(b)	(b)	(b)

a No record for September, October, and November, because of sugar strike.

b No record; road to wells impassable.

No measurements were made in wells 43 and 56 in 1946 because of leaky casing.

PUMPAGE

The following table gives the draft from all important ground-water pumping plants in the Hawaiian Islands. The draft from all other drilled wells entering the main basalt aquifer of Oahu, which are not included, is estimated to be about 30 million gallons a day. Numbers in parentheses in the pumpage records for Oahu and Maui are those used by the Federal Geological Survey.

The total draft during 1946 was 169,986 million gallons, 59,833 million gallons less than 1945. Of the total decrease 27,286 million gallons was on Oahu, 29,312 million gallons on Maui, and 1,345 million gallons on Hawaii.

The Honolulu Suburban Water System received 155 million gallons of spring and tunnel water by gravity supply from the Waianae Plantation powerhouse, in Waianae Valley, in exchange for water used by that plantation from the city and county shaft at Lualualei (shaft 2). The following gravity supplies were also used by the Suburban Water System: Haiku tunnel,

Kailua, 779 million gallons; Luluku tunnels and springs, Kailua, 233 million gallons; Waimanalo city and county and plantation tunnels, 89 million gallons.

The U. S. Navy used an estimated 114.0 million gallons of water from Lualualei tunnel on Oahu in addition to that listed.

The new tunnel of the Waianae Plantation, in Makaha Valley, Oahu, was flowing at a rate of 1.45 million gallons a day in December. The Honokane tunnel, being driven into the dike complex of the Kohala Mountain on Hawaii by the Kohala Sugar Co., in December reached a total length of 1,991 feet, had cut 23 dikes, and was estimated to be yielding 5 million gallons daily.

Ground-water draft, in millions of gallons, from wells in the Territory of Hawaii, 1946
(Data furnished by owners)

Island of Hawaii		Island of Lanai	
Kaiwika Sugar Co.		Hawaiian Pineapple Co.	
Domestic tunnel	a 54	Tunnels 1 and 2	101
Cane cleaning plant tunnel	a 320	Shaft 2	<u>125</u>
	374		226
		Island of Maui	
Hamakua Mill Co.	a 450	Hawaiian Commercial and Sugar Co.	
Kohala Sugar Co.		Pump 1 (14) (Kihei)	0
Hoea Pump	438	Pump 2 (25)	2,118
Kohala Pump	1,127	Pump 3 (22)	1,870
Waikane Pump	<u>255</u>	Pump 4 (24)	1,530
	1,820	Pump 5 (19)	1,072
Olaa Sugar Co.	601	Pump 6 (18)	3,020
U. S. Navy,		Pump 7 (16)	4,270
Hilo Air Station	<u>50</u>	Pump 8 (17)	3,347
		Pump 3 (15) (Kihei)	3,154
Total	3,295	Central power plant (20)	<u>2,315</u>
			22,746
		Maui Agricultural Co.	
Island of Kauai ^{b/}		Lower Paia (30)	1,506
County of Kauai		(pumps 1, 5, and 6)	
Waimea Water Works	139	Kaheka (27)	1,601
Hanapepe Water Works	<u>91</u>	(pumps 3 and 4)	
	231	Pump 7 (28)	1,788
Kekaha Sugar Co.		Maliko (32)	825
Well 9	512	(pumps 10 and 11)	
Wells K-1 to K-5	600	Pump 12 (31)	305
Wells M-1 to M-12	1,087	Mill (29)	3,214
Kekaha Pump	535	(pumps 8 and 13)	<u>9,239</u>
Mana Pump	68		
Waiawa Pump	<u>268</u>	Maui Pineapple Co.	
	3,070	Kahului Cannery (13)	a 96
Koloa Sugar Co.	37		
Lihue Plantation Co.		Pioneer Mill Co.	
Domestic shaft	a 470	Pump A (9) Lahaina	213
Kealia wells	a 213	Pump B (8) Lahaina	999
Hanamaulu shaft	<u>10</u>	Pump C (7) Mill	cl, 769
	693	Pump D (3)	
Total	4,030	Kaanapali	dl, 673
		Pump E (9) Lahaina	(e)
		Pump F (2)	
		Honokowai	638

* See footnotes at end of table.

Ground-water draft, in millions of gallons, from wells in the Territory of Hawaii, 1946--Continued
(Data furnished by owners)

Island of Maui--Continued		Island of Oahu--Continued	
Pump G (4) Hahakea	410	Honolulu Board of Water Supply	
Pump H (3) Kaanapali	930	Kalihi Station (shaft 6)	3,149
Pump L (6) Wahikuli ...		Waialae Station (shaft 7)	188
Pump M (5) Kahoma	1,110	Halawa Station (shaft 12)	2,497
Pump N (10) Olowalu	302	Kaimuki Station (7)	1,482
Pump O (11) Olowalu	50	Teretania Station (88)	3,541
Pump P (12) Ukumehame	160	Kalihi Station (128)	2,246
	8,254		13,103
U. S. Navy Puunene Air Base (shaft 33)	a 43	Honolulu Plantation Co.	
		Pump 1 (185)	g 129
		Pump 2 (196)	689
		Pump 3 (186)	g 1,502
		Pump 4 (197)	1,757
		Pump 5 (189)	1,343
		Pump 6 (Kalauao Spring)	407
		Pump 16 (199-1)	h 1,683
		Pump 21 (shaft 13)	1,230
			8,740
Total	40,604	Honolulu Suburban Water System	
Island of Molokai		Aiea (190-1B)	1
County of Maui Kamakana well	5	Pearl City (shaft 9)	182
Other wells	a 1	Pearl City (202)	91
		Waipahu (241)	143
Total	6	Manakuli (dug well 16)	18
Island of Oahu		Luualualei (shaft 2) 1/2	106
Ewa Plantation Co.		Waialua (well 333)	129
Pump 1 (268)	1,012	Hauula (394)	21
Pump 2 (257)	907	Kaaawa (shaft 10)	33
Pump 3 (264)	2,746		724
Pump 4 (264)	2,424	Kahuku Plantation Co.	
Pump 5 (259)	1,877	Pump 1 (353)	977
Pump 6 (259)	2,362	Pump 2 (341)	2,590
Pump 7 (263)	1,639	Pump 3 (362)	1,940
Pump 8 (270)	742	Pump 5 (352)	2,179
Pump 9E (273)	191	Pump 6 (362-1)	503
Pump 9F (273) a, f	812	Pump 7 (363)	473
Pump 10 (276)	2,397	Pump 8 (357)	375
Pump 11 (276)	1,549	Pump 12 (361)	168
Pump 12 (276)	1,092	Pump 14 (338) a	375
Pump 13 (276)	45	Pump 15 (348)	146
Pump 15) 2,824		Pump 17 (362)	185
) (shaft 3)		Pump 20 (377)	959
Pump 16) 3,122		Pump 23 (387)	156
Pump 20 (dug well 20)	361	Pump 25 (373)	143
Pump 21 (dug well 21)	226	Pump 26 (392)	149
Pump 22 (dug well 22)	316	Pump 27 (396)	608
Pump 23 (dug well 23)	2,361	Mill Pump (355) a	951
Pump 24 (254)	512		12,877
Pump 25	372	Oahu Sugar Co.	
	29,389	Pump 1 (247)	1,709
Hawaiian Electric Co.		Pump 2 (249)	1,406
Wells and tunnel (199-1 and shaft 8)	3,396	Pump 3 (249)	341
Kaluaoopu Spring	2,679	Pump 4 (248)	843
	6,075	Pump 4B (tunnel)	...
		Pump 5 & 5B (274)	1,689

* See footnotes at end of table.

Ground-water draft, in millions of gallons, from wells in
the Territory of Hawaii, 1946--Continued
(Data furnished by owners)

Island of Oahu--Continued		Island of Oahu--Continued	
Oahu Sugar Co.--Continued		Waialua Agricultural Co.--Continued	
Pump 6 (239)	1,579	Pump 7 (324)	1,046
Pump 6B (239)	571	Pump 8 (329)	366
Pump 7 (246)	2,929	Pump 9 (327)	68
Pumps 8 & 8A (Waikele Spring)	1,264	Pump 10 (323)	1,610
Pump 9 (Waiawa Spring)	<u>189</u>	Pump 11 (296)	76
	12,520	Pump 12 (332)	63
Private wells in Honolulu	j 9,170	Pump 13 (328)	83
		Pump 15 (317)	41
U. S. Army		Pump 16 (316)	83
Schofield (shaft 4)	1,973	Mill (319)	<u>2,589</u>
Kahuku air base (339)	a <u>1</u>		16,738
	1,974	Waianae Co.	
U. S. Navy		Puko (dug well 1)	105
Aiea (shaft 5)	2,286	Makaha (dug well 1B)	24
Red Hill (shaft 11)	4,865	Makaha (dug well 2)	2
Barbers Point (shaft 14)	825	Lehano (dug well 3)	54
Aiea wells (187)	164	Kuaiwa (dug well 4)	20
Wahiawa Radio Station (330-2)	85	Fahechee (dug well 5)	43
Moanalua (well 156)	0	Keekee (dug well 6)	25
Pearl City well	739	Pahoia (dug well 7)	21
Ewa junction	a <u>4</u>	Kahoolanako (dug well 10)	19
	8,968	Kamaile (277)	581
Wahiawa Water Company, Ltd.		Shaft 17 (shaft 1)	180
Deep Well (330-3)	13	Makaha wells (277-9)	a <u>72</u>
			1,146
Waialeale Training School		Waimano Home (196-1)	a <u>78</u>
Sunset Beach (337-1 & 2)	a 8	Total	k 122,051
School Pump	a 28		
(337-1 & 2)	<u>36</u>	Grand Total	169,986
Waialua Agricultural Co.			
Pump 1 (321)	477		
Pump 2 (322)	4,433		
Pump 3 (331)	2,791		
Pump 4 (334)	1,643		
Pump 5 (285)	1,133		
Pump 6 (298, 299, and 301)	236		

a Estimated.

b McBryde Sugar Co. not included. Three pumps in Hanapepe Valley and one pump at Lawai Valley pump ground and surface water. It is not possible to separate the ground-water draft from the surface water.

c Of this, 1,131 million gallons was wasted.

d Of this, 719 million gallons was wasted after being used for cooling.

e Abandoned.

f Pumps 9A, B, and C were abandoned in December 1944. Water from wells 273 A, B, C, D, and F now flows directly into a surface-water tunnel and is pumped together with surface water by pump 9F.

h Includes an inseparable amount from Kaluaopuu Spring, obtained from the Hawaiian Electric Co.

i Of this, 72 million gallons was received by Waianae Plantation in exchange for water from mountain tunnels.

j Includes pumpage from wells belonging to military establishments in Honolulu, except for well 156 (Moanalua) which is listed under U. S. Navy.

k Pump 16, Honolulu Plantation Co., not included in Oahu total because it boosts water already listed under Hawaiian Electric Co. well.

NEW MEXICO

INTRODUCTION

By C. V. Theis and C. S. Conover

PROGRAM OF WORK

Investigation of ground-water resources in various areas in New Mexico was continued in 1946 in cooperation with the State engineer of New Mexico. Studies of ground water in New Mexico have been largely confined to areas where it is used for irrigation and have been in progress in certain areas for many years. Published reports on these investigations are listed in Part 1, General discussion, for each county.

Measurement of water levels or artesian head in observation wells constitutes an important part of the ground-water program. A large number of observation wells are measured in January or February each year when recovery from pumping effects of the previous pumping season has taken place and comparison with water levels in former years can best be made. Measurements are also made in selected groups of observation wells at approximately 2-month intervals in order to note seasonal changes 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 magnitude of the effect of artificial withdrawal on the yearly changes in water level.

In all, about 2,637 measurements of water level were made during the year in about 950 observation wells, exclusive of Hidalgo County, and including about 250 measurements of water level made in 32 of the observation wells that were equipped with water-stage recorders for which daily records are presented.

FLUCTUATIONS OF WATER LEVEL

Water levels in 1946 in areas in the southeastern portion of New Mexico, where ground water is used for irrigation, started declining early in the year due to early pumping resulting from the lack of rainfall. Water levels reached their low levels for the year at the end of the pumping season in late August and early September, somewhat earlier than in 1945. Fall precipitation was generally greater in 1946 than in 1945, some months being above normal. This excess precipitation caused a general shortening of the pumping season and contributed some recharge to the ground-water bodies with the result that the net yearly declines for 1946 were less than for 1945. In the heavily pumped areas the water levels by the end of 1946 reached their lowest levels on record, while the water levels in the outlying wells were still somewhat above the previously recorded lows in early 1941. Thus, the large rises in water level that occurred in early 1942, as a result of the excessive rains in late 1941, have been wiped out in the areas of heavy pumping. A few areas in Chaves and Eddy Counties and in Lea County, generally, from Lovington southward to the vicinity of Hobbs, showed net rises in water level for 1946 as a result of the rains in the latter part of the year. However, because of the lateness of the rains, the dry early part of the year, and a general increase in irrigated acreage, the amount of water pumped for irrigation in 1946 was approximately the same as in 1945.

In the southwestern portion of the State the rainfall was not as favorable and caused greater pumping of ground water for irrigation in 1946 in the Mimbres Valley than in 1945 with a consequent greater lowering of water levels.

WELL-NUMBERING SYSTEM

The system of numbering wells in New Mexico, used in all counties except Hidalgo and Sierra, 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 County,

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 located 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 in which no confusion can arise, 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 SW $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$ 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 more accurately locate 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 in the same 10-acre tract.

The following diagram shows the method of numbering the tracts within a section.

111	112	121	122	211	212	221	222
- (1) -	-	- (2) -	-	- (1) -	-	- (2) -	-
113	114	123	124	213	214	223	224
[1]				[2]			
131	132	141	142	231	232	241	242
- (3) -	-	- (4) -	-	- (3) -	-	- (4) -	-
133	134	143	144	233	234	243	244
[3]				[4]			
311	312	321	322	411	412	421	422
- (1) -	-	- (2) -	-	- (1) -	-	- (2) -	-
313	314	323	324	413	414	423	424
[3]				[4]			
331	332	341	342	431	432	441	442
- (3) -	-	- (4) -	-	- (3) -	-	- (4) -	-
333	334	343	344	433	434	443	444

WELL DESCRIPTIONS, RECORDS OF ARTESIAN HEAD, AND WATER-LEVEL MEASUREMENTS

General discussion

Measurements for most of the observation wells in New Mexico are listed under the counties in which the wells are situated. Two groups of measurements--those of artesian head in the Roswell artesian basin and those of water level in the artesian-intake area of that basin--are listed under the common heading "Chaves and Eddy Counties (Roswell Artesian Basin)."

The data for the counties Lea, Luna, Quay, Roosevelt, Sierra, and Torrance, are presented in five parts as outlined below. The data for shallow water-level measurements in Chaves and Eddy Counties are also presented in five parts with the exception of part 1, which covers both counties. Part 2 for the data for water-level measurements in Valencia County is omitted as 1946 was the first year of winter measurements, no comparative readings being available. The five parts are as follows:

Part 1. General discussion.

Part 2. Water levels in January or February 1946, and highest and lowest recorded water levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders.

Part 5. Miscellaneous data concerning observation wells.

Part 1 for each county gives the number of observation wells, the number of measurements made on the wells during the year, the program of work, the amount of precipitation, the amount of pumpage, and a general discussion of the fluctuations of water level during the year. Also given is a list of water-supply papers in which records of water levels in observation wells in the particular county have been previously published. The descriptions of wells are, in general, given in the water-supply paper covering the year in which the record begins (next to last column in Part 2). In the case of a few wells whose records began in the latter part of a year, the descriptions 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 very few cases, the description of a well was published in the water-supply paper for the year succeeding that given in Part 2 for the year when record began.

Part 2 lists the water levels in January or February 1946 for all observation wells, the change since the measurements of the preceding January, and lists for comparison the highest and lowest recorded levels during January in 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, as far as could be determined, except in a few 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 pumping measurement recorded for the present year is lower

than a previous low, then the present year will not be reported as missing until the following year. In some cases a previous year will be reported as missing due to a low reading as a result of the effects of pumping, yet a yearly change will be shown. For wells having water-stage records, the highest and lowest reported levels were taken from the recorder record for the month of January, when available, except in Torrance County where the levels for February were used. However, for the wells equipped with water-stage recorders, 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 Part 2 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.

This part of the report shows in clear form 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 pumping 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. Only the last name of the owner is given in Part 3, but the full name may be found 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 automatic water-stage recorders are maintained. These show the day-to-day fluctuation of 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 changes in ownership, descriptions of new wells and measuring points, and a few miscellaneous water-level records that do not conform to the other tables. Reference to Part 5 and to other parts is given in column 3 in Part 2.

In the following data on New Mexico, except for Hidalgo County, eight standard footnotes have been employed as follows:

- 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.

Records of mean monthly and mean annual artesian head in the Roswell basin are expressed as water level in feet above mean sea level. All other measurements are given in feet below a precisely established land-surface datum which approximates closely the land surface at the well. Where measurements are made from a measuring point from which the tape cannot hang vertically, the correction to apply to the tape reading to reduce it to the land-surface datum is stated in the description of the measuring point; whereas, if the tape hangs vertically throughout the whole length, the distance of the measuring point above the land-surface datum is stated in its description.

CHAVES AND EDDY COUNTIES (ROSWELL ARTESIAN BASIN)

By C. S. Conover

Part 1. General discussion

The program of maintaining records of water level and artesian head in the Roswell artesian basin was continued in 1946 in cooperation with the State engineer of New Mexico. Most of the Roswell artesian basin is in Chaves County, but a considerable part lies in northern Eddy County.

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 of New Mexico. A comprehensive report of the hydrology and agricultural development of the Pecos Vally has been published 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," 1942. Data on artesian head and shallow-water levels have been published in past

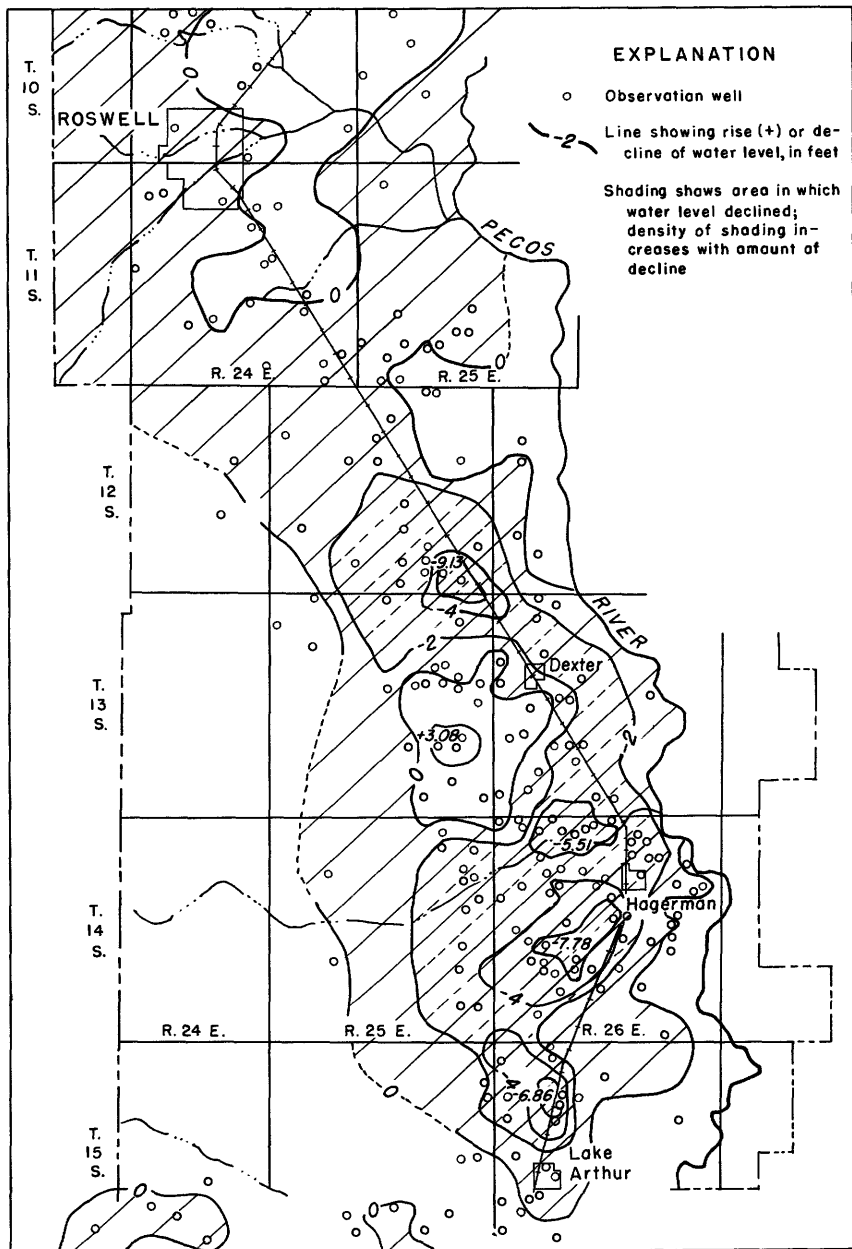


Figure 12.--Map of northern part of Roswell Basin, in Chaves County, N. Mex., showing changes in water level from January 1946 to January-February 1947.

years in Geological Survey water-supply papers as follows:

Year of record	Water-Supply Paper	Page numbers	
		Artesian head	Shallow-water levels
1925-35	777	109-114	.....
1936	817	195-197	.....
1937	840	252-254	.....
1938	845	279-282	.....
1926-38	845	.....	282-300
1939	886	376-378	378-422
1940	911	152-154	154-174
1941	941	186-188	190-212
1942	949	259-262	264-293
1943	991	206-209	210-244
1944	1021	188-199	199-232
1945	1028	207-216	216-240

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

The continuous water-stage recorders on the six artesian observation wells reported in previous years were kept in operation in 1946. The records obtained from these wells were used to compute the mean monthly and mean annual artesian heads, as has been done in previous years. 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 accompanying full-page table the mean 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 1946 to show the change in ground-water storage and the change in recharge to the artesian aquifer. A total of 34 measurements was made during the year on the artesian-intake wells, all of which were made by U. N. Bengé. 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 and rate of recharge.

Shallow wells

In order to show the yearly change in the shallow-water level caused by withdrawals for irrigation and additions by recharge, water levels are measured in a large number of wells once a year, usually in January. Water levels were measured in 401 wells in January 1946, most of which had been measured in January 1945. In order to show the trend of the water table throughout the year, water levels were measured in about 47 of the wells at bimonthly intervals and water-stage recorders were maintained intermittently on 7 of the wells. A total of 733 measurements was made during the year on the shallow wells including 216 measurements made on the bimonthly observation wells and about 116 made on the recorder wells. Of the observation wells 280 are in Chaves County and 121 in Eddy County. All measurements were made by U. N. Bengé.

Precipitation and pumpage

Changes in the amount of precipitation in the Roswell basin affect the water levels by changing the amount of pumping necessary for growing crops and by changing the amount of water that recharges the ground-water body, particularly that in the intake area of the artesian aquifer to the west of the basin. Years of deficient rainfall are characterized by large declines in water levels, particularly during the pumping season.

The precipitation for 1946, as reported by the U. S. Weather Bureau, in the Roswell basin was below normal at all stations although totaling more than in the previous year. The precipitation at Roswell was 78 percent of normal, that at Artesia 89 percent of normal, and that at Carlsbad 88 percent of normal. Precipitation during the growing season, April through September, was about the same percentage of normal as that for the year. The deficiency of precipitation during 1946 was less than the deficiency for 1945 by about 36 percent. In general, the southeastern portion of New Mexico had comparatively large amount of precipitation from August through the end of the year, which, in some areas, shortened the pumping season from a few days to a few weeks as evidenced by hydrographs of some of the recorder wells.

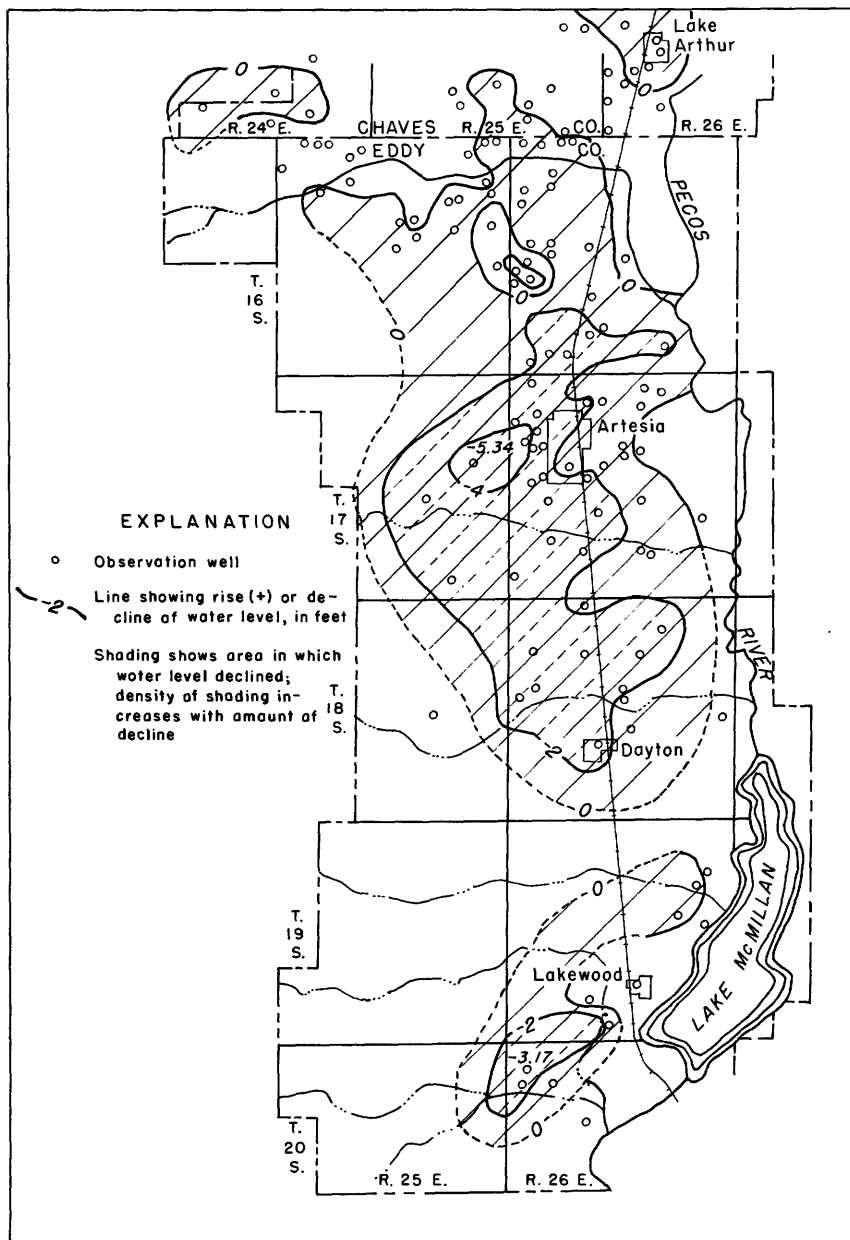


Figure 13.--Map of southern part of Roswell Basin, in Chaves and Eddy Counties, N. Mex., showing changes in water level from January 1946 to January 1947.

Precipitation and departures from normal, in inches, at stations in Roswell basin and vicinity, 1946

Month	Roswell		Hagerman		Artesia		Carlsbad	
	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure	Precipitation	Departure
Jan.	1.15	+0.62	0.34	-0.09	0.45	+0.09	0.84	+0.50
Feb.	.07	-.50	.08	-.28	.00	-.51	T	-.39
Mar.	.53	-.21	.28	-.25	.45	-.19	.36	-.19
Apr.	.34	-.55	.38	-.47	.00	-.98	.33	-.47
May	.28	-.81	.39	-1.70	1.80	+3.33	.87	-.32
June	1.67	.00	....	.....	1.05	-.23	1.10	-.53
July	1.26	-1.00	....	.....	3.14	+1.17	1.72	-.43
Aug.	.94	-1.21	....	.....	1.36	-.17	1.99	+1.19
Sept.	2.93	+8.82	....	.....	.86	-.85	1.13	-.78
Oct.	1.31	-.11	....	.....	1.70	+4.6	2.37	+9.6
Nov.	.36	-.49	....	.....	.53	-.04	.46	-.07
Dec.	.78	+1.2	....	.....	.15	-.43	.55	-.03
Total	11.62	-3.32	....	.....	11.49	-1.35	11.72	-1.56
Apr.-Sept.	7.42	-2.75	....	.....	8.21	-.73	7.14	-2.34

T - Trace.

A preliminary study of the records of power and fuel used in 1946 for 485 wells for which comparable records were also available in 1945 and of the pumpage from 81 rated typical wells indicates that about the same amount of water, both shallow and artesian, was pumped in 1946 as in 1945. There was probably very little change in the total acreage irrigated in 1946 compared to 1945. It is probable, therefore, that about 200,000 acre-feet of artesian water and about 115,000 acre-feet of shallow water were used for irrigation in 1946. The main effect apparently of the excess rainfall in 1946 compared with 1945 was an increase in the amount of recharge, a decrease in amount of pumping in the fall, and in some areas ending of the pumping season a little sooner than usual.

Fluctuations of artesian head and water level

Artesian wells

The mean monthly water levels were lower in January 1946 than in January 1945 in the six artesian wells equipped with recorders. This lowering was smallest in the Berrendo well, 1.04 feet, in the northern portion of the artesian basin, and largest in the Artesia well, 13.76 feet, in the southern portion of the basin. Pumping during the growing season resulted in a gradual lowering of artesian head, with the exception of May, until the low level for the year was reached in August. The mean monthly water levels for August 1946 were the lowest on record for the three southern wells, Orchard Park, Greenfield, and Artesia, which, in the Orchard Park well, was 13.88 feet below the previous monthly low in 1945. Mean monthly levels for August in the three northern wells approached the previous low levels reached in 1940.

The comparatively heavy precipitation following the heavy pumping season caused a faster recovery of the water level in 1946 than in 1945 with the consequent rises as shown in the following table. In the Greenfield well the mean monthly level for September 1946 was 14.83 feet above that in September 1945. The sharp recovery of water level following the pumping season in 1946 nearly offset the low levels occurring at the first of the year so that the mean annual levels for 1946 were generally only slightly lower than for 1945. Even so, record low mean annual water levels were recorded in the Mountain View and Artesia wells, which in the Artesia well exceeded the previous mean annual low of 1940 by 3.70 feet. In the comparison of the mean annual levels it is evident that a much smaller decline occurred during 1946 than during 1945.

Change of mean monthly water levels in artesian wells, for corresponding months, from 1944-45 and 1945-46, in feet

Name	Berrendo	Perrendo-Smith	Mountain View	Orchard Park	Greenfield	Artesia						
Location No.	10.24, 9.530	10.24, 21.212	11.24, 29.242	12.25, 23.110	13.25, 27.211	18.26, 5.330						
Month	1944-45	1944-45	1944-45	1944-45	1944-45	1944-45						
Jan.	-0.99	-1.04	-0.30	-1.66	-0.26	-2.31	-0.43	-2.27	-0.02	-4.61	-2.78	-13.76
Feb.	-1.07	-1.25	-1.57	-1.70	-1.89	-1.97	-5.35	-81	-1.52	-3.35	-4.63	-11.54
Mar.	-1.61	-1.58	-2.23	-1.00	-2.09	-1.33	-5.88	-3.99	-9.95	-1.58	-3.30	-9.60
Apr.	-1.38	-1.55	-1.03	-2.36	-1.35	-2.97	-7.59	-4.98	-2.54	-9.21	-2.20	-10.84
May	-2.22	-1.76	-0.88	-1.74	-0.97	-1.86	-4.19	-4.98	-2.90	-3.89	-1.75	-6.83
June	-1.52	-1.46	-1.43	-0.93	-1.97	-1.36	-9.29	-3.33	-7.84	-5.69	-4.71	-8.04
July	-1.72	-1.24	-2.09	-1.37	-1.57	-1.57	-12.39	-1.77	-13.62	-2.53	-8.04	-8.64
Aug.	-1.28	-2.75	-1.12	-3.32	-2.76	-3.43	-5.38	-13.83	-9.90	-11.25	-6.24	-12.22
Sept.	-3.43	-0.68	-3.63	+2.6	-3.87	-2.9	-13.29	+8.03	-20.10	+14.83	-15.94	-5.39
Oct.	-1.32	+2.77	-1.82	+0.6	-2.69	+4.4	-3.57	+8.66	-6.70	+11.91	-8.84	-6.05
Nov.	-1.86	-2.29	-2.28	-2.82	-2.72	+0.8	-5.63	+6.34	-4.88	+7.98	-7.82	-4.20
Dec.	-1.79	-2.23	-2.06	-1.18	-2.92	+3.3	-5.09	+4.89	-9.62	+8.18	-11.57	+0.6
Year	-1.52	-1.05	-1.68	-1.08	-2.27	-1.27	-6.27	-0.09	-8.31	+0.27	-6.49	-8.07

Mean monthly and mean annual water levels in artesian wells in 1946 and highest and lowest mean annual and mean monthly water levels, in feet above mean sea level

Name	Perrendo	Perrendo-Smith	Mountain View	Orchard Park	Greenfield	Artesia						
Location No.	10.24, 9.330	10.24, 21.212	11.24, 29.242	12.25, 23.110	13.25, 27.211	18.26, 5.330						
1946	Days of record	Days of record	Days of record	Days of record	Days of record	Days of record						
Jan.	31	3570.79	31	3570.98	31	3568.87	31	3537.09	31	3524.45	31	3383.79
Feb.	28	3570.84	28	3570.94	28	3569.04	19	3532.11	28	3516.75	28	3381.97
Mar.	31	3569.20	31	3568.30	31	3566.08	27	3514.25	22	3496.90	31	3375.87
Apr.	30	3566.88	30	3564.38	30	3560.92	30	3499.36	29	3482.57	30	3365.99
May	31	3566.54	31	3565.00	31	3561.09	31	3486.01	31	3486.79	31	3369.23
June	30	3565.76	30	3563.60	30	3559.52	30	3500.61	30	3480.11	18	3362.91
July	31	3564.64	31	3562.62	31	3558.39	27	3496.83	31	3479.39	28	3361.75

* See footnote at end of table.

Mean monthly and mean annual water levels in artesian wells in 1946 and highest and lowest mean annual and mean monthly water levels, in feet above mean sea level--Continued

Name Location	Berrendo	Smith	Ferrendo-	Mountain	Orchard	Greenfield	Artesia					
No.	10.24.9.330	10.24.21.212	11.24.29.242	View 12.25.23.110	Park 13.25.27.211	18.26.5.330						
1946	Days of record	Water level	Days of record	Water level	Days of record	Water level	Days of record					
Aug.	31	3562.12	31	3559.98	27	3554.97	31	3487.83	31	3355.41		
Sept.	30	3564.97	30	3564.13	30	3559.16	29	3497.63	21	3362.74		
Oct.	g 17	3568.63	31	3568.26	31	3565.03	31	3526.86	31	3378.15		
Nov.	30	3569.27	30	3568.48	30	3567.10	19	3541.08	g 30	3384.80		
Dec.	31	3570.26	31	3570.20	31	3568.23	31	3540.97	g 30	3386.89		
Mean annual g 351		3567.48	365	3566.43	361	3563.20	g 322	3516.60	g 353	3501.86	g 321	3372.30
Highest	1942	3571.8	1942	3571.0	1942	3569.6	1942	3528.1	1941	3517.5	1942	3391.9
Lowest	1940	3563.0	1941	3566.2	1946	3563.20	1940	3516.1	1945	3501.59	1946	3372.30
Mean monthly	Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level
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'40	3560.0	Aug'40	3557.9	Aug'40	3553.4	Aug'46	3484.24	Aug'46	3467.83	Aug'46	3355.41
Beginning of record	June 1926		June 1940		July 1940		August 1925		May 1940		April 1931	

g A few days estimated.

Records of artesian head

10.24.9.330. Berrendo well. Maximum recorded daily fluctuation, 1946: Aug. 2, 3.12.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	15.36	14.72	16.34	16.95	19.59	19.89	20.49	21.44	22.53	18.12	16.79	16.09
2	15.41	14.75	16.35	17.06	19.46	19.70	20.69	21.53	22.44	18.02	16.76	16.06
3	15.45	14.73	16.24	17.17	19.34	19.88	21.04	22.56	22.01	17.99	16.86	16.09
4	15.44	14.69	15.94	17.31	19.21	19.47	20.99	22.67	21.80	17.89	16.83	16.04
5	15.44	14.72	16.38	17.40	18.66	19.24	20.80	22.59	21.68	.....	16.72	15.99
6	15.47	14.77	16.50	17.50	18.28	19.48	20.42	22.91	21.57	.....	16.69	15.94
7	15.50	14.69	16.61	17.61	19.07	19.84	20.84	23.27	21.51	.....	16.74	15.91
8	15.44	14.67	15.84	17.54	18.38	20.03	20.64	23.28	22.22	.....	16.74	15.93
9	15.46	14.67	15.76	17.71	18.26	19.76	20.26	23.43	22.15	.....	16.75	15.91
10	15.31	14.64	15.53	17.84	18.26	19.36	20.24	23.41	21.61	.....	16.79	15.87
11	15.29	14.62	15.45	18.01	18.34	19.48	19.89	23.17	21.37	.....	16.81	15.79
12	15.33	14.60	15.48	18.16	18.93	19.51	20.14	23.42	22.16	.....	16.82	15.79
13	15.22	14.63	15.63	18.22	18.87	19.48	20.37	23.68	22.12	.....	16.81	15.82
14	15.16	14.70	15.67	18.26	18.21	19.52	20.20	23.68	22.34	.....	16.63	15.79
15	15.14	14.69	15.64	18.22	18.09	19.69	20.06	23.98	22.20	17.34	16.61	15.73
16	15.09	14.67	15.67	18.32	18.34	19.66	20.30	24.02	22.08	17.31	16.61	15.72
17	15.06	14.67	15.77	18.43	18.56	19.52	20.37	23.89	22.09	.....	16.52	15.77
18	14.95	14.67	15.72	18.53	18.57	19.64	20.45	23.34	20.67	17.24	16.44	15.71
19	14.92	15.68	15.89	18.57	18.53	19.70	20.52	23.28	19.68	.....	16.39	15.69
20	14.89	15.76	15.98	18.83	18.47	19.69	20.41	23.50	19.25	.....	16.33	15.70
21	14.92	15.83	16.08	18.69	18.58	19.57	20.36	23.61	18.98	.....	16.32	15.72
22	14.84	15.87	16.41	18.34	19.02	19.68	20.33	23.09	18.88	17.07	16.32	15.69
23	14.82	15.90	16.53	19.58	19.16	19.44	21.00	22.82	18.76	17.02	16.23	15.68
24	14.79	15.79	16.48	19.67	19.24	19.24	20.91	22.74	18.64	17.01	16.18	15.67
25	14.74	15.76	16.34	19.75	19.12	19.39	20.74	23.34	18.56	16.97	16.18	15.60
26	14.74	15.87	16.64	19.99	19.04	19.52	20.86	22.43	18.61	16.94	16.20	15.54
27	14.74	15.98	16.66	19.74	18.89	19.49	20.94	23.19	18.44	16.94	16.19	15.54
28	14.71	16.17	16.81	19.79	18.97	20.29	20.80	22.28	18.44	16.93	16.13	15.52
29	14.64		16.69	19.60	19.21	20.39	20.63	23.03	18.32	16.89	16.10	15.52
30	14.68		16.86	19.59	19.58	20.69	20.96	22.92	18.20	16.89	16.08	15.51
31	14.73		16.91		20.17		21.20	22.81		16.86		15.48

g Estimated.

10.24.21.212. Berrendo-Smith well. Maximum recorded daily fluctuation, 1946: July 31, 4.21.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.90	9.42	10.88	12.85	14.74	16.33	15.80	18.81	17.54	13.42	11.62	10.56
2	9.90	9.41	10.60	13.49	14.63	15.42	15.91	16.69	17.45	17.35	11.56	10.52
3	9.92	9.39	10.38	13.60	14.65	15.18	16.21	18.99	17.74	13.29	11.59	10.64
4	9.98	9.35	10.28	13.87	14.29	15.55	15.63	19.10	17.70	13.01	11.55	10.58
5	10.04	9.41	10.68	14.08	13.67	15.64	15.50	18.85	17.59	12.95	11.39	10.55
6	9.99	9.39	10.77	14.19	13.56	15.95	15.63	19.38	17.76	12.81	11.35	10.50
7	9.98	9.33	11.17	14.29	13.85	16.32	15.88	19.53	17.53	12.72	11.41	10.44
8	9.90	9.29	11.15	14.06	14.02	16.45	15.87	19.60	17.25	12.65	11.35	10.55
9	9.96	9.28	11.04	14.60	13.80	16.62	16.13	19.63	17.10	12.54	11.33	10.45
10	9.83	9.22	10.73	14.87	13.87	15.42	15.82	19.33	17.27	12.49	11.35	10.50
11	9.81	9.19	10.63	15.03	14.02	16.07	15.63	19.62	16.91	12.50	11.29	10.40
12	9.98	9.25	10.74	15.37	13.78	16.13	16.15	19.31	16.99	12.39	11.30	10.38
13	9.85	9.33	11.04	15.41	13.57	16.27	16.42	20.13	16.82	12.35	11.28	10.37
14	9.72	9.42	11.19	15.18	13.93	16.28	16.45	20.55	17.39	12.31	11.10	10.38
15	9.61	9.43	11.13	14.98	14.12	16.87	16.22	20.67	16.77	12.23	11.09	10.28
16	9.53	9.33	11.25	15.09	14.75	16.26	16.68	20.50	16.59	12.13	11.08	10.25
17	9.53	9.32	11.30	15.32	15.15	16.05	16.77	20.23	16.71	12.07	10.99	10.32
18	9.40	9.31	11.18	15.19	15.30	16.59	16.95	19.37	15.88	12.05	10.93	10.30
19	9.33	9.50	11.52	15.23	15.10	16.43	16.94	19.39	15.23	12.04	10.68	10.25
20	9.32	9.61	11.73	15.87	14.95	16.42	16.75	20.00	14.83	11.94	10.84	10.37
21	9.35	9.75	11.83	15.33	15.10	16.23	16.67	19.73	14.87	11.91	10.81	10.39
22	9.30	9.81	12.50	14.25	15.70	16.37	16.43	19.59	14.51	11.88	10.87	10.32

10.24.21.212--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
23	9.26	10.03	12.53	15.41	15.73	15.39	16.48	19.86	14.38	11.83	10.77	10.33
24	9.25	9.79	12.42	15.29	15.50	15.32	17.52	19.63	14.24	11.79	10.67	10.28
25	9.18	9.73	12.01	15.22	15.63	15.87	17.57	19.24	14.10	11.80	10.63	10.13
26	9.20	10.00	12.67	15.48	15.13	15.51	17.78	19.07	13.97	11.75	10.65	10.07
27	9.17	10.27	12.57	15.32	14.88	15.50	17.84	18.67	13.87	11.73	10.68	10.12
28	9.15	10.56	12.91	15.28	15.27	15.44	17.47	18.62	13.85	11.69	10.64	10.10
29	9.10		12.72	14.83	15.78	15.49	17.13	18.80	13.64	11.68	10.59	10.04
30	9.15		13.15	14.87	16.42	15.85	18.02	18.65	13.48	11.69	10.56	10.01
31	9.37		13.12		15.91		18.26	17.91		11.70		10.00

11.24.29.242. Mountain View well. Maximum recorded daily fluctuation, 1946: June 22, 1.46.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	58.68	57.78	59.24	63.58	66.06	67.53	66.66	70.90	70.58	64.06	60.88	59.32
2	58.66	57.82	59.23	63.95	66.12	66.86	67.18	70.65	70.40	63.91	60.76	59.26
3	58.66	57.73	58.64	64.33	66.20	66.62	67.10	....	70.45	63.76	60.82	59.26
4	58.63	57.65	58.76	64.61	65.71	66.59	67.00	....	70.16	63.36	60.77	59.21
5	58.60	57.72	58.93	64.88	64.77	66.82	66.82	....	70.10	63.27	60.51	59.19
6	58.60	57.75	59.17	65.02	64.85	67.16	67.04	....	69.94	62.98	60.44	59.11
7	58.73	57.69	59.24	64.98	65.33	67.36	66.93	71.76	69.98	62.86	60.38	59.06
8	58.63	57.84	59.44	64.71	65.42	67.45	66.78	71.86	69.40	62.70	60.27	59.15
9	58.73	57.61	59.54	65.53	65.32	67.03	67.31	71.91	69.29	62.53	60.21	59.10
10	58.55	57.53	59.63	65.86	65.40	66.83	67.59	71.89	69.38	62.47	60.24	59.11
11	58.51	57.50	59.47	66.41	65.68	67.56	67.20	71.81	69.13	62.61	60.19	58.96
12	58.82	57.59	59.75	66.56	64.97	67.81	67.52	71.54	68.86	62.29	60.22	58.96
13	58.54	57.70	60.04	66.51	64.68	68.08	67.90	72.09	68.69	62.17	60.08	59.00
14	58.44	57.91	60.26	66.22	65.01	67.95	67.74	72.53	68.44	62.11	59.83	58.95
15	58.36	57.87	60.03	66.04	65.06	67.99	67.54	72.57	67.78	61.96	59.82	58.80
16	58.19	57.76	60.35	66.43	65.28	67.61	68.52	72.53	67.65	61.80	59.93	58.78
17	58.14	57.73	60.53	66.66	65.59	67.31	69.04	72.49	67.85	61.76	59.80	58.93
18	57.94	57.70	60.40	66.73	65.63	67.86	69.57	72.12	67.65	61.71	59.76	58.79
19	57.83	58.00	60.68	66.79	65.33	68.12	69.54	71.92	67.18	61.66	59.70	58.71
20	57.90	58.10	61.14	66.76	65.23	68.17	69.15	72.12	66.62	61.51	59.66	58.76
21	57.95	58.13	61.39	65.71	65.42	68.14	68.63	72.22	66.32	61.46	59.72	58.86
22	57.81	58.36	61.78	65.41	65.69	68.05	68.50	72.31	66.16	61.36	59.78	58.74
23	57.78	58.56	62.20	66.18	66.11	66.58	69.09	72.46	65.97	61.29	59.55	58.71
24	57.80	58.37	62.13	66.35	66.45	66.41	69.51	72.49	65.74	61.24	59.41	58.71
25	57.72	58.29	62.03	66.60	66.68	66.85	69.72	71.94	65.54	61.14	59.43	58.53
26	57.74	58.61	62.41	66.63	65.92	66.87	69.96	71.76	65.30	61.05	59.56	58.44
27	57.73	58.92	62.61	66.52	65.63	66.79	70.06	72.00	65.16	61.04	59.58	58.46
28	57.71	59.04	62.98	65.91	66.42	66.76	69.73	71.89	65.06	61.03	59.49	58.43
29	57.61		63.40	65.62	66.99	66.82	69.45	71.51	64.69	60.98	59.40	58.41
30	57.64		63.76	65.95	67.21	66.79	70.21	71.36	64.26	60.97	59.34	58.36
31	57.85		63.63		67.29		70.41	71.34		60.96		58.33

12.25.23.110. Orchard Park well. Maximum recorded daily fluctuation, 1946: Sept. 3, 6.27.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.27	11.63	23.73	42.06	48.46	46.32	43.12	58.50	53.46	....	....	4.33
2	10.72	11.75	23.92	45.38	48.17	42.68	40.53	59.72	52.24	....	....	4.87
3	10.52	9.57	20.40	46.49	47.27	41.43	41.70	61.02	46.48	....	....	5.18
4	10.45	8.82	20.67	47.91	41.63	43.22	41.32	60.78	45.42	....	....	5.05
5	10.75	8.98	22.25	47.81	39.83	45.03	41.29	61.46	44.12	....	h5.68	6.62
6	10.53	8.38	24.28	46.95	40.15	46.21	42.05	62.35	45.21	....	....	6.16
7	10.13	8.26	25.16	44.79	39.01	45.88	41.03	62.80	45.05	....	....	5.95
8	10.12	8.43	...	45.04	38.98	45.53	40.58	62.26	40.42	....	....	5.28
9	10.50	7.77	....	46.90	38.23	41.82	42.50	63.05	38.55	....	....	4.52
10	9.30	6.60	.....	47.78	38.08	41.79	45.42	62.22	43.60	7.88	....	4.48

h Tape measurement at odd hour.

12.25.23.110--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
11	9.08	6.84	.....	49.40	38.72	45.82	43.09	61.40	44.90	7.58	....	5.75
12	9.45	10.16	29.20	48.87	37.03	47.30	47.27	61.38	44.19	7.50	h4.84	5.86
13	8.82	10.94	29.75	49.28	36.84	47.80	45.87	61.22	41.70	7.68	4.65	5.89
14	7.77	12.14	31.15	44.75	36.98	47.47	44.80	61.05	38.68	8.22	4.50	5.72
15	6.89	13.28	30.00	43.35	37.92	47.32	46.18	63.40	34.88	7.80	4.35	5.12
16	6.17	14.02	30.35	46.27	38.86	43.09	49.37	62.07	32.62	7.73	4.74	5.20
17	6.07	14.08	29.63	46.13	37.84	42.52	50.60	63.96	32.07	7.57	4.96	5.70
18	5.93	13.44	28.82	45.51	38.78	44.74	.....	64.78	31.03	7.33	5.05	5.29
19	6.02	.....	32.55	46.08	35.78	45.43	.....	63.77	30.00	7.37	4.92	5.24
20	6.60	.....	33.00	45.70	35.07	46.45	51.93	64.00	28.92	7.52	4.59	5.28
21	6.56	.....	35.30	41.12	38.15	48.71	49.21	64.96	26.52	7.77	4.80	4.90
22	6.32	.....	35.65	40.30	38.96	47.95	48.63	65.42	25.15	7.92	4.60	4.29
23	6.28	.....	36.94	44.10	40.75	42.17	52.59	64.80	23.67	7.42	4.48	4.31
24	7.00	.....	36.07	47.53	42.78	40.74	51.42	65.29	22.60	7.42	4.30	4.37
25	8.47	.....	34.96	48.23	41.03	42.46	54.70	62.84	21.73	7.32	4.28	3.68
26	9.84	.....	36.29	47.52	40.25	44.22	56.66	62.73	21.07	6.90	4.46	3.62
27	8.13	.....	36.88	44.29	40.28	43.26	57.24	60.82	21.05	6.56	4.36	3.97
28	7.73	23.36	39.70	43.29	42.46	43.12	55.78	56.78	20.40	6.43	4.53	4.07
29	10.23	.....	40.99	43.30	42.39	44.05	54.50	57.12	.....	.....	4.13	4.40
30	10.95	.....	43.20	46.52	45.77	43.49	56.72	58.87	.....	.....	4.84	4.47
31	11.27	.....	43.08	.....	45.63	.....	58.10	57.23	.....	.....	4.06	.....

g Estimated.

h Tape measurement at odd hour.

13.25.27.211. Greenfield well. Maximum recorded daily fluctuation, 1946: Aug. 28, 11.69.

Highest daily water level, in feet with reference to
land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	-0.47	+0.50	-17.60	-32.19	-46.34	-41.69	-35.09	-46.54	.....	-7.96	+5.01	+8.64
2	-2.82	-.24	-16.56	-36.09	-46.37	-39.61	-28.45	-50.86	-43.38	-6.54	+4.79	+7.25
3	-2.09	+7.5	.....	-37.96	-41.24	-38.78	-36.44	-53.21	-35.15	-5.11	+4.89	+5.61
4	-1.48	+1.44	.....	-37.15	-36.18	-40.78	-38.42	-53.71	-39.82	-2.65	+6.52	+5.72
5	-2.27	+1.50	.....	-38.24	-33.04	-41.23	-37.35	-52.90	-37.39	-.56	+6.95	+3.78
6	-1.21	+1.89	.....	-37.31	-32.53	-44.36	-42.01	-53.67	-35.64	+4.46	+6.96	+4.06
7	-.76	+1.25	.....	-34.35	-35.43	-45.49	-40.94	-54.38	-31.46	+8.7	+7.48	+5.09
8	-.18	+1.54	.....	-34.47	-35.90	-42.19	-41.31	-56.11	-27.96	+2.87	+8.34	+6.61
9	-1.06	+3.80	.....	-37.87	-33.37	-39.58	-43.04	-57.83	-26.65	+3.61	+8.52	+7.85
10	-.66	+4.57	.....	-40.31	-34.61	-38.03	-38.49	-57.65	-31.94	+3.84	+8.77	+7.49
11	-.48	+3.12	.....	-42.95	-33.16	-44.83	-37.03	-55.76	-30.45	+4.57	+9.17	+7.70
12	-1.15	-1.93	-22.10	-43.08	-30.64	-46.96	-44.19	-56.16	-31.45	+5.27	+8.52	+7.32
13	+.74	-1.15	-21.82	-37.66	-30.06	-46.37	-43.90	-57.20	-31.85	+5.78	+7.76	+7.38
14	+3.01	-4.03	-22.43	-33.68	-31.14	-46.01	-45.04	-58.35	-29.18	+6.29	+8.81	+10.25
15	+5.64	-6.46	-21.62	-35.33	-27.93	-45.74	-42.13	-58.21	-26.03	+6.54	+8.80	+10.81
16	+6.60	-8.15	-22.49	-40.73	-31.93	-40.31	-43.09	-49.03	-20.89	+6.46	+8.23	+9.88
17	+4.30	-7.68	-23.92	-40.40	-31.98	-39.56	-44.75	-57.97	-20.19	+5.83	+8.30	+10.30
18	+4.87	-7.68	-23.38	-39.87	-33.05	-42.56	-46.44	-55.38	-19.19	+5.74	+8.07	+10.75
19	+3.87	-9.81	-27.79	-40.94	-31.50	-40.95	-42.44	-53.06	-18.52	+5.62	+9.01	+10.61
20	+2.88	-12.20	-28.04	-39.11	-29.81	-45.71	-40.10	-56.31	-16.29	+5.17	+9.24	+9.81
21	+3.56	-10.71	-29.09	-34.45	-32.74	-48.57	-39.19	-58.35	-15.99	+5.34	+8.09	+10.39
22	+4.17	-9.56	-30.44	-33.39	-33.43	-46.48	-37.34	-59.24	-14.79	+5.35	+8.66	+10.58
23	+4.47	-12.41	-29.83	-41.60	-33.18	-37.23	-42.33	-58.30	-14.38	+5.87	+9.07	+10.80
24	+3.15	-12.42	-30.11	.....	-35.97	-35.14	-40.38	-58.13	-13.74	+6.30	+8.70	+11.12
25	+2.31	-13.08	-31.19	-46.35	-31.09	-40.55	-44.76	-57.39	-13.67	+5.58	+9.02	+11.56
26	+1.64	-14.84	-31.06	-46.04	-35.22	-36.17	-47.98	-56.56	-12.91	+6.02	+8.78	+11.58
27	+3.29	-16.93	-29.98	-32.71	-36.43	-37.47	-45.07	-49.66	-12.60	+5.92	+9.04	+11.09
28	+3.69	-18.42	-34.14	-39.83	-35.81	-37.11	-47.84	-41.14	-11.28	+6.12	+8.53	+11.25
29	+2.73	.....	-32.94	-40.22	-39.64	-37.74	-46.80	-42.79	-9.36	+5.34	+8.80	+11.48
30	+2.67	.....	-36.54	-45.66	-41.93	-35.54	-47.87	-50.79	-10.06	+4.82	+7.83	+11.36
31	+2.32	.....	-31.99	.....	-41.17	.....	-49.68	-47.38	.....	+4.90	.....	.....

g Estimated.

18.26.5.330. Artesia well. Maximum recorded daily fluctuation, 1946: July 20, 3.29.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.32	10.10	17.21	24.90	27.15	30.95	29.75	34.80	33.44	.....	11.87	8.14
2	8.60	10.26	16.63	25.93	27.88	29.90	29.23	34.90	33.11	.....	11.69	7.90
3	8.96	10.18	16.30	26.38	27.81	29.22	28.92	35.91	33.20	.....	11.52	7.95
4	9.81	10.00	16.14	26.75	24.05	.....	29.58	35.81	33.88	.....	10.97	8.03
5	10.15	10.22	16.51	27.00	22.26	.....	30.83	35.35	34.11	.....	10.36	7.96
6	10.43	10.44	16.74	27.93	21.65	31.68	31.12	36.37	34.41	.....	9.92	8.14
7	10.86	10.78	17.80	26.88	23.15	32.63	.....	37.44	34.13	.....	9.80	8.01
8	11.04	11.05	17.15	26.14	22.38	32.46	g32.21	38.13	33.49	.....	9.65	7.77
9	11.62	10.16	17.65	27.00	20.43	30.43	32.42	39.02	33.17	.....	9.54	7.56
10	10.96	9.80	17.58	27.40	19.98	30.54	33.21	39.44	34.83	.....	9.46	7.49
11	10.85	9.67	17.76	28.94	19.49	31.52	32.45	38.97	35.36	.....	9.37	7.89
12	11.90	10.00	18.47	29.23	16.79	32.22	35.51	36.49	35.82	.....	9.46	7.67
13	11.46	10.41	18.97	26.87	18.68	32.66	34.55	39.34	36.01	.....	9.31	7.89
14	11.04	11.03	19.43	27.48	19.75	31.90	33.36	39.69	35.47	.....	9.12	7.92
15	10.74	11.33	18.55	26.99	21.33	31.52	32.88	39.70	33.89	.....	9.30	7.69
16	10.46	11.48	18.72	27.13	22.93	31.52	34.41	38.84	32.78	.....	....	7.64
17	10.71	11.05	18.92	28.42	24.01	31.71	35.04	40.29	32.30	14.56	....	7.90
18	10.41	10.62	18.95	29.07	24.58	.....	35.54	40.09	31.67	14.32	....	7.65
19	10.33	11.06	20.18	29.90	24.32	.....	35.79	40.15	30.30	14.02	....	7.34
20	9.91	12.72	20.90	29.53	24.68	.....	33.29	40.21	29.35	13.52	9.13	7.42
21	9.58	13.56	21.48	27.63	25.55	.....	30.24	40.73	29.19	13.20	8.75	7.43
22	9.47	14.40	22.12	26.90	26.16	30.00	29.62	41.56	.....	12.97	8.97	6.92
23	9.61	15.42	22.44	28.03	26.14	29.51	29.55	42.01	.....	12.74	8.74	6.69
24	10.07	14.88	22.01	28.95	27.20	29.71	30.74	42.07	.....	12.66	8.21	6.80
25	10.29	14.35	21.73	29.18	27.99	30.88	31.42	41.31	.....	12.59	7.97	6.24
26	10.98	15.68	21.90	29.38	26.60	31.05	32.12	39.06	.....	12.29	7.74	6.02
27	10.51	16.59	21.51	28.56	26.05	30.86	32.44	37.02	.....	12.07	8.04	6.42
28	10.01	16.79	22.80	26.38	27.60	30.25	31.37	35.52	.....	11.93	8.19	6.64
29	10.09	.....	23.83	27.72	28.41	30.82	30.80	36.15	.....	11.85	8.26	6.62
30	10.28	.....	24.81	27.48	29.81	30.07	32.27	35.54	.....	11.92	8.57	6.56
31	10.83	.....	24.94	.....	30.37	.....	33.49	34.80	.....	12.00	.....	5.92

g Estimated.

Artesian-intake wells

The water levels in the artesian-intake wells, based upon bimonthly measurements, reached their highest levels in March in the three northern wells, Wood, Herbst, and Diamond A, and in January in the two southern wells. The lowest levels were reached in early September, as in 1945, in response to the draft on the artesian aquifer by the artesian wells to the east. The decline from March to September was slightly greater in 1946 than in 1945. Because of the greater precipitation in late 1946 than in late 1945, the rise from September to the first of the year was greater in 1946 than for the same period in 1945, this rise being twice as great in 1946 in the Herbst and Diamond A wells as it was in 1945. The net decline from January 1946 to January 1947 was therefore less than for the previous like period. The average net yearly decline for the four northern wells was about 1.0 foot in 1946 as compared with about 2.6 feet in 1945. Comparable readings are not available for the southern well, Coffin. The net yearly decline for the Wood well was 0.50 foot in 1946 as compared with 2.16 feet in 1945.

Water-level measurements in artesian-intake area,
in feet below land-surface datum, 1946

Name Location number	H. L. Wood	J. Herbst	Diamond A Cattle Co.	D. W. Runyan	C. R. Coffin
	11.22.1.312	12.23.5.320	14.23.8.340	16.23.15.323	19.23.27.111
Jan. 12,22	255.91	235.40	260.25	a213.95	b368.83
Mar. 14,16	a255.46	234.93	259.97	214.21	b372.77
May 15,18	257.35	b256.59	261.22	214.76	b372.69
July 15,20	b258.85	b237.96	.....	a215.59	371.25
Sept. 6,9	1260.23	239.06	263.19	216.45	371.65
Nov. 14,18	257.81	237.33	262.07	215.76	369.33
Change:					
Jan. 45-Jan. 46	-2.16	-2.77	-2.25	j-2.03	.....
Jan. 46-Jan. 47	-.50	j-1.07	-1.04	-1.56	j-3.50

Year of highest and lowest water level and year of
first observed water level, in January

January reading	Year	Water level	Year	Water level	Year	Water level	Year	Water level	Year	Water level
Highest	1945	253.75	1943	228.74	1945	258.00	1945	211.92	1946	368.83
Lowest	1946	255.91	1941	243.33	1941	270.01	1941	225.70	1941	379.30
First year	1945		1941		1941		1941		1941	
Years missing									1945	

a Pumping.

b Pumping recently.

i Windmill removed prior to measurement.

j Influenced by pumping.

Shallow wells

The water table in the Roswell basin from January 1946 to January and February 1947 lowered over most of the area, with three exceptions, where appreciable amounts of shallow water was pumped for irrigation. The water table lowered more than 2 feet under an area of about 117 square miles, more than 4 feet under an area of about 18 square miles, and more than 6 feet under an area of about 3 square miles. These areas are considerably smaller than those in 1945 when the water table lowered more than 2 feet under an area of about 200 square miles, more than 4 feet under an area of about 100 square miles, and more than 6 feet under an area of about 9 square miles. The maximum recorded decline in 1946 of 7.78 feet occurred in a well about 3 miles southwest of Hagerman.

In Chaves County the water table declined more than 2 feet under an area of about 64 square miles, principally in about the same location as previous years, northwest of Dexter and southwest of Hagerman. The water table declined more than 4 feet under an area of about 16 square miles comprised of an area of less than 3 square miles along the railroad, 3 miles northwest of Dexter; about 3 square miles west of the railroad, 2 miles northwest of Hagerman; about 8 square miles centered 2 miles southwest of

Hagerman; and a small area of more than 2 square miles about 2 miles north of Lake Arthur. These areas of decline were nearly separated by an area of rise, west and south of Dexter, in which a maximum recorded rise of 3.08 feet occurred in a well 3 miles southwest of Dexter. In another area of rise, extending northward and southward to the east of Roswell, the maximum recorded rise was about 0.5 foot.

In Eddy County the water table lowered more than 2 feet under an area of about 53 square miles, 48 of which were in an area extending from about 3 miles north of Artesia southward to Dayton and extending generally from the railroad west about 2 to 6 miles. Under a small area of about 4 square miles, about 3 miles southwest of Lakewood, the water table declined more than 2 feet. The water table declined more than 4 feet under a small area of less than 2 square miles about 2 miles west of Artesia. The water table rose under a small area about 4 miles northwest of Artesia.

The smaller areas of decline of water table in 1946 as compared with 1945 and the scattered areas of rise in 1946 were due primarily to earlier ending of the pumping season in 1946 as compared to 1945. As the rainfall is of a showery nature it is probable that some areas received greater amounts and at different times than others. The area of rise in Chaves County, southwest of Dexter, was probably caused by excessive local precipitation although no precipitation record is available. The Howard Amason well, 13.26.7.333, which is equipped with a recorder, located in the northeast corner of the area of rise, showed a rise of 1.69 feet in the period January 1946 to January 1947. On the basis of an incomplete record, the lowest water level in this well in 1946 occurred in late August, about 2 weeks earlier than in 1945, and the rate of rise of water level in 1946 following the low level was somewhat greater than for the same period in 1945.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet

Location number	Owner	See also Part	Water levels			Highest			Lowest			Record	
			Jan. 1946 Day	Change 1945-46	Level	Year	Level	Year	Level	Year	Jan	Feb	Years missing
10.24.8.111	O. S. Stockton	.	41.02	+4.77	40.16	39	45.79	45	38	42.44			
15.342	W. C. Crawford	.	12.01	+1.88	8.82	38	12.99	41	38	39.42, 44			
16.133	G. D. Perrine	.	24.46	-.38	22.85	43	28.70	41	38				
17.111	C. C. Henry and G. P. Mabry	3, 5	38.92	.....	.....	..	.....	..	46			
17.122	Mr. Howard	.	27.35	-1.42	28.58	42	33.67	41	38				
18.424	L. T. Lewis	.	37.90	-1.70	34.32	42	44.50	41	38				
20.344	Clyde Blackwell	5	39.94	.....	.....	42	46.65	41	38	39.45		
22.322	A. B. Carpenter	.	14.21	-.34	11.19	42	19.70	41	38				
27.111	Jack Taylor	.	18.32	-1.07	15.20	42	25.17	39	38				
29.353	Issac Durand	(Measurements discontinued)			32.89	43	41.41	41	38	45.46			
31.444	J. P. Van Winkle	(Measurements discontinued)			15.68	42	25.45	40	38	46			
32.111	J. W. Lewis	5	27.48	.....	.....	..	.....	..	46			
33.244	J. Westover	.	5.67	+1.6	5.35	45	5.83	45	41				
34.333	Elmer Butler	.	4.45	+49	2.67	42	4.94	45	41				
36.222	State of New Mexico	.	2.18	+35	2.18	45	4.15	41	41				
10.25.7.444	(Incorrect designation used previously for well 10.25.18.222, which see)												
17.344	P. E. Cannon	.	6.97	-.65	4.16	42	7.65	41	41				
18.222	J. R. Pendergrass	5	8.39	-.91	3.28	42	8.96	41	41				
19.331	F. C. Smith, Jr.	3	34.40	-2.00	30.76	42	32.58	41	41				
29.222	U. S. Government	.	.....	+1.3	.....	46	3.15	41	41			
11.23.12.221	S. P. Hannifin	5	85.39	-1.81	51.57	45	61.14	40	38	41.42			
11.24.3.312	Dee Priestow	(Measurements discontinued)			4.54	43	16.01	41	39	46			
6.243	J. A. Moore	3, 5	22.71	.....	.....	..	.....	..	46			
6.311	E. B. Wirtz	.	44.24	-1.99	37.61	59	51.87	41	39	40			
6.433	Mr. Watkins	.	35.12	-2.49	28.98	42	41.29	41	38				
6.444	Morrie Huff	.	35.20	-1.93	33.20	43	42.06	41	39				
9.122	Raymond McCutchen	.	32.89	-1.48	27.25	42	34.83	141	38				
10.114	Claude Hobbs	5	20.65	-1.80	16.85	42	26.60	41	40				
10.224	C. E. Smith	3	13.83	-.87	11.69	42	19.61	39	38				
10.321	G. A. Oney	.	25.20	-1.74	23.15	42	28.64	40	38	39			
13.144	Frank Peter	.	.....	.....	.....	42	16.08	43	38	46		
14.513b	J. F. Martin Filling Station	3, 5	31.85	-1.94	27.92	43	38.45	41	38				
15.421	M. L. Barnett	5	34.33	-2.10	30.09	42	41.49	41	38				
15.431	W. L. and S. Barnett	.	35.24	-2.04	31.30	142	42.80	41	38				

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued

Location number	Owner	See also Part	Water levels				Highest Year	Lowest		Be-gan	Years missing	Record
			Jan. 1946 Level	Change 1945-46	Level	Year		Level	Year			
11.24.17.121a	D. H. Johnson	.	85.67	.....	48.96	43	51.15	45	42	46	
18.333	G. V. Coker	.	44.13	-1.98	79.56	43	90.84	41	39			
22.333	John Tweedy	.	12.01	-1.55	40.03	42	52.26	41	38			
23.411a	H. E. Babcock, Jr.	5	13.54	.....	10.35	42	17.34	41	38	45	
23.433	Tweedy Gin	.	16.43	+57	7.60	42	19.80	40	38			
23.433a	do	5	16.43	.....	.....	..	.....	..	46		
28.113	Rocky Arroyo school-house	3	62.10	-2.34	53.52	42	69.20	41	39			
29.333	F. W. Clow	.	84.0	.....	78.91	42	83.59	44	42	45, 46	
29.144	Pelle Hurst	5	79.57	-2.37	69.82	42	85.65	41	38			
29.411	(Incorrect designation used previously for well 11.24.29.144, which see)											
34.411b	Pelle Hurst	5	44.15	-1.39	40.40	43	51.63	41	39	42		
36.133	Wiley Grizzle	.	27.06	-31	25.29	43	36.02	40	39	45		
36.211	Russell Smith	.	18.69	.....	15.44	42	24.88	40	39	45	
36.333	Wiley Grizzle	.	30.22	-53	28.45	42	35.55	39	39	40, 41		
11.25.6.123a	J. P. White Co.	.	14.97	-80	13.26	43	14.97	46	43	44		
6.421a	do	3	6.03	-40	4.44	42	7.13	41	41			
22.333	Mrs. T. E. Whitney	.	7.79	-1.55	5.36	42	7.79	46	38			
29.234	E. Whitney	.	6.62	+78	5.35	42	9.10	41	38			
28.244	R. O. Whitney	.	6.65	+70	4.07	42	7.62	41	38	43		
28.333	Unknown	.	8.98	+13	5.34	44	9.11	45	38	39-43		
29.111	Farmers Incorporated	5	7.75	+88	5.47	39	8.74	43	38			
29.343	Albert Hobson	.	6.44	+1.14	4.39	40	8.33	41	39			
29.444	Glenn Wheeler	4	9.25	-45	4.59	42	11.02	46	38			
30.333	J. P. White & Co.	.	13.18	-58	9.24	42	17.07	40	38			
31.223	Ruby Brown	.	12.53	-09	8.60	42	14.58	41	39			
31.433a	Albert Watson	.	27.85	-1.70	19.85	42	30.98	40	38			
31.433b	do	5	27.67	-1.62	23.60	43	30.68	40	39	42		
32.333	George Fogart	.	25.32	-2.12	16.89	42	26.27	40	38	41		
12.24.13.111	Leora Newman	3, 5	65.83	-1.20	62.36	43	66.83	46	42			
23.441a	Monte Goodin	.	78.64	-1.91	75.53	43	83.95	40	38			
12.25.2.Lot 3	B. F. Heine	5	16.49	-83	9.80	42	16.49	46	38			
2.Lot 4	V. H. Hodges	5	14.34	-76	7.27	42	14.34	46	38			
3.334	J. W. Young	.	29.49	-2.85	21.21	42	29.49	46	38			
7.144a	Olivia Etz	.	40.15	-1.90	37.08	43	45.00	38	39			
9.422	Cumberland Township	3	47.68	-2.67	39.60	42	47.68	46	38			

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued

Location number	Owner	See also Part	Water levels					Record			
			Jan. 1946 Level	Day	Change 1945-46	Highest Level	Year		Lowest Level	Year	Re-gain	Years missing
12.25.13.111	M. F. Colclazier	.	13.15	30	-1.77	11.23	43	18.15	46	39	
16.111	Ernest Nelson	.	32.88	30	-1.70	29.50	45	35.98	41	38	
16.222	State of New Mexico	.	55.20	30	-3.91	42.25	33	55.20	46	38	
22.231	W. T. Clardy	.	77.71	30	-5.48	51.84	39	77.71	46	39	
25.413	Ann E. Freeman	5	32.96	k 1	-4.18	17.90	42	32.96	46	38	40, 41
26.311	J. K. Murphey	.	63.29	k 1	-5.05	40.82	38	63.29	46	38	
27.211	W. T. Clardy	.	72.98	30	-5.34	48.70	39	72.98	46	39	
30.222	Ivy Woodman	.	80.05	30	-.25	78.24	43	81.50	41	38	
33.112	H. D. Wager	.	84.15	31	-4.32	39.09	38	84.15	46	39	41
34.211	Mack Sharp	5	61.50	k 1	-4.32	39.09	38	61.50	46	38	39-41
34.431	Jack Wask	.	59.31	k 1	-4.62	43.14	42	59.31	46	39	
35.111	C. E. Smith	.	53.70	k 1	-5.72	34.00	42	53.70	46	40	
35.131	do	.	56.76	k 1	-6.84	47.14	44	56.76	46	44	
35.311a	H. G. Moberly	.	52	k 1	.....	33.81	42	48.53	45	38	46
35.311b	do	.	e	k 1	.....	33.81	42	48.53	45	38	
35.411a	A. C. Stone	.	55.79	k 1	-6.51	36.42	42	55.79	46	38	
35.411b	do	.	b48.20	k 1	-7.97	40.23	45	48.20	46	45	
36.133	H. Kuykendall	3, 5	39.95	k 1	.....	23.91	42	39.95	46	38	45
36.142	O. E. Ferry	.	(a)	k 1	.....	13.55	42	24.27	45	39	45
36.211	Unknown	.	(a)	k 1	.....	24.55	44	27.01	45	44	46
36.313	M. L. Kuykendall	.	36.70	k 1	-.89	22.34	38	36.70	46	38	42
12.26.7.421	Cecil Johnson	.	2.57	30	+.23	(m)	(m)	5.60	38	38	42
18.221	do	.	a14.39	30	.....	10.87	42	14.19	45	42	
18.221a	do	.	c14.95	30	-.38	14.57	45	c14.95	46	45	
29.333	T. S. Lawing	3	17.98	30	-1.42	14.20	40	17.98	46	39	
30.213	Lowman Wiley	3	23.09	30	-6.02	13.32	42	23.09	46	38	
13.25.1.111	M. L. Kuykendall	5	25.09	k 1	-3.63	12.78	42	25.09	46	38	40
1.331	Will Schaaphok	.	21.18	k 1	-4.45	9.77	42	21.18	46	38	
3.111	Grace Stanley	.	65.42	31	-5.08	45.40	38	65.42	46	38	
5.111	W. H. Felcher	.	62.96	31	+.62	60.70	42	65.30	41	38	44
6.333	R. L. Lowe	.	81.01	31	-.23	78.22	38	82.16	44	38	
8.133	W. H. Jeffries	3	65.73	31	-3.92	59.61	42	70.33	41	39	
10.344	H. W. Reimicke	5	.....	..	.....	57.30	38	66.98	45	38	41, 46
11.111	Kermit Southard	.	51.21	31	-6.53	36.01	42	51.21	46	39	
11.343	J. E. Brockman	.	59.30	31	-6.50	42.21	42	59.30	46	38	
11.433	do	.	50.71	31	-6.98	32.75	42	50.71	46	40	
12.153	M. F. Colclazier	.	(a)	k 1	.....	17.93	42	28.90	41	38	45, 46

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued

Location number	Owner	See also Part	Water levels				Record				
			Jan. 1946 Level	Day	Change 1945-46	Highest Level	Year	Lowest Level	Year	Re- gan	Years missing
13.25.12.311	M. F. Colclazier	.	b37.57	k 1	-13.80	16.23	42	27.99	41	39	
13.1113	W. F. Kerr	.	45.70	31	-4.72	29.95	42	45.70	46	38	
13.1531	Fletcher Bros.	.	45.95	31	-5.56	29.05	42	45.95	46	38	
13.1333	do	.	49.69	31	-7.21	32.76	42	49.69	46	42	
13.233a	W. F. Kerr	.	35.33	31	-3.98	21.05	42	35.33	46	38	
13.233b	do	.	36.23	31	-4.03	22.96	42	36.23	46	38	
13.311	Fletcher Bros.	5	52.59	31	-8.89	32.13	42	52.59	46	40	41
13.433	Mrs. J. W. Weir	.	39.25	31	-4.42	25.54	42	39.25	46	38	
14.131	M. C. Conn	5	65.43	31	-4.65	48.65	42	65.43	46	38	
14.231	William Zappe	.	57.95	31	-5.92	40.12	42	57.85	46	40	
15.311	Rex Richmond	.	80.06	31	.....	68.88	38	80.06	46	38	43, 45
15.422	do	.	66.20	31	-6.29	49.63	42	66.20	46	38	40, 41
17.411	R. Thaman	.	63.15	31	-3.17	55.08	42	63.15	41	39	40, 44
23.111	I. P. Wortman	.	59.99	31	-4.74	51.21	42	65.17	41	38	
24.333	Hal Bogle	.	56.40	31	-4.75	41.34	42	56.40	46	38	
26.211	Belle Hurst	.	63.93	31	-5.61	47.33	42	63.93	46	38	40, 41
26.222	do	.	56.63	31	-4.62	41.42	42	56.63	46	38	
27.111	Hal Rogle	.	(a)	k 1	.....	69.30	38	78.77	45	38	46
27.211b	do	.	72.70	k 1	-2.72	61.95	42	72.70	46	39	40, 41, 44
32.411	William Brashler	3	79.15	25	-.52	77.65	38	85.49	44	38	
34.433a	W. F. Kerr	.	78.78	25	-2.36	61.30	42	78.78	46	38	40, 41
35.311	do	.	(Measurements discontinued; well filled)			57.13	38	70.53	45	38	42, 46
35.311a	W. F. and L. D. Kerr	5	74.70	25	.....	.....	..	.....	..	46	
35.322	W. F. Kerr	5	72.46	25	-5.91	58.73	43	72.46	46	45	
36.421a	R. M. Ware	5	55.44	25	.....	39.00	38	55.44	46	38	41, 45
36.421c	do	5	57.46	25	-4.07	39.79	42	57.46	46	38	
13.26.5.111	R. H. Aston	.	15.33	30	-1.50	7.40	42	15.33	46	39	
5.231a	C. P. Sterrett	.	e16.75	30	.....	11.95	42	17.79	41	38	40, 46
5.231b	do	5	13.61	30	-.81	7.43	42	13.66	40	38	
5.331	W. W. Harris	5	14.53	30	-1.14	13.27	42	16.51	40	38	
7.333	Howard Amason	4	15.69	7	-2.47	f 6.28	42	f 15.83	46	40	
7.433	J. P. Sinn	.	12.89	31	-.19	9.18	42	12.89	46	39	
8.332	G. M. Sterrett	.	5.77	30	+3.18	5.77	46	10.29	38	38	40
14.331	G. C. and H. E. Saunders	3	5.53	25	-2.49	.....	.....	3.33	46	41	
16.114a	U. S. Government (fish hatchery)	.	8.70	30	-.60	8.01	43	10.92	41	38	

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued.

Location number	Owner	See also Part Level	Water levels				Record			
			Jan. 1946 Day	Change 1945-46	Highest Level	Highest Year	Lowest Level	Lowest Year	Be-gan missing	Years missing
13.26, 13.11, 14b	U. S. Government (fish hatchery)	.	5.42 30	-0.14	4.31	43	7.77	40	39	
16.11, 14c	do	.	5.87 30	-.51	5.19	43	7.83	41	39	40
17.321	Leo Nowak	3	11.63 25	-.16	8.90	39	14.24	44	38	
17.443	H. Vandembout	.	13.02 25	+3.31	11.28	42	13.33	45	38	
17.444	do	.	12.60 25	+4.45	11.86	42	14.28	44	38	
18.211	B. A. Armor	(Measurements discontinued)			10.41	43	12.52	45	40	46
18.311	W. F. Ferr	.	21.65 31	-2.11	11.50	42	21.95	41	38	
19.222	A. T. Stone	.	22.83 30	-.55	18.22	39	22.83	46	38	
19.333	Hal Bogle	.	33.32 30	-4.26	20.00	42	33.32	46	38	44
19.343	do	.	27.68 30	-3.63	16.15	42	27.68	46	38	
19.432	Tom Bogle	.	14.94 30	-1.65	6.19	42	14.94	46	38	
20.113	A. T. Stone	.	23.20 30	-1.39	17.25	42	23.20	46	38	
20.333	Mrs. O. W. Lockhead	.	6.77 25	-.12	10.39	42	14.86	44	38	46
23.111	G.C. and H.E. Saunders	5	13.98 25	+4.52	9.66	42	6.77	46	38	
28.121	Geo. Grassie	3	16.33 25	+1.17	14.82	39	20.79	41	38	42
28.221	Hal Bogle	5	6.90 25	+3.02	6.90	46	10.84	41	38	
28.311	Joe Giles & Anna Heinzel	5	10.84 30	+3.08	10.42	39	15.19	44	38	
29.111	J. H. Reid	.	b17.40 30	+3.17	9.67	39	15.72	40	39	42, 45
29.113	do	.	11.30 30	.....	13.39	42	17.60	44	38	46
29.211	do	.	11.30 30	-.88	7.22	39	14.55	43	38	41
29.333	M. Y. Monfcal	.	17.19 25	-1.25	11.04	42	17.19	46	38	
29.424	do	(Measurements discontinued; well filled)			6.80	42	12.73	41	40	46
31.241	Hal Bogle	.	17.86 25	-3.26	6.03	42	17.86	46	38	
31.311	E. O. Moore	.	52.98 25	-7.00	35.30	38	52.98	46	38	
33.421	E. P. Malone	.	16.17 25	+1.31	15.62	42	18.14	44	38	
34.313	Elton Lanford	.	9.36 25	+4.86	8.28	39	10.76	44	38	
34.431	Mrs. Elizabeth Cole	.	ae43 25	.....	22.08	45	32.79	44	41	46
14.25.1.112	P. R. Fuller	.	e49 24	.....	25.87	36	42.15	45	36	46
1.343	A. W. Langnegger	.	65.90 24	-5.77	43.20	38	65.90	46	38	40
1.344	do	3, 5	b61.56 24	-5.40	36.04	36	b61.56	46	36	
2.233a	L. T. Lewis	.	71.74 24	-5.82	52.13	42	71.74	46	40	
2.431	J. V. Thomas	.	84.50 24	-5.69	67.69	43	84.50	46	43	
2.444	do	.	71.17 24	.....	48.50	38	71.17	46	38	41, 45

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued.

Location number	Owner	See also Part	Water levels					Record			
			Jan. 1946		Change		Highest				
			Level	Day	1945-46	Level	Year		Lowest	Year	
14.25.8.411	Ray Mathes	.	95.58	24	-0.38	93.24	42	95.58	46	39	
11.333	do	.	(a)	24	.....	79.83	42	92.24	45	42	46
12.133a	C. H. Whitman	.	80.50	24	-5.76	60.82	42	80.50	46	42	
12.133b	do	.	80.83	24	-5.54	58.17	38	80.83	46	38	
12.313	L. T. Lewis	.	84.15	24	-5.71	60.75	38	84.15	46	38	41
12.314	do	.	81.72	24	-5.68	71.35	44	81.72	46	44	
13.213	Calvin Graham	.	78.83	23	-5.73	59.54	42	78.83	46	42	45, 46
13.311	E. O. Moore	.	85.54	23	-5.16	80.38	38	75.74	44	38	
13.311a	do	.	(a)	24	.....	94.52	39	85.54	46	45	
14.131	Ray Mathes	.	75.46	23	-5.53	71.46	35	96.20	45	39	46
20.443	Freeb Hurst	3	76.24	23	-4.22	56.73	38	75.46	46	33	
24.133	F. O. Moore	.	76.24	23	-3.74	76.24	46	76.24	46	38	
25.111	J. M. Norris	.	73.98	20	-4.00	56.05	32	73.98	46	33	
25.111a	do	.	71.92	20	-4.00	59.92	43	71.92	46	43	
25.221	do	4	59.44	23	-4.60	24.50	26	59.44	46	26	27-37
36.111	C. H. Foster	.	65.04	20	-3.24	55.69	45	65.04	46	42	
36.211	do	.	69.03	20	-4.01	60.33	44	68.03	46	44	
14.26.3.111	Flores West	.	12.40	23	+1.24	12.03	39	14.28	44	33	40, 41
3.243	Mary Brown	.	12.65	24	-4.20	12.45	45	12.65	46	45	
3.413	Howard Venefee	.	9.05	23	+3.30	8.35	39	10.33	44	38	
3.442	John Langnegger	5	16.66	23	+6.68	16.10	38	18.90	44	38	
4.133a	W. F. Jacobson	.	19.52	24	+1.80	18.43	39	20.69	44	38	
4.141	Roy Lockhead	5	19.15	24	+1.80	18.47	39	21.61	44	38	
4.231	C. E. Wade	.	16.53	24	+1.43	15.52	39	13.54	44	38	
5.131	L. M. Harter	.	28.67	24	-1.42	21.70	42	29.67	46	38	
5.211	M. P. Menoud	.	24.68	24	+4.16	22.00	42	25.46	44	38	
5.243	J. D. S. McKinstry	.	21.25	24	+4.45	22.00	39	22.23	44	38	
5.433	D. L. Newsom	5	29.63	24	+6.97	25.62	38	29.55	45	33	41
6.111	Wiley Grizzle	.	33.61	24	-5.80	16.30	38	33.61	46	38	46
6.142	W. L. Heitmann	.	.....	.	.....	19.77	42	25.11	45	40	
6.211	Wiley Grizzle	5	33.01	24	-3.46	18.54	38	33.01	46	38	
6.232	Tom Andrews	.	37.95	24	-3.63	26.82	42	37.95	46	40	
6.241	do	.	32.43	24	-1.62	23.80	38	32.43	46	38	42
7.443	W. W. Adams	3	55.75	23	-4.60	30.95	36	55.75	46	36	
8.112	G. L. Truitt	.	55.43	24	-4.06	21.80	35	55.43	46	38	
8.243	P. Flores, Jr.	.	54.76	24	-4.18	19.53	38	34.76	46	38	

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued

Location number	Owner	See also Part Level	Water levels										Record	
			Jan. 1946		Change 1945-46		Highest		Lowest		Be-	Years		
			Level	Day	1945-46	Level	Year	Level	Year	gan			missing	
14.26.6.312	N. C. Newsom	.	60.93	24	-6.20	41.54	42	60.93	46	42				
8.435a	Tom Ferguson	.	63.05	23	-7.78	35.82	36	63.03	46	36		44		
9.143	V. R. Barnett	.	29.55	24	+4.29	26.06	39	30.18	40	38				
9.434	Cave Bros.	.	17.18	24	.....	8.35	38	17.18	46	38		45	
9.442	Oscar Cave	.	15.08	23	+0.09	12.25	42	15.64	44	38		41		
10.121	Mrs. Levi Barnett	.	13.36	23	-0.74	12.22	39	14.91	43	38				
10.221	John Langnegger	.	11.32	23	+1.61	10.88	42	13.35	44	42				
10.244	do	.	11.51	23	-0.82	10.69	45	14.14	43	38				
11.111	do	.	14.52	23	+4.48	14.52	46	17.18	43	39				
11.121	H. A. Kiper	.	15.34	23	+5.1	15.13	39	16.85	41	38		43		
11.322	Marie Stewart	5	8.76	23	+1.02	8.76	46	13.59	44	38		41		
11.444	W. E. Utterback	.	10.92	23	-0.24	9.43	42	11.24	41	38				
12.131	do	3	22.02	23	-0.03	20.98	42	22.02	46	38				
12.453b	W. N. Olive	.	15.85	23	+3.4	12.50	42	16.88	41	40				
13.121	L. M. Lang	.	16.65	23	+0.27	14.30	42	17.50	41	38				
14.212	B. L. Barnett	.	25.24	23	-12.56	11.36	42	13.40	41	40				
14.421	Jim Michelet	.	13.28	23	-0.47	10.49	43	13.28	46	43				
14.441	do	.	15.48	23	-0.45	10.04	42	15.48	46	38				
14.445	Unknown	.	12.82	23	-0.22	11.22	44	12.82	46	44				
15.115	State of New Mexico	.	15.68	23	+0.85	13.40	42	18.15	41	38				
15.322	F. H. Evans	3, 5	9.61	23	-0.87	5.55	42	9.61	46	42				
15.333	E. D. Mercout	.	24.44	23	-0.32	16.42	38	24.44	46	38				
17.122	R. A. and T. A. Fledsoe	3	.....	..	.....	40.46	42	56.04	45	42		46
17.211	William Salomon	.....	.....	.....	.....	40.97	42	55.33	44	38		45, 46
17.211a	do	(Measurements discontinued)	62.34	23	-7.24	55.10	45	62.34	46	45				
17.444	Pearson Bros.	.	58.98	23	-5.81	38.42	38	58.98	46	38				
18.113	R. G. Campbell	5	70.65	23	-5.97	50.57	39	70.65	46	39				
18.131	William Cooke	5	70.54	23	-5.94	50.83	42	70.54	46	42				
18.131	William Cooke	5	65.50	20	.....	39.68	38	65.50	46	38		45	
19.211	Pearson Bros.	5	73.55	20	-6.93	48.05	38	73.55	46	38				
19.242	Oscar H. Pearson	4, 5	56.48	20	-5.27	36.12	38	56.48	46	38				
19.311	W. C. West	.	72.53	20	-4.93	49.10	38	72.53	46	38				
19.444	F. E. Lane	5	73.21	20	.....	48.15	38	73.21	46	38		45	
20.145	Pearson Bros.	.	.....	..	.....	64.36	42	73.34	44	40		45, 46
20.334	E. Langnegger	.	81.15	20	-6.45	56.26	38	81.15	46	38		41		
20.345	do	.	.....	..	.....	56.26	38	81.15	46	38		44
21.333	G. E. Wade	5	51.20	20	.....	33.38	42	51.20	46	38		44, 45	

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued.

Location number	Owner	See also Part	Water levels					Record					
			Jan. 1946 Level	Day	Change 1945-46	Highest Level	Lowest Level	Year	Years missing				
14,26,21,422	A. L. Nail		(Measurements discontinued; well filled)					14.52	38	22.89	45	38	46
22,141	J. E. Lusk	.	b30.28	23	-1.37	21.66	42	b30.28	46	38			
23,131	F. A. White	.	13.35	23	-1.00	6.39	42	13.35	46	38			
23,214a	F. E. Pilley	.	14.76	23	-.80	13.96	45	14.76	46	45			
23,415	E. A. White	.	14.95	23	-1.20	8.99	42	14.95	46	42			
27,111	J. L. Ogle	.	15.65	20	+1.05	8.43	42	17.21	40	38			
27,424	M. C. Brown		(Measurements discontinued; well filled)					22.97	44	24.29	45	44	46
27,424a	do	5	25.57	20	.....	.....	..	.....	..	46		
28,111	William Langegger	5	49.41	20	-2.45	32.52	42	49.41	46	42			
28,114	do	5	44.80	20	-3.22	29.85	42	44.80	46	38	41		
28,211	L. T. Lewis	.	35.88	20	-3.82	24.18	42	35.88	46	38	41		
28,423	do	.	21.23	20	-1.26	14.14	42	23.89	43	42			
28,112	P. E. Stokes	.	84.23	20	-6.35	58.80	38	84.23	46	38	40, 41		
29,215	do	.	74.58	20	-6.56	49.52	38	74.58	46	38			
29,441a	J. W. Wiggins	.	51.50	20	-5.04	32.25	38	51.50	46	38	41		
29,441b	do	.	51.16	20	-4.87	31.20	38	51.16	46	38			
32,131a	B. F. Knoll	.	70.33	20	-5.72	53.09	43	70.33	46	42			
32,331	P. E. Spencer	3	44.73	19	-3.53	32.85	38	44.73	46	38			
35,344	J. Q. Mitchell	3, 5	a69.09	19	-1.17	65.68	45	a69.09	46	41			
15,24,23,344	Carroll Jackson	.	a67.35	19	-1.45	66.09	39	a67.35	46	38			
27,344	S. A. Lanning	.	58.49	19	+9.5	58.49	46	61.75	38	38			
28,244	State of New Mexico	.	a97.19	19	-6.49	88.62	39	92.30	41	38	43		
32,211	Carl Mangum	3	a39.61	19	-1.98	37.63	45	50.72	41	40			
34,341	S. A. Lanning	.	34.95	18	-3.15	30.58	39	38.82	42	38	41		
35,145	E. P. Malone	.	b21.98	18	+2.14	16.51	44	27.70	38	38			
36,243	State of New Mexico	.	(a)	18	.....	37.67	42	41.88	45	38	46	
15,25,12,111a	Jack Palmer	.	45.20	19	-2.53	35.64	42	45.20	46	38			
12,212b	Unknown	.	49.60	19	-3.66	41.92	44	48.60	46	44			
12,421	C. H. Foster	.	51.34	19	-4.16	41.66	44	51.34	46	44			
24,111	Hal Bogle	.	13.20	19	+1.04	12.06	42	14.30	44	38			
24,211	do	5	16.52	19	-.97	7.65	42	16.52	46	38	41		
26,423	R. T. Spence	.	4.94	19	+1.02	5.96	42	5.96	45	42			
27,321	Pearson Bros.	.	25.34	19	-4.42	17.50	42	35.93	44	38			
28,331	T. C. Sexton	.	34.23	19	-6.59	27.64	45	34.23	46	38	40, 41, 43		

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued

Location number	Owner	See also Part	Water levels										Record	
			Jan. 1946		Change 1945-46		Highest		Lowest		De-	Years		
			Level	Day	Level	Year	Level	Year	Level	Year				
15.25.28.331a	T. C. Sexton	.	32.71	19	-6.23	26.48	45	32.71	46	44				
33.112	Carroll Jackson	.	24.18	19	-4.54	11.18	42	24.18	46	38	39			
35.111	W. M. Spence	3	29.56	19	-3.03	15.51	42	29.56	46	38				
35.311	Paul Robinson	.	.....	.	.....	28.85	42	37.97	41	38	40, 46
35.311a	Z. C. Robinson	5	29.05	19	.....	.....	..	.....	..	46	
36.333	J. M. Norris	.	29.52	18	-1.60	24.20	42	29.52	46	39	40, 41, 43			
36.333a	do	(Measurements discontinued; well filled)				23.20	42	28.02	45	42	46			
15.26.4.444	Harry Cowan	3	39.43	19	-2.35	33.14	42	39.43	46	40				
5.121	P. F. Spencer	3	50.66	19	-2.91	34.80	38	50.66	46	38				
5.142	A. Russell Estate	.	43.04	19	-4.58	25.55	43	43.04	46	38				
6.311	Calvin Graham	.	42.79	19	-2.27	28.66	38	42.79	46	38				
7.312	C. H. Foster	.	46.10	19	-4.26	36.25	44	46.10	46	44				
8.411	E. M. George	.	22.73	20	-.89	16.08	44	22.73	46	44				
8.413	do	.	22.48	20	-1.13	15.53	44	22.48	46	44				
9.133	do	.	22.09	20	-1.37	16.68	42	22.42	41	40				
14.222	Freeb Hurst	.	6.95	19	-.40	2.38	42	6.95	46	41				
17.211	E. M. George	.	20.76	19	-3.65	12.06	44	20.76	46	44				
18.112	R. T. Spence	.	39.92	19	-3.69	31.29	44	39.92	46	44				
19.211	Lake Arthur Cemetery	3	35.35	19	-1.96	23.87	42	35.35	46	42				
19.442	J. F. Frazier	.	12.44	19	-1.56	5.47	42	12.44	46	38				
20.144	J. W. Webb	.	27.53	19	-2.05	19.30	42	27.53	46	38				
20.431a	Unknown	.	18.69	19	-1.75	16.94	45	18.69	46	45				
29.111	E. C. Jackson	.	7.14	19	+.26	3.68	42	8.01	41	38				
30.131	Paul Robinson	.	7.67	19	-1.39	2.10	40	7.72	43	39	42			
30.224	1st Nat'l Bank, Artesia	.	11.45	19	-.92	6.27	42	11.45	46	38				
30.411	J. P. Crook	.	15.07	19	-.39	13.35	43	15.07	46	43				
31.111	E. J. Cromo	5	13.47	19	-.24	9.55	42	13.73	41	38				
31.333	R. E. Spencer	.	13.15	18	-.17	15.12	42	13.15	46	42				
32.231	Mrs. H. C. Evans	5	9.44	19	-.10	7.70	42	9.64	40	38				

a Pumping.

b Pumping recently.

c Dry at depth given.

f From recorder chart.

i Also 1940.

j Also 1943.

k February.

m Flowing in 1939, 1940, 1941.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946

Location number	10.24. 17.111	10.25. 19.331	11.24. 6.243	11.24. 10.224	11.24. 14.313b	11.24. 28.113	12.25. 6.421a	12.24. 13.111
Owner	Henry and Mabry	Smith	Moore	Smith	Martin Filling Station	School	White	Newman
Jan. 26, 28-30	38.92	a34.40	22.71	b13.83	31.85	b62.10	6.03	a65.83
Mar. 12-14	39.68	33.82	24.03	18.30	37.92	61.69	8.09	a66.29
May 14,15	41.80	a35.58	27.66	23.81	.....	66.74	8.00	b71.27
July 11	43.97	a34.89	30.12	25.21	.....	.....	9.96	b72.16
Sept. 4,5, 6	.....	a36.99	30.89	27.23	.....	72.41	9.55	a79.39
Nov. 13,14	41.02	a34.26	(1)	b15.14	33.67	b66.64	5.68	a69.20
Location number	12.25. 9.422	12.25. 35.411a	12.26. 18.221a	12.26. 29.333	13.25. 8.133	13.25. 11.433	13.25. 32.411	13.26. 14.331
Owner	Town- site	Stone	Johnson	Lawing	Jeff- ries	Brock- man	Brash- ler	Saun- ders
Jan. 25, 29-31	47.68	.....	c14.95	17.98	65.73	50.71	79.15	3.33
Feb. 1	.....	b48.20	.....	.....	.....	.....	.....	....
Mar. 12, 13,15	47.27	b59.64	c14.57	15.68	68.32	56.58	79.21	2.41
May 14-16	50.06	a79.13	c14.42	16.90	74.33	.....	79.24	7.04
July 11,12	51.43	c69.04	c15.25	17.54	76.80	.....	79.32	c17.98
Sept. 5-7	52.73	c68.31	15.51	17.03	78.50	.....	80.18	8.16
Nov. 13-15	51.09	56.07	15.48	16.90	70.76	.....	79.40	3.50
Location number	13.26. 17.321	13.26. 28.121	14.25. 1.344	14.25. 20.443	14.26. 7.443	14.26. 12.131	14.26. 15.322	14.26. 15.333
Owner	Nowak	Gras- sie	Lang- negger	Hurst	Adams	Utter- back	Evans	Menoud
Jan. 23-25	11.63	16.33	b61.56	75.46	55.75	22.02	9.61	24.44
Mar. 13,15	10.76	15.64	61.74	75.55	55.81	21.81	8.44	26.33
May 16	a19.01	21.71	72.29	75.59	54.00	21.40	9.95	29.28
July 12,13	b18.29	b21.67	66.68	75.37	j47.56	21.34	10.30	30.74
Sept. 7	b14.46	b23.99	72.02	75.29	.....	21.34	12.57	34.43
Nov. 15,16	b16.40	b18.74	67.23	74.87	51.52	21.51	11.23	29.53
Location number	14.26. 32.331	14.26. 35.344	15.24. 32.211	15.25. 35.111	15.26. 4.444	15.26. 5.121	15.26. 19.211	
Owner	Spen- cer	Mitch- ell	Mangum	Spence	Cowan	Spen- cer	Cemetery	
Jan. 19	44.73	a69.09	a39.61	29.56	39.43	50.66	35.35	
Mar. 15,18	45.78	69.23	a41.10	29.08	39.58	50.84	35.49	
May 16,17	47.18	69.24	b41.58	30.60	40.20	51.12	(a)	
July 13	46.30	69.46	42.68	31.94	40.80	51.35	36.85	
Sept. 10	47.67	69.83	a43.61	32.39	41.62	51.53	37.86	
Nov. 16,19	58.66	70.05	a41.35	b31.39	40.20	51.69	36.41	

a Pumping.

b Pumping recently.

c Nearby well pumping.

i Measurements discontinued after Sept. 5, 1946; well plugged.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

11.25.29.444. Glenn Wheeler.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	10.61	8.83	9.92	7.88	.....	.....	11.71	12.58	.....	9.67	....
2	10.97	8.82	9.66	7.56	.....	.....	.....	12.36	12.84	9.67	....
3	11.18	8.81	9.13	7.56	.....	.....	.....	12.41	11.75	9.69	....
4	11.24	8.80	8.89	7.60	.....	.....	.....	12.07	11.17	9.65	....
5	11.13	8.84	8.88	.....	.....	11.65	.....	11.68	10.74	9.45	....
6	11.12	.....	8.93	.....	.....	11.27	.....	11.63	10.55	9.23	....
7	11.09	.....	8.96	.....	.....	11.04	.....	.....	10.37	9.09	....
8	11.02	.....	.....	.....	.....	10.97	10.15	.....	10.27	.....	....
9	11.06	.....	.....	.....	.....	11.14	10.16	.....	10.22	.....	....
10	10.93	.....	.....	.....	.....	11.38	10.59	.....	10.20	.....	....
11	10.79	.....	.....	.....	.....	11.35	10.55	12.14	10.15	.....	....
12	11.02	8.77	8.96	.....	.....	11.40	10.88	12.19	10.11	.....	9.55
13	10.75	8.82	9.05	.....	11.12	.....	11.09	12.23	10.04	.....	9.52
14	.....	8.87	9.23	.....	10.67	.....	11.20	12.34	9.99	.....	9.48
15	.....	8.82	9.70	.....	10.55	.....	.....	12.38	9.91	.....	9.48
16	.....	8.80	9.80	.....	10.52	.....	11.26	12.53	9.88	.....	9.56
17	9.87	8.80	10.22	.....	10.49	.....	11.25	12.57	9.87	.....	9.60
18	9.67	8.76	10.67	.....	10.85	.....	11.41	12.70	9.89	.....	9.58
19	9.57	8.77	10.43	.....	10.71	.....	11.41	12.72	9.90	.....	9.58
20	9.46	.....	.....	.....	10.88	.....	11.60	12.73	9.71	.....	9.60
21	9.40	.....	.....	.....	10.97	.....	11.77	12.74	9.70	.....	9.62
22	9.23	.....	.....	.....	.....	.....	11.88	12.60	9.74	.....	9.69
23	9.20	.....	.....	10.10	.....	.....	11.44	12.52	9.84	.....	9.65
24	9.07	.....	.....	9.96	.....	11.59	11.34	12.44	9.79	.....	9.61
25	8.97	.....	.....	9.93	.....	11.12	.....	12.34	9.75	.....	9.49
26	8.96	.....	.....	10.09	.....	10.95	.....	12.15	9.71	.....	....
27	8.86	.....	.....	10.03	.....	11.14	.....	12.14	9.71	.....	....
28	8.84	9.81	9.15	10.19	.....	11.36	.....	12.31	9.74	.....	....
29	8.82	.....	9.05	10.18	.....	11.56	.....	.....	9.73	.....	....
30	8.87	.....	8.58	10.16	.....	11.70	.....	.....	9.69	.....	....
31	8.84	.....	8.22	.....	.....	.....	.....	.....	.....	.....	....

h Tape measurement at odd hour.

13.26.7.333. Howard Amason.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	15.85	14.81	15.36	16.82	17.66	.....	.....	18.56	.....	.....	.....	.....
2	15.82	14.78	15.34	16.86	17.72	.....	.....	18.56	.....	.....	.....	.....
3	15.81	14.71	15.31	16.90	17.80	.....	.....	18.58	.....	.....	.....	.....
4	15.77	14.65	15.26	16.95	17.86	.....	.....	18.64	.....	.....	.....	14.31
5	15.72	14.60	15.23	17.03	17.93	17.41	.....	18.72	19.32	.....	14.41	14.31
6	15.69	14.57	15.21	.....	17.90	17.41	.....	18.81	19.16	.....	14.42	14.26
7	15.68	14.55	.....	.....	17.90	17.42	.....	.....	19.07	.....	14.41	14.21
8	15.66	.....	.....	.....	.....	17.42	17.90	.....	18.91	.....	14.41	14.15
9	15.63	.....	.....	.....	17.88	17.43	17.89	.....	18.90	.....	14.41	14.08
10	15.62	.....	.....	.....	17.80	17.43	17.88	.....	18.70	.....	14.40	14.00
11	15.60	.....	.....	.....	17.70	17.43	17.88	.....	18.62	.....	14.39	13.93
12	15.60	14.56	15.49	.....	17.58	17.50	17.88	.....	18.59	.....	.....	.....
13	15.59	14.56	15.52	.....	17.47	.....	17.92	.....	18.55	.....	.....	.....
14	15.56	14.58	15.60	.....	17.41	.....	17.92	.....	18.55	.....	.....	.....
15	.....	14.62	15.68	.....	17.37	.....	17.91	.....	18.51	.....	14.35	.....
16	.....	14.65	15.73	.....	17.32	.....	17.91	.....	18.46	14.72	14.35	.....
17	15.45	14.69	15.81	.....	17.27	.....	17.93	.....	18.32	14.65	14.35	.....
18	15.40	14.72	16.00	.....	17.21	.....	17.96	.....	18.24	14.60	14.35	.....
19	15.36	14.74	16.10	.....	17.15	.....	17.99	19.49	18.16	14.56	14.34	.....
20	15.33	14.79	16.21	.....	17.08	.....	.....	19.50	18.07	14.53	14.33	.....
21	15.30	.....	.....	.....	17.01	.....	.....	19.54	.....	14.49	14.32	.....
22	15.25	.....	.....	.....	16.96	.....	.....	19.59	.....	14.48	14.32	.....

g Estimated.

h Tape measurement at odd hour.

13.26.7.333--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
23	15.22	.....	.....	.....	16.91	.....	.....	19.64	.....	.....	.....	.....
24	15.20	.....	.....	17.26	.....	18.38	h18.29	19.69	17.66	.....	.....	.....
25	15.15	.....	.....	17.28	.....	18.35	.....	19.75	17.57	.....	.....	.....
26	15.10	.....	.....	.....	.....	18.31	.....	19.79	17.47	.....	.....	h13.82
27	15.06	.....	.....	.....	.....	18.25	.....	.....	17.37	.....	.....	13.82
28	15.01	15.38	.....	.....	.....	18.23	.....	.....	17.29	.....	.....	.....
29	14.95	.....	g16.74	.....	.....	18.20	.....	.....	17.12	.....	.....	.....
30	14.90	.....	16.75	g17.60	.....	.....	.....	.....	17.04	.....	.....	.....
31	14.87	.....	16.78	.....	.....	.....	18.57	.....	.....	.....	.....	.....

g Estimated.

h Tape measurement at odd hour.

14.25.25.221. John M. Norris. Water-stage recorder removed July 19, 1946.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 23	h59.39	Mar. 1	59.14	Mar. 20	59.29	Mar. 31	59.70
24	59.28	15	h59.30	21	59.39	Apr. 1	59.75
25	59.28	16	59.29	22	59.41	2	59.76
26	58.30	17	59.29	29	59.65	3	e59.78
Feb. 12	h59.04	18	59.28	30	59.66	4	e59.78
28	59.07	19	59.29				

e Dry at depth given.

h Tape measurement at odd hour.

14.26.19.242. Oscar H. Pearson. Water-stage recorder installed July 19, 1946.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 20	h73.55	Aug. 5	85.87	Sept. 27	87.00	Nov. 20	g81.40
Mar. 15	h75.44	6	85.90	28	86.77	21	81.36
May 16	h80.21	7	85.94	29	86.62	22	81.28
July 13	h84.26	8	g85.97	30	86.47	23	81.15
19	h84.77	19	h86.47	Oct. 1	g86.27	24	81.09
20	84.81	20	86.49	16	84.48	25	81.09
21	84.90	21	86.57	17	84.37	26	81.03
22	84.96	22	86.72	18	84.25	Dec. 3	80.71
23	85.04	23	g86.92	19	84.15	4	80.64
24	85.11	Sept. 7	h88.08	20	84.02	5	80.56
25	85.13	8	88.10	21	83.91	6	80.48
26	85.13	9	88.14	22	g83.80	7	80.41
27	85.13	10	88.17	Nov. 5	82.63	8	80.37
28	85.18	11	88.24	6	82.56	9	g80.32
29	85.27	12	88.29	7	82.46	26	80.21
30	85.35	13	88.37	8	82.37	27	80.15
31	85.43	14	88.45	9	82.31	28	80.08
Aug. 1	85.52	24	87.37	10	82.25	29	80.01
2	h85.69	25	87.22	11	82.19	30	79.94
3	85.72	26	87.05	19	81.45	31	79.86
4	85.79						

g Estimated.

h Tape measurement at odd hour.

Part 5. Miscellaneous data concerning observation wells

10.24.17.111. Henry & Mabry. Dug and drilled irrigation well, equipped with turbine pump, diameter 10 inches, depth 287 feet. Measuring point, lower inside edge at oval opening in south side of pump shell, 0.40 foot above land-surface datum. Reference point, top of concrete weir box 8.25 feet north of well at a point 2 feet east of the outside southwest corner, 0.18 foot above land-surface datum. Water levels, in feet below land-surface datum, 1945: May 18, 40.67; July 18, 42.97; Sept. 12, 43.72; Nov. 12, 40.35.

10.24.20.344. Blackwell. Measuring point beginning Jan. 29, 1946, top of casing, at land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.

10.24.32.111. Lewis. Dug well, equipped with windmill, diameter 3 $\frac{1}{2}$ feet. About 25 feet southeast of rockhouse. Measuring point, top inside edge of steel barrel over top of well, 2.35 feet above land-surface datum. Reference point, top south edge of north car frame across top of well, inside of steel barrel cover, at land-surface datum.

10.25.18.222. Pendergrass. Previously designated incorrectly as well 10.25.7.444. 180 feet southwest of section corner marker of bronze cap with description.

11.23.12.221. Hannifin. Formerly owned by Mabel Clifford. Reference point beginning Jan. 28, 1946, upper surface of large stone block, slightly east of south of well, in top course of blocks in circular stone wall holding wooden water tank, 5.71 feet above land-surface datum.

11.24.6.243. Moore. Dug and drilled irrigation well, equipped with centrifugal pump, diameter 4- by 4-feet. Measuring point, top south edge of north side of concrete well curb, 1.5 feet west of northeast corner of well curb, 0.30 foot above land-surface datum.

11.24.10.114. Hobbs. Measuring point beginning Jan. 28, 1946, top inside edge of opening in pump case, 0.70 foot above concrete pump base, 0.85 foot above land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.

11.24.14.313b. Martin. Formerly owned by Ernest Wright.

11.24.15.421. Barnett. Measuring point beginning Jan. 28, 1946, raised to 0.76 foot above land-surface datum.

11.24.23.411a. Babcock. No equipment. Measuring point beginning Jan. 28, 1946, top of casing and old concrete pump base, at land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data. Reference point beginning Jan. 28, 1946, top surface of southeast corner of concrete base for motor, 1.5 feet west of well, 1.45 feet above land-surface datum.

11.24.23.433. Tweedy. Apparent rise of water level probably due to oil on water in well.

11.24.23.433a. Tweedy. Drilled commercial well, equipped with pump jack, diameter 8 inches, depth 94 feet. Inside of pump shed, 2 feet south of observation well 11.24.23.433. Measuring point, top of 8-inch casing, 1.15 feet above land-surface datum. Reference point, top of concrete floor, at land-surface datum.

11.24.29.144. Hurst. Previously designated incorrectly as 11.24.29.411.

11.24.34.411b. Hurst. Measuring point beginning Jan. 29, 1946, top west edge of east pump support, at land-surface datum.

11.24.36.133. Grizzle. Measuring point beginning Jan. 27, 1946, top of casing east side of well, at land-surface datum.

11.25.29.111. Farmers. Turbine pump installed on well. Inside of shed. Measuring point beginning Jan. 28, 1946, top edge of opening inside of pump case, 0.07 foot above concrete pump base, 1.00 foot above land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.

- 11.25.31.433b. Watson. Pressure pump installed on well. Measuring point beginning Jan. 22, 1946, top east edge of 1- by 4-inch board nailed on top of 2- by 6-inch wood frame over concrete base, 0.40 foot above concrete base and land-surface datum.
- 12.24.13.111. Newman. Reference point beginning July 11, 1946, top edge of Geological Survey washer on northeast side of southeast windmill tower anchor-post, 5.8 feet southeast of measuring point, 0.52 foot above land-surface datum.
- 12.25.2.Lot 3. Heine. Measuring point beginning Jan. 29, 1946, raised to 0.75 foot above land-surface datum.
- 12.25.2.Lot 4. Hodges. Formerly owned by E. R. Duvall.
- 12.25.25.413. Freeman. Concrete pump base raised to 0.20 foot above land-surface datum. Measuring point beginning Feb. 1, 1946, top edge of $\frac{3}{8}$ -inch hole in base of pump. Subtract 0.30 foot from tape measurements to reduce to concrete pump base, and 0.50 foot to reduce to land-surface datum.
- 12.25.34.211. Sharp. New concrete pump base, turbine pump installed on well. Measuring point beginning Feb. 1, 1946, top inside edge of rectangular opening in north side of pump case, 0.75 foot above concrete pump base, 1.75 foot above land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.
- 12.25.35.411a. Stone. Measuring point beginning Nov. 13, 1946, top of casing, 0.95 foot above land-surface datum.
- 13.25.1.111. Kuykendall. Measuring point beginning Feb. 1, 1946, top of casing, 0.80 foot above land-surface datum.
- 13.25.10.344. Reinicke. Pressure pump installed on well prior to Jan. 31, 1946.
- 13.25.13.311. Fletcher Bros. Old pump removed, new pump installed; pump rests on top of steel casing, 0.94 foot above old concrete pump base. Measuring point beginning Jan. 31, 1946, lower inside edge of rectangular opening in south side of pump case, 1.70 feet above concrete pump base, and 1.90 feet above land-surface datum.
- 13.25.14.131. Conn. Measuring point beginning Jan. 31, 1946, lower inside edge of rectangular opening in southwest side of pump case, 0.75 foot above concrete base, 1.50 feet above land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.
- 13.25.35.311a. Kerr. Drilled irrigation well, equipped with turbine pump. East of earthen tank, and 300 $\frac{1}{2}$ feet east of well 13.25.35.311 which is on west side of earthen tank. Measuring point, top of casing level with pump base, 0.50 foot above land-surface datum.
- 13.25.35.322. Kerr. Well equipped with turbine pump. Measuring point beginning Jan. 25, 1946, top edge of $\frac{1}{2}$ -inch hole in base of pump. Subtract 0.70 foot from tape measurements to reduce to concrete base and land-surface datum.
- 13.25.36.421a. Ware. Well equipped with pressure pump, placed in concrete pit. Measuring point beginning Jan. 25, 1946, top of concrete floor in pit, 2.00 feet below land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.
- 13.25.36.421c. Ware. Well abandoned. Measuring point beginning Jan. 25, 1946, top of casing and concrete pump base, 0.25 foot above land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.
- 13.26.5.231b. Sterrett. Measuring point beginning Jan. 30, 1946, top of 10-inch casing, 0.11 foot below land-surface datum.
- 13.26.23.111. G. C. and H. E. Saunders. Measuring point beginning Jan. 25, 1946, top of casing, 0.25 foot above land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data. Old measuring point destroyed.

13.26.28.221. Bogle. Hagerman canal water being applied to surrounding land on Jan. 25, 1946.

13.26.28.311. Giles & Heinzel. Measuring point beginning Jan. 30, 1946, top of casing level with concrete pump base, 1.00 foot above land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data. Old measuring point destroyed or changed.

14.25.1.344. Langnegger. Reference point beginning July 13, 1946, top west edge of north 6-inch well casing in ground, 5 feet east of well, 2.19 feet above land-surface datum.

14.26.3.442. Langnegger. Casing cut off. Measuring point beginning Jan. 23, 1946, top edge of casing, at land-surface datum. Possible discrepancy between preceding and succeeding land-surface data.

14.26.4.141. Lockhead. Measuring point beginning Jan. 24, 1946, lower inside edge of rectangular opening in pump case, 0.68 foot above concrete pump base, and 0.75 foot above land-surface datum.

14.26.5.433. Newsom. Incorrectly designated as 14.26.5.443 in Water-Supply Papers 911 and 941.

14.26.6.211. Grizzle. New concrete pump base and new pump installed. Measuring point, lower edge of mouth of discharge pipe. Subtract 3.33 feet from tape measurements to reduce to top of concrete pump base and 3.88 feet to land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.

14.26.11.322. Stewart. Casing cut off. Measuring point beginning Jan. 23, 1946, top edge of casing, at land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.

14.26.15.322. Evans. Measuring point beginning Mar. 24, 1945, raised to 0.58 foot above land-surface datum. Reference point beginning Mar. 24, 1945, top edge of Geological Survey washer on south side of wooden pier for galvanized storage tank, 2.17 feet north of measuring point, 0.58 foot above land-surface datum.

14.26.18.113. Campbell. Formerly owned by E. D. Watson. A new irrigation well was drilled in 1945, 6 feet east of observation well.

14.26.18.131. Cooke. Formerly owned by E. D. Watson.

14.26.19.211. Pearson Bros. Measuring point beginning Jan. 20, 1946, top of concrete pump base, 0.30 foot below lower edge of pump basal plate, 0.30 foot above land-surface datum. Possible discrepancy of a few tenths of a foot between preceding and succeeding land-surface data.

14.26.19.242. Pearson. Equipped with water-stage recorder July 19, 1946. Measuring point, top of casing, northside of well, 0.23 foot above land-surface datum.

14.26.19.444. Lane. Well deepened to approximately 300 feet in November 1945. Measuring point beginning Jan. 20, 1946, top edge of casing, 0.50 foot above land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.

14.26.21.333. Wade. Pump removed. Measuring point beginning Jan. 20, 1946, top edge of casing, level with top of concrete pump base and 0.30 foot above land-surface datum.

14.26.27.424a. Brown. Used drilled domestic well, equipped with windmill. 4 feet east of well 14.26.27.424 which has been filled. Measuring point, top edge of 6-inch steel casing, 1.00 foot above land-surface datum.

14.26.28.111. Langnegger. Formerly owned by Ross Sears.

14.26.28.114. Langnegger. Formerly owned by Ross Sears.

14.26.35.344. Mitchell. Formerly owned by J. H. King.

15.25.24.211. Bogle. Measuring point beginning Jan. 19, 1946, raised to 0.30 foot above top of casing, 0.98 foot above land-surface datum.

15.25.35.311a. Robinson. Used dug and drilled irrigation well, equipped with turbine pump which rests on two 7-inch steel truck frame supports across 6-foot diameter concrete well curb. Measuring point, lower edge of south pump support at center of well, 0.12 foot above concrete well curb, 1.00 foot above land-surface datum.

15.26.31.111. Gromo. Measuring point beginning Jan. 19, 1946, raised to 0.17 foot above concrete pump base, 0.42 foot above land-surface datum.

15.26.32.231. Evans. Measuring point beginning Jan. 19, 1946, top of casing, 0.39 foot above land-surface datum. Windmill out of order.

EDDY COUNTY

Part 1. General discussion

The general discussion of water-level changes in the Eddy County portion of the Roswell artesian basin has been included with Part 1 for Chaves County as the areas are part of one continuous hydrologic area and cannot coherently be discussed separately.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet

Location number	Owner	See also Part	Water levels						Record		
			Jan. 1946		Change 1945-46		Highest		Lowest		
			Level	Day	1945-46	Level	Year	Level	Year	Year	Missing
16.25.1.Lot 3	Pearson Bros.	.	13.96	13	+0.64	10.61	44	19.40	39	38	
1.Lot 13a	Charles Puck	.	13.28	18	+1.61	14.66	44	18.39	45	45	
1.344	Buck Bros.	3	b13.65	13	-1.93	9.50	42	b13.65	46	38	
2.Lot 9	Ralph Pearson	.	a19.49	18	+1.41	14.07	44	a20.90	45	38	39
2.Lot 15	do	.	20.32	18	-1.77	17.35	44	20.32	46	40	
4.Lot 12	J. E. Taylor	.	13.09	18	-1.15	10.58	42	13.74	39	38	
5.Lot 4	F. P. Malone, Jr.	.	10.15	18	+3.20	9.42	42	13.35	45	38	
5.Lot 5	do	.	10.22	18	+3.95	9.43	42	14.17	45	42	
5.Lot 13	Fred Crook	.	b 3.45	18	+2.72	b 3.45	46	15.72	38	38	
5.443	W. M. Ault	.	13.66	18	-1.85	8.27	42	18.66	46	38	
6.Lot 4	F. M. Nelson	3	14.56	18	-2.50	11.42	42	a15.40	39	38	
6.513	Frank Childress	4	29.82	18	-1.51	f27.27	42	f30.50	41	38	
8.111	Pearson Bros.	.	25.33	18	-1.06	24.27	45	a31.39	40	38	39
10.333	Orval Gray	.	60.48	18	-3.65	56.55	44	60.48	46	44	
10.334	do	.	53.25	18	-1.64	48.60	42	53.64	39	38	40, 41
11.133	J. J. Terry	.	36.24	18	-1.77	34.46	44	36.24	46	44	
11.233	Noah Buck	.	33.62	18	-1.88	28.45	42	33.62	46	38	
12.124	Buck Bros.	.	19.60	18	-1.27	15.45	42	19.60	46	38	
12.412	T. J. Terry	.	(a)	17	.....	10.85	42	14.17	41	38	46
13.211	do	.	28.12	17	-4.09	19.64	42	28.12	46	39	
14.213	L. T. Lewis	.	37.65	17	-2.51	30.70	42	37.65	46	38	
15.233	J. M. Fverest	.	76.07	18	-2.99	64.20	39	76.07	46	39	40, 41
15.331	do	.	92.42	18	-1.12	82.78	38	92.42	46	38	40, 41
24.212	Monroe Howard	.	41.95	17	-5.55	30.42	42	41.95	46	38	
16.26.5.Lot 3	Ed Taylor	.	28.91	18	-1.70	22.73	42	28.91	46	38	
5.Lot 4	H. V. Parker	.	b32.84	18	+8.72	27.35	42	b32.84	46	38	45
5.331	Nancy Epper	.	18.73	18	+1.47	16.21	38	20.20	45	38	
6.Lot 2	H. V. Parker	.	32.06	18	-1.46	24.07	42	32.06	46	38	41, 45
6.Lot 4	do	.	34.45	18	-1.98	27.15	42	34.45	46	38	40, 41
6.Lot 4a	do	.	19.99	18	+9.07	19.99	46	29.06	45	44	
6.Lot 4a	do	.	13.45	18	+2.5	10.80	42	13.70	45	38	
6.333	Scott Meyer	.	13.58	18	-2.34	7.20	42	15.63	40	38	
7.121	L. T. Lewis	.	10.41	17	-2.90	3.09	42	10.41	46	38	
7.521	T. J. Frink	5	16.47	18	-1.70	12.45	42	17.00	47	38	
8.111	Ira S. Reser	.	12.20	11	-1.49	9.66	42	12.20	46	42	
15.333	Carl Manda	5	6.43	11	-1.49	9.66	42	12.20	46	42	
16.313	V. L. Gates	.	6.43	11	-1.67	3.20	42	8.60	40	38	

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels					Record		
			Jan. 1946 Level	Change 1945-46	Highest Level	Lowest Level	Year	Be-gan	Years missing	
16.26-17.311	W. R. Roberts	.	26.44	-5.76	16.68	42	26.44	46	38	
17.331	Elzie Swift	.	14.74	-4.77	6.12	43	14.78	41	38	42
18.551	Monroe Howard	.	(a)	.....	14.32	42	20.83	41	39	46
18.411	Ira S. Reser	.	24.27	-6.04	13.29	42	24.27	46	39	41
19.113	H. F. Hall	.	31.98	-9.52	16.19	42	31.98	46	39	
19.133	F. M. Privett	.	25.28	-5.29	16.54	42	29.28	46	38	
19.211	E. W. Parker	.	20.45	-5.20	9.34	42	20.45	46	38	
19.411	F. M. Privett	3,5	37.18	-4.08	27.84	42	37.18	46	38	
21.333	J. H. Fverest	3	8.73	-2.58	2.09	42	8.73	46	38	
28.333	Irvin Dixon	3	15.90	-3.62	9.57	42	15.90	46	38	
28.431	R. E. Coleman	3	14.73	-2.95	8.72	42	14.94	41	38	
31.413	T. F. Wilson	5	47.34	-3.19	35.53	38	47.34	46	38	
32.231	B. E. Green	5	27.20	-4.66	20.41	43	27.20	46	43	
32.411	do	.	b23.35	-4.44	15.20	42	20.64	40	38	41
32.421	W. W. Parker	.	20.27	.....	13.78	42	20.27	46	38	45
35.113	J. T. Fulton	5	9.54	-1.41	7.86	43	9.54	46	43	
17.25.13.131	L. G. Monsehke	5	98.35	-5.12	85.20	42	98.35	46	38	41
22.223	J. M. Jackson	5	al82.48	-4.63	135.66	42	al52.48	46	38	40
24.433	do	.	al06.59	-16.44	82.40	42	91.82	41	38	40
26.222	Mildred and M. L. Doss	3	.....	.....	91.56	42	101.77	41	38	46
35.411	Ed Kissinger Estate	3	118.80	-4.08	107.95	43	113.80	46	38	
17.26.2.133	Fred Savoie	.	9.19	-1.16	5.82	42	9.69	41	38	
3.231	H. R. Rogers	.	9.61	-1.67	4.61	42	9.83	41	38	
3.333	A. T. Woelk	5	12.63	-2.08	9.96	43	12.63	46	43	
3.453	Mrs. R. W. Fox	5	10.08	-1.94	5.23	42	10.08	46	38	45
4.121	State of New Mexico	.	9.29	+5.56	9.25	42	17.39	38	38	
4.531a	Howard Stroup	.	.....	.....	.10	38	8.32	41	38	46
4.331b	do	.	10.44	+1.64	.55	42	12.04	45	39	
4.413	Pred Crawford	.	17.14	.....	9.48	41	17.14	46	38	40,42,44,45
5.422	Joe Luce	.	13.68	+2.62	9.83	42	16.30	45	38	
6.213	Martin Yates, Jr.	5	42.73	.....	.....	..	.....	..	46	46
6.413	Fred and B. A. Savoie	.	.....	.....	34.75	42	42.24	45	38	46
7.131	J. W. Collins	.	56.69	-5.92	42.87	42	56.69	46	38	40
7.821	Buck Jernigan	.	39.73	-4.30	32.74	44	39.73	46	44	
7.544	E. E. Scofield	3,5	45.09	-5.57	31.53	42	45.09	46	40	

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels										Record
			Jan. 1946		Change 1945-46		Highest		Lowest		Be-gan	Years missing	
			Level	Day	1945-46	1945-46	Level	Year	Level	Year			
17.26.7.421	Ivan Rogers	.	32.74	9	-5.40	19.24	42	32.74	46	38	41		
7.423	C. A. Houghton	.	41.17	9	.....	15.87	42	26.49	41	40	46	
7.433	Ed Stone	.	33.49	9	-5.97	26.90	42	41.17	46	38			
7.444	Albert Blake	.	35.49	9	-3.11	20.98	42	33.49	46	38			
10.333	V. L. Gates	3, 5	627.47	8	-3.91	4.60	42	10.61	41	39			
10.433	D. D. Sullivan	.	10.38	8	-10.38	14.41	42	18.81	41	38	41, 43		
15.113	R. L. Vogel	.	9.55	8	-4.08	1.48	42	9.55	46	38			
15.121	do	.	114.05	8	-5.78	5.00	42	114.05	46	38	41		
15.211	J. M. Vogel	.	17.84	11	-8.43	11.57	42	17.84	46	38			
15.411	W. M. Jackson	5	22.90	8	-8.16	11.25	42	22.90	46	38			
16.333	Artesia Cemetery	3	17.00	8	-4.78	6.14	42	17.00	46	38			
16.411	C. G. Armstrong & Son	.	119.40	8	-3.49	11.34	42	119.40	46	39	40, 42		
17.423	H. A. Denton	.	21.03	9	-3.10	17.93	45	21.03	46	38			
18.433	A. C. Baca	.	52.52	8	-5.80	38.61	42	52.52	46	38			
18.442	Mrs. Murphy	.	40.19	9	-6.29	26.50	42	33.97	40	38	41		
20.153	J. W. Sharp & G. V. McCravy	.	38.36	8	-5.91	25.49	42	38.36	46	38			
21.112	Roger Durand	.	8.22	8	.....	8.63	43	15.85	41	38	46	
21.341	W. S. Hogsett	.	23.03	9	-4.74	4.53	42	8.22	46	38	42		
22.255	R. L. Paris	.	3.57	8	-2.09	18.54	42	23.05	46	38			
24.333	Mary E. Yates	3, 5	13.08	8	-7.5	2.13	42	3.57	46	41			
27.413	W. L. Martin	5	13.00	8	+6.69	11.16	42	14.87	38	38	40, 41		
27.423	do	.	13.00	8	-4.2	10.38	42	15.90	41	38			
28.331	C. E. Martin	.	18.83	11	-4.80	8.78	42	19.10	41	38			
29.131a	do	.	33.15	9	-5.65	26.04	42	38.15	46	38			
31.133	C. R. Prainard	.	67.95	9	-4.67	56.57	43	67.95	46	38			
18.25.23.111	Mrs. C. M. Phelps	3	106.90	9	-13.82	90.67	42	106.90	46	42			
18.26.2.333	S. O. Higgins	3	10.75	10	+1.02	10.75	46	14.35	40	38	41		
4.11b	Frank Watkins	3	26.53	8	-4.24	18.19	43	27.10	40	38	41		
4.433	W. M. Schneider	.	.....	..	.....	16.82	43	23.0	41	38	46
7.234a	C. H. Hutsonpillar	4	53.57	8	-4.42	43.62	43	53.57	46	39			
7.234c	do	.	54.88	9	-8.9	53.73	44	56.83	39	39	42		
9.133	Martin Yates, Jr.	.	34.41	11	-3.49	26.01	43	34.41	46	43			
9.311	C. T. McCauley	.	34.35	11	-3.24	26.62	43	35.76	41	39	40		
10.233	Charles Rogers	.	12.61	10	-6.9	9.80	42	14.82	40	38	39, 41		
15.133	J. D. Perry Estate	.	21.57	10	-1.12	15.78	42	23.95	40	38			

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels					Record			
			Jan. 1946 Level	Day	Change 1945-46	Highest Level	Year	Lowest Level	Year	Be-gan	Years missing
18.26.15.311	Charles Martin	.	20.32	10	-0.53	14.16	42	23.02	40	38	
18.241	W. P. McCrary	.	48.94	11	-5.61	37.50	43	53.85	41	38	40
18.325	do	.	54.54	11	-4.24	38.49	43	54.91	41	38	40
21.544	Town of Dayton	4	42.98	10	-5.46	f32.97	43	f43.83	41	39	
22.314	Mrs. W. I. Eads	5	413.60	10	-1.60	8.16	43	a13.60	46	38	40
23.215	A. W. Boyce	.	26.00	10	-2.54	17.55	42	27.30	41	38	
24.131	R. G. Goodwin	.	17.41	10	-1.98	14.16	43	17.41	46	43	
24.225	Angeline Mackey	3,5	6.47	10	-1.48	1.26	42	6.47	46	39	
28.132	Dayton School	.	58.29	10	-3.43	49.83	43	59.30	41	38	
33.111	Thelma Yates	.	65.86	10	-1.64	64.22	45	67.97	40	38	
19.26.12.323	Forrest Lee	.	27.57	10	-4.27	15.74	42	27.57	46	39	
12.323a	do	.	27.45	10	-4.62	17.06	43	27.45	46	43	
12.335	Ollie Banks	3	32.65	10	-4.51	22.21	43	32.65	46	41	42
13.211	R. L. House	.	(Measurements discontinued)			8.02	42	14.83	41	38	46
13.344	R. W. Rankin	3	11.99	10	.....	2.70	42	11.99	46	42	45
14.431	Albert Lee	.	(Measurements discontinued)			3.55	42	15.54	41	38	40,43,45,46
14.431a	do	5	15.88	10	-4.13	11.75	45	15.88	46	45	
27.233	Lakewood School	3	54.45	10	-7.35	40.73	43	54.45	46	38	40
28.334	Frank Howard	.	61.54	10	-7.05	46.20	42	61.54	46	38	40
28.441	D. D. Sullivan	.	68.39	10	-6.54	53.11	42	68.39	46	38	
33.412	J. H. Everest	.	48.29	10	-3.09	39.63	42	51.90	41	38	
20.26.6.431	J. G. Moutry & Sons	.	49.98	10	-4.25	85.67	42	48.98	46	38	
7.122	P. S. Campbell	3,5	a49.32	10	-3.90	36.57	42	a49.32	46	38	
7.421	E. Marthe!	.	.....			30.99	42	39.47	41	38	39,46
8.112	J. G. Moutry & Sons	.	37.21	10	-4.21	24.15	42	37.21	46	38	
17.411	J. H. Angell	.	.....			43.00	42	48.42	41	38	46
21.112	Manuel Hernandez	5	20.97	10	.....	.....	..	.....	..	..

a Pumping, recently.
 b Pumping, recently.
 c Nearby well pumping.
 f From recorder chart.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946

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	Privett	Dixon	Klss-inger	Scog-gins	Gates	Ceme-tery
Jan. 8,9, 11,18	b13.65	14.56	37.18	15.90	118.80	45.09	9.45	17.00
Mar. 18	b18.38	a12.26	46.42	b18.43	119.19	49.82	11.68	28.29
May 17-20	a30.23	111.53	46.88	23.69	121.80	53.83	14.91	28.53
July 13, 15,16	b31.38	12.85	a68.85	28.03	123.58	59.85	(a)	38.88
Sept. 9,10	a35.82	12.64	32.45	29.29	-125.65	60.13	15.62	41.07
Nov. 19	b13.79	13.26	33.60	21.54	124.04	54.11	12.18	22.58
Location number	17.26. 24.333	18.25. 23.111	18.26. 4.111b	18.26. 24.223	19.26. 12.333	19.26. 13.344	19.26. 27.233	20.26. 7.122
Owner	Yates	Phelps	Watkins	Mackey	Banks	Rankin	School	Camp-bell
Jan. 8-10	3.57	106.90	26.53	6.47	32.65	11.99	54.45	a49.32
Mar. 18	2.86	113.12	28.50	5.50	32.86	11.46	b57.27	50.97
May 20	3.37	117.73	30.47	5.81	34.48	12.64	60.46	54.58
July 15,16	4.97	125.55	b33.11	6.74	e38.6	e16.2	b61.95	a56.68
Sept. 9,10	e6.05	127.21	35.08	c7.54	e38.6	e16.2	59.72	a59.73
Nov. 18,19	3.65	107.49	29.73	6.20	33.85	12.73	b52.86	53.69

a Pumping.

b Pumping recently.

c Nearby well pumping.

e Dry at depth given.

i Water running in irrigation ditch nearby.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

16.25.6.313. Frank Childress.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	29.89	.....	29.81	29.40	29.26	.....	.....	.....	.....	29.41	.....	.....
2	29.87	.....	29.92	29.40	.....	.....	.....	29.75	.....	.....	.....	.....
3	29.77	.....	29.75	29.40	.....	.....	.....	29.72	.....	.....	.....	28.95
4	29.70	.....	29.75	29.40	.....	.....	.....	29.72	.....	.....	.....	28.87
5	29.62	.....	29.75	29.40	.....	h29.40	.....	29.75	.....	.....	29.18	28.79
6	29.62	.....	29.76	.....	.....	.....	.....	29.75	.....	.....	29.05	28.70
7	29.93	.....	29.85	.....	.....	.....	.....	29.72	.....	.....	29.00	28.68
8	29.79	.....	.....	.....	.....	.....	29.55	29.73	29.67	.....	28.89	28.69
9	29.79	.....	.....	.....	.....	.....	29.50	29.76	29.67	.....	28.89	28.77
10	29.87	.....	.....	.....	.....	.....	29.50	.....	29.70	.....	28.97	28.78
11	29.81	.....	.....	.....	.....	.....	29.62	.....	29.76	.....	29.08	.....
12	29.91h	29.50	.....	.....	.....	.....	29.65	.....	29.67	.....	29.16	.....
13	29.97	29.54	.....	.....	29.14	.....	29.57	.....	29.65	.....	29.25	.....
14	29.81	29.80	.....	.....	29.14	.....	29.57	.....	29.64	.....	.....	.....
15	29.81	29.74	.....	.....	29.15	.....	29.57	.....	29.60	.....	.....	.....
16	.....	29.64	.....	.....	29.18	.....	29.61	.....	.....	29.18	.....	.....
17	.....	29.64	.....	.....	29.19	.....	29.61	.....	.....	29.17	.....	.....
18	29.72	29.65	29.57	.....	29.12	.....	29.61	.....	.....	29.18	.....	.....
19	29.67	29.65	29.48	.....	29.13	.....	29.62	29.92	.....	29.20	28.89	.....
20	29.70	.....	29.40	.....	29.17	.....	29.72	29.94	.....	29.31	28.85	.....
21	29.73	.....	29.40	.....	29.21	.....	.....	29.89	.....	29.23	28.85	.....
22	29.84	.....	29.40	.....	29.14	.....	29.66	29.84	.....	29.22	29.03	.....
23	29.80	.....	29.40	.....	29.14	.....	29.66	29.84	.....	29.11	28.78	.....
24	29.83	.....	29.40	29.34	29.16h	29.50	29.69	29.83	29.60	.....	28.70	.....
25	29.70	.....	29.40	29.34	.....	.....	29.71	29.82	29.54	.....	28.72	.....
26	.....	.....	.....	29.34	.....	.....	29.72	29.83	29.44	.....	28.98	28.53

g Estimated.

h Tape measurement at odd hour.

16.25.6.313--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
27	29.24	.....	.....	29.69	.....	29.42	.....	.....	28.53
28	29.79	.....	29.24	.....	.....	29.70	.....	29.42	.....	.....	28.54
29	29.40	29.28	.....	.....	29.73	.....	29.58	.....	.....	28.69
30	29.40	29.26	.....	.....	.....	.....	29.55	.....	.....	28.65
31	29.40	.....	.....	.....	.....	.....	.....	.....	.....	28.71

18.26.7.234a. C. H. Hutsonpillar.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	53.75	.....	53.54	54.85	57.22	.....	58.69	.....	.....	61.13	.....	.....
2	53.73	.....	53.60	54.93	57.26	.....	.....	59.65	.....	.....	.....	.....
3	53.69	.....	53.59	55.01	.....	.....	.....	59.66	.....	.....	.....	57.67
4	53.64	.....	53.59	55.10	.....	.....	.....	59.70	.....	.....	.....	57.62
5	53.61	.....	53.61	55.18	.....	57.69	.....	59.75	.....	.....	59.19	57.57
6	53.61	.....	53.66	55.25	.....	57.70	.....	59.78	.....	.....	59.13	57.52
7	53.58	.....	53.70	.....	.....	57.72	.....	59.83	.....	.....	59.07	57.47
8	53.56	.....	53.77	.....	.....	57.75	58.86	59.89	60.98	.....	58.99	57.45
9	53.56	.....	.....	.....	.....	57.78	58.89	59.93	60.98	.....	58.95	57.42
10	53.52	.....	.....	.....	.....	57.80	58.93	59.99	60.98	.....	58.91	57.37
11	53.51	.....	.....	.....	.....	57.83	58.97	.....	60.98	.....	58.86	.....
12	53.52	53.02	.....	.....	.....	57.86	59.01	.....	60.98	.....	58.82	.....
13	53.48	53.04	.....	.....	57.30	57.89	59.04	.....	60.99	.....	.....	.....
14	53.45	53.07	.....	.....	57.30	.....	59.08	.....	61.01	.....	.....	.....
15	53.45	53.09	.....	.....	57.30	.....	59.09	.....	61.02	.....	.....	.....
16	.....	53.10	54.08	.....	57.31	.....	59.11	.....	.....	60.29	.....	.....
17	53.41	53.12	54.11	.....	57.31	.....	59.15	.....	.....	60.22	.....	.....
18	53.35	53.16	54.15	.....	57.32	.....	59.20	.....	.....	60.16	58.31	.....
19	53.33	53.19	54.20	.....	57.34	.....	59.24	60.48	.....	60.10	58.25	.....
20	53.32	53.21	54.24	.....	57.35	.....	59.29	60.52	.....	60.04	58.19	.....
21	53.32	.....	54.26	.....	57.36	.....	59.33	60.55	.....	59.97	58.18	.....
22	53.30	.....	54.30	.....	57.36	.....	59.34	60.60	.....	59.90	58.12	.....
23	53.29	.....	54.35	.....	57.36	.....	59.36	60.63	.....	59.84	58.05	.....
24	53.27	.....	54.40	56.86	57.39	58.33	59.38	60.67	61.19	.....	58.00	.....
25	.....	.....	.....	56.89	57.44	58.35	59.41	60.70	61.20	.....	58.00	.....
26	.....	.....	.....	56.94	57.48	58.40	59.43	60.73	61.21	.....	.....	56.79
27	.....	.....	.....	56.98	57.52	58.45	59.46	.....	61.21	.....	.....	56.76
28	.....	53.52	.....	57.05	57.54	58.49	59.50	.....	61.20	.....	.....	56.74
29	.....	.....	54.68	57.11	.....	58.54	59.51	.....	61.18	.....	.....	56.73
30	.....	.....	54.72	57.17	.....	58.58	.....	.....	61.15	.....	.....	56.71
31	.....	.....	54.79	.....	.....	.....	.....	.....	.....	.....	.....	56.68

g Estimated.

h Tape measurement at odd hour.

18.26.21.344. Town of Dayton. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Feb. 11, 12, 17, 42.81; Sept. 29, 47.07.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	42.98	42.88	43.19	43.63	44.66	45.14	.....	45.99	46.78	47.03	46.35	45.89
2	43.00	42.87	43.22	43.69	44.68	45.17	.....	46.00	46.80	47.01	46.34	45.86
3	42.99	42.87	43.18	43.75	44.67	45.18	45.60	46.01	46.81	46.99	46.35	45.85
4	42.99	42.86	43.18	43.81	44.70	45.19	45.61	46.06	46.83	46.85	46.33	45.82
5	43.95	42.86	43.23	43.86	44.68	45.21	45.63	46.08	46.85	46.85	46.30	45.79
6	42.99	42.85	43.24	43.91	44.69	45.23	45.64	46.11	46.86	46.90	46.28	45.77
7	42.97	42.83	43.26	43.94	44.70	45.25	45.66	46.13	46.87	46.87	46.26	45.76
8	42.94	42.83	43.28	43.99	44.70	45.28	45.67	46.16	46.88	46.85	46.24	45.75
9	42.97	42.85	43.30	44.01	44.71	45.28	45.69	46.18	46.89	46.83	46.22	45.74
10	42.95	42.83	43.29	44.02	44.72	45.30	45.70	46.20	46.90	46.83	46.21	45.72
11	42.95	42.81	43.29	44.16	44.72	45.30	45.73	46.22	46.91	46.80	46.20	45.69

g Estimated.

18.26.21.344--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
12	42.97	42.81	43.30	44.18	44.72	45.30	45.74	46.25	46.91	46.77	46.19	45.70
13	42.95	42.84	43.35	44.22	44.74	45.30	45.76	46.28	46.93	46.76	46.17	45.69
14	42.93	42.84	43.36	44.26	44.75	45.31	45.78	46.29	46.95	46.73	46.14	45.66
15	42.95	42.83	43.37	44.30	44.76	45.32	45.79	46.32	46.96	46.71	46.12	45.65
16	42.93	42.82	43.44	44.35	44.78	45.32	45.81	46.35	46.97	46.67	46.13	45.65
17	42.93	42.81	43.46	44.38	44.79	45.32	45.83	46.38	46.98	46.65	46.10	45.64
18	42.91	42.83	43.45	44.40	44.82	45.33	45.84	46.41	47.01	46.62	46.06	45.61
19	42.91	42.86	43.48	44.43	44.84	45.35	45.87	46.43	47.02	46.63	46.04	45.61
20	42.90	42.87	43.50	44.45	44.87	45.37	45.89	46.47	47.01	46.59	46.02	45.61
21	42.94	42.90	43.53	44.47	44.88	.....	43.89	46.50	47.02	46.57	46.02	45.61
22	.....	42.95	43.53	44.50	44.90	.....	45.90	46.52	47.03	46.55	46.00	45.61
23	.....	42.99	43.53	44.52	44.92	.....	45.90	46.56	47.03	46.53	45.98	45.51
24	.....	43.02	43.52	44.54	44.96	.....	45.90	46.58	47.04	46.52	45.96	45.51
25	.....	43.00	43.52	44.57	44.97	45.47	45.90	46.61	47.04	46.50	45.97	45.48
26	.....	43.04	43.54	44.59	44.98	.....	45.90	46.63	47.04	46.47	45.96	45.50
27	.....	43.08	43.53	44.60	45.00	.....	45.91	46.65	47.05	46.46	45.95	45.47
28	.....	43.13	43.53	44.61	45.04	.....	45.92	46.68	47.05	46.44	45.92	45.45
29	42.85		43.56	44.63	45.03	.....	45.94	46.71	47.07	46.41	45.90	45.46
30	42.87		43.58	44.64	45.08	.....	45.95	46.73	47.05	46.40	45.89	45.46
31	42.87		43.60		45.11		45.97	46.75		46.38		45.45

g Estimated.

Part 5. Miscellaneous data concerning observation wells

16.26.7.321. Frink. Formerly owned by Charles Buck.

16.26.15.333. Menda. Measuring point beginning Jan. 11, 1946, top of 3/4-inch hole in wooden pipe clamp, 0.25 foot above casing, 0.33 foot above land-surface datum.

16.26.19.411. Privett. Windmill pump installed on well in July 1946.

16.26.31.413. Wilson. Formerly owned by W. W. Wilson. Well deepened to 202 feet during 1945.

16.26.35.113. Fulton. Measuring point beginning Jan. 11, 1946, top edge of Geological Survey washer on north edge of north 8- by 8-inch timber pump support, center of well, north side of pump, 0.55 foot above land-surface datum. Reference point beginning Jan. 11, 1946, top surface of angle iron brace, north side of elevated storage tank tower, at northwest corner, 3.04 feet above land-surface datum.

17.25.13.131. Monsehke. Measuring point beginning Jan. 9, 1946, surface of concrete pump base, 0.44 foot above land-surface datum.

17.26.3.333. Woelk. Measuring point beginning Jan. 11, 1946, lower edge of pump base at southwest corner of pump. Subtract 0.74 foot from tape measurements to reduce to concrete pump base, 1.04 feet to reduce to land-surface datum. Old measuring point destroyed.

17.26.6.213. Yates. Used drilled irrigation well, equipped with turbine pump. Measuring point, top edge of opening in base of pump, inside of pump case, 0.20 foot above concrete pump base, 0.50 foot above land-surface datum.

17.26.7.344. Scoggins. Measuring point beginning Nov. 19, 1946, lower edge of mouth of discharge pipe. Subtract 3.74 feet from tape measurements to reduce to top of casing which is level with concrete pump base and land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.

17.26.10.333. Gates. Measuring point beginning Nov. 19, 1946, top of concrete pump base, 0.65 foot above top of casing, 1.50 feet above land-surface datum. Possible discrepancy of a few hundredths of a foot between preceding and succeeding land-surface data.

17.26.15.411. Jackson. Measuring point, lower edge of mouth of discharge pipe. Subtract 4.05 feet from tape measurements to reduce to top of concrete pump base, 5.05 feet to reduce to land-surface datum.

17.26.24.333. Yates. Water level, in feet below land-surface datum, 1941: Feb. 19, 3.44.

17.26.27.413. Martin. Measuring point beginning Jan. 8, 1946, top of new concrete pump base, north side of well, 3.70 feet above land-surface datum. Possible discrepancy of a few tenths of a foot between preceding and succeeding land-surface data.

18.26.22.314. Eads. Water level, in feet below land-surface datum, 1941: Jan. 11, 13.33.

18.26.24.223. Mackey. Measuring point beginning May 20, 1946, top edge of 2- by 4-inch well cribbing, inside of 11-inch steel collar, 0.02 foot above land-surface datum. Reference point beginning May 20, 1946, south side of concrete base for steel circular tank, at chiseled square in concrete, 9.5 feet north of well, 0.23 foot above land-surface datum. Windmill pump removed. Water level measurement reported in Water-Supply Paper 886 for Jan. 10, 1939, should be 5.72.

19.26.14.431a. Lee. Unused drilled domestic well, diameter 6 inches, depth 100 feet. 21 feet west of well 19.26.14.431. Upper water cased off. Measuring point beginning Jan. 10, 1946, top edge of casing, 0.50 foot above land-surface datum. Water level, in feet below land-surface datum, 1945: Jan. 4, 11.75.

20.26.7.122. Campbell. Measuring point beginning Nov. 18, 1946, top of steel pipe clamps, 0.86 foot above land-surface datum. Reference point beginning May 20, 1946, top surface of northwest corner of northeast concrete base of elevated storage tank, 4 feet southeast of well, 1.06 feet above land-surface datum.

20.26.21.112. Hernandez. Used dug and drilled irrigation well, equipped with horizontal centrifugal pump, pit diameter 9 by 10 feet. Measuring point, top edge of suction pipe head, 6.3 feet below concrete rim of pit, 5.80 feet below land-surface datum.

GRANT COUNTY

By C. S. Conover

Part 1. General discussion

The water-stage recorder installed in April 1943 on the Mracek well near Central was continued in operation in 1946 until the well went dry in May. Records of water levels in this well for previous years are given in the following Geological Survey Water-Supply Papers: 991, pp. 243-245; 1021, pp. 233-235; and 1028, pp. 241-243.

Fluctuations of water level

The water level in the Mracek well, as in previous years, declined throughout the period of record. The water level went below the bottom of the well on May 14, 1946, after which measurements were discontinued and the recorder removed.

During the $4\frac{1}{2}$ months of record in 1946 the water level fell 14.6 feet as compared with 17.6 feet for all of 1945. The decline in 1946 averaged about $3\frac{1}{4}$ feet a month, more than twice the rate of decline in 1945. The average daily decline in 1946 was 0.11 foot with an apparent minimum daily change of zero and a maximum daily decline of 0.20 foot. The rate of decline increased in 1946 from an average daily change of 0.10 foot in January to about 0.15 foot in May. This continued increase in the rate of decline of water, beginning in 1945, may be due to an increase in rate of pumping from the mines nearby or by the mines intercepting the water at lower elevations than previously, or, possibly, by mining operations intercepting the water closer to the well than formerly. Variations in the rate of decline may possibly be due partly to a change in the hydrologic constants of the aquifer with the large change in water level. Data pertaining to these conditions are lacking.

If the decline of water level in this well is representative of the water levels in the area, then the large decline will necessitate deepening of wells in order to obtain water supplies.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

17.12.31.121. Albert P. Mracek. Measurements discontinued and water-stage recorder removed after May 14.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 1	270.98	Jan. 26	273.39	Feb. 23	276.23	Mar. 20	278.94
2	271.08	27	273.51	24	276.37	21	279.03
3	271.15	28	273.60	25	276.44	22	279.15
4	271.22	29	273.69	26	276.57	23	279.24
5	271.35	30	273.79	27	276.67	24	279.35
6	271.42	31	273.89	28	276.79	25	279.46
7	271.54	Feb. 4	274.29	Mar. 1	276.90	30	h279.95
8	271.63	5	274.40	2	277.00	31	280.00
9	271.73	6	274.50	3	277.10	Apr. 1	280.00
10	271.81	7	274.61	4	277.19	2	280.06
11	271.91	8	274.69	5	277.32	3	280.12
12	272.00	9	274.81	6	277.41	4	280.21
13	272.10	10	274.92	7	277.52	5	280.33
14	272.19	11	275.00	8	277.67	6	280.46
15	272.30	12	275.12	9	277.75	7	280.59
16	272.39	13	275.21	10	277.85	8	280.71
17	272.50	14	275.32	11	277.95	9	280.83
18	272.60	15	275.45	12	278.09	10	280.96
19	272.70	16	275.53	13	278.16	11	281.09
20	272.78	17	275.62	14	278.29	12	281.21
21	272.89	18	275.73	15	278.39	13	281.35
22	273.00	19	275.83	16	278.49	14	281.49
23	273.12	20	275.96	17	278.60	15	281.61
24	273.20	21	276.03	18	278.71	16	281.75
25	273.30	22	276.15	19	278.82	17	281.89

h Tape measurement at odd hour.

17.12.31.121--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Apr. 18	282.00	Apr. 25	283.00	May 2	284.07	May 9	285.23
19	282.14	26	283.15	3	284.19	10	285.37
20	282.27	27	283.31	4	284.36	11	285.50
21	282.41	28	283.47	5	284.56	12	285.58
22	282.55	29	283.61	6	284.73	13	285.61
23	282.71	30	283.78	7	284.91	14	e285.63
24	282.83	May 1	283.91	8	285.09		

e Dry at depth given.

HIDALGO COUNTY (VIRDEN VALLEY)

By R. L. Cushman

The Virden Valley is the New Mexico portion of the Duncan-Virden Valley, which lies along the upper Gila River, in Greenlee County, Arizona, and Hidalgo County, New Mexico. Water-level fluctuations in typical wells in the Duncan-Virden Valley are compared with precipitation and pumpage in the Greenlee County, Arizona, section of this report.

During 1946 22 water-level measurements were made in 6 wells in the Virden Valley. More water was pumped from wells to supplement surface water during 1946 than during any year from 1940 to 1945, inclusive.

Well descriptions and water-level measurements

181 (*911, p. 75; 941, p. 213; 949, p. 294; *991, p. 246; 1021, p. 236; 1028, p.). P. Lunt. SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 18 S., R. 21 W. water levels, in feet below land-surface datum, 1946: Jan. 20, 41.54; Apr. 11, 45.19; July 4, 46.82; Dec. 30, 41.52.

185 (*911, p. 175; 941, p. 213; 949, p. 294; *991, p. 246; 1021, p. 236; 1028, p.). J. Pierce. SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 32, T. 18 S., R. 21 W. Water levels, in feet below land-surface datum, 1946: Jan. 20, 30.30; Apr. 11, 31.54; July 4, 33.13; Dec. 30, 31.75.

201 (*911, p. 175; 941, p. 213; 949, p. 294; *991, p. 246; 1021, p. 236; 1028, p.). J. E. Payne. NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 2, T. 19 S., R. 21 W. Water levels, in feet below land-surface datum, 1946: Jan. 20, 44.21; Apr. 11, 45.10; July 4, 47.86; Dec. 30, 44.75.

202 (*991, p. 246; 1021, p. 236; 1028, p.). Byron Echols. SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 2, T. 19 S., R. 21 W. Water levels, in feet below land-surface datum, 1946: Jan. 20, 14.38; Apr. 11, pumping; July 4, pumping; Dec. 30, 15.00.

217 (*911, p. 176; 941, p. 213; *949, p. 294; *991, p. 246; 1021, p. 236; 1028, p.). Nancy O. Pace. NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 12, T. 19 S., R. 21 W. Water levels, in feet below land-surface datum, 1946: Jan. 20, 19.65; Apr. 11, 15.45; July 4, 16.37; Dec. 30, 17.05.

232 (*911, p. 177; 941, p. 214; 949, p. 294; *991, p. 246; 1021, p. 236; 1028, p.). Floyd Johns. NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 18, T. 19 S., R. 20 W. Water levels, in feet below land-surface datum, 1946: Jan. 20, 25.00; Apr. 11, 25.21; July 4, 43.00; Dec. 30, 26.35.

LEA COUNTY (TATUM-LOVINGTON-HOBBS AREA)

By C. S. Conover

Part 1. General discussion

Investigation of the ground-water resources of the part of Lea County in which ground water is used for irrigation was continued in 1946 in cooperation with the State engineer of New Mexico, by measuring water levels in the system of observation wells. Results of this investigation, which began in 1929, have been published in the 9th to 13th biennial reports of the State engineer. Records of water levels in past years in Lea County have been published in the following Geological Survey Water-Supply Papers:

<u>Year</u>	<u>Water-Supply Paper</u>	<u>Page Nos.</u>
1929-40	911	177-200
1941	941	214-227
1942	949	294-302
1943	991	247-255
1944	1021	237-245
1945	1028	244-252

Water levels are measured in a large number of wells each January, when the residual drawdown of the water levels, due to the effects of the previous years pumping, is slight, in order that the net yearly change in water levels can be determined. (See part 2.) Water levels are also measured at 2-month intervals in a selected group of wells to determine the seasonal fluctuations caused by the combination effects of pumping and precipitation. (See part 3.) Water levels were measured in 90 wells in January 1946 and in about 26 of them in March, May, July, September, and November. Two water-stage recorders were in operation during the year. (See part 4.) The recorder which had been maintained for a number of years on well 12.36.29.110 was moved to another well nearby, 12.36.29.122, in order to permit a turbine pump to be installed on the older well. A total of 232 measurements of water level was made during the year including 13 tape measurements made upon the recorder wells. All water-level measurements were made by U. N. Bengé, except those in January which were made by C. R. Murray.

Fluctuations of water level

The withdrawal of water by wells for irrigation in Lea County in 1946 was probably about equal to that in 1945 in spite of the increase in land irrigated by new wells. This was due to the abnormal precipitation recorded

in the later part of the year, after July. The precipitation for 1946, as reported by the U. S. Weather Bureau was 17.07 inches at Lovington, 3.28 inches above normal; 23.59 inches at Hobbs, 7.87 inches above normal; and 18.21 inches at Pearl, 4.53 inches above normal. Precipitation during the growing season, April through September, was also above normal in spite of the deficient rainfall at the beginning of the growing season. The above-normal precipitation, April through September, was 1.71 inches at Lovington, 5.57 inches at Hobbs, and 2.93 inches at Pearl.

The acreage of land served by pumps, many of which were hardly used because of the lateness of installation and the above-normal precipitation, increased rapidly during 1946 in Lea County. The irrigated area in 1946 is roughly estimated at 5,000 acres. Because of the drought conditions of the past few years irrigation of pasture land has been increasing. In the past, most of the irrigated land has been planted to row crops requiring very little irrigation in years of average precipitation and none in years of abnormal precipitation. It seems that as the area of irrigated land increases more water may be used proportionately if an increase of truck crops is farmed. This tendency may be offset by a lack of market for truck.

It is estimated that about 3,500 acre-feet of water was pumped for irrigation in 1946 in addition to about 7,000 acre-feet pumped for stock, municipal, and industrial uses.

The spacing of wells in Lea County is so great that the relationship of the fluctuations of water level in different observation wells is not always apparent. Many of the observation wells are in areas removed from pumping wells, the water levels responding to the effects of precipitation. Observation wells in a few areas are near pumped wells, the water levels responding to effects of pumping.

The water levels in most of the wells measured in Lea County showed rises during 1946 resulting from the heavy precipitation in the later part of the year. Of the 83 wells having comparable readings in January 1946 and January 1947, 51 showed rises amounting to as much as 3 feet. In general, most of the wells showing rises were south of Lovington where apparently the greatest amount of precipitation occurred. The average rise for all of the wells in 1946 was 0.26 foot. The water level in artesian

well 12.37.20.331 of Mr. Dunlap showed a decline of 6.4 feet from January 1946 to January 1947, which seems to have been caused by the large number of "shot point" holes drilled into the confining bed in the area around Tatum, allowing the artesian water to escape into the shallow water.

Near Lovington, where a number of irrigation wells are located, water levels showed declines in 1946 although, in general, not as large as in 1945. The unused well of E. H. Byers, 16.36.5.Lot 12, which is near the heavily pumped area around Lovington and is equipped with a water-stage recorder, showed a decline from January 1946 to January 1947 of 0.9 foot as compared with a decline from January 1945 to January 1946 of 0.4 foot. The larger decline in 1946 in this well is probably due to the residual effects of nearby pumping in previous years that are now reaching the well. A used irrigation well nearby, 16.36.5.411, of E. J. Robinson, showed a decline in 1946 of 0.30 foot as compared with a decline of 2.5 feet in 1945. The smaller decline in 1946 reflects the decrease in pumping in 1946 caused by the abnormal precipitation.

Water levels in Lea County at the end of 1946 were generally still above the low levels reached in early 1941 prior to the abnormal precipitation in late 1941. However, in the pumped area near Lovington the lowest levels were reached at the end of 1946. With the increase in the number of pumps, it is expected that in succeeding years the general tendency in the pumped areas will be a gradual yearly lowering of water levels except in years of abnormal precipitation.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet

Location number	Owner	See also Part	Jan. 1946/Day	Water levels			Lowest Level	Year	Be-gan	Years missing
				Change 1945-46	Highest Level	Year				
12.36.19.223	O. V. Fisher	.	a26.40	29	22.13	43	32.05	41	39	
24.434	Jerry Clay	.	all.05	29	+1.32	42	all.05	46	41	
25.222	State of New Mexico	3	20.93	29	-2.26	44	24.60	41	36	
27.212	do	3	35.60	29	-1.18	42	37.21	41	36	
29.110	E. D. Holt	3,4	29.38	29	-9.98	44	f34.25	41	30	
12.37.20.331	W. O. Dunlap	.	+13.71	29	-8.99	43	+13.39	41	41	
12.38.4.312	G. C. Copeland	.	39.81	29	-9.99	43	43.55	41	41	
13.35.11.222	Ashley Green	.	31.76	29	-1.20	43	33.22	39	30	32-38
19.211	Clara Elkins	.	44.75	29	+4.44	46	49.07	41	41	
13.36.6.221	R. W. Duncan	.	33.63	29	+0.6	46	36.27	41	39	
33.321	Lewis Peaman	.	40.13	29	+1.0	45	43.28	41	39	
35.323	M. J. McClish	.	36.67	30	-6.0	45	38.83	41	39	
13.37.3.131	J. H. Simpson	.	35.56	29	-4.3	42	39.86	41	39	
3.133	do	.	34.77	29	-7.2	43	35.67	41	40	42
7.121	W. O. Barrow	.	28.32	29	-1.18	45	34.28	36	30	46
13.132	A. M. Brownfield	.	23.32	29	-1.18	42	30.09	41	30	
28.230	A. F. Hight	5	33.76	30	.....	..	.....	..	46	
28.413	Mr. Dorn	.	32.32	30	-6.2	45	32.52	46	45	
13.38.6.341	Opal Fulton	5	45.56	29	-5.4	45	45.62	41	40	
14.35.30.141	W. A. Anderson	.	45.94	1	-4.8	46	43.93	41	39	
33.433	do	3	40.08	1	+0.2	46	42.37	30	30	
14.36.2.410	C. M. King	.	39.30	30	-2.8	45	40.88	41	39	
6.420	S. A. and W. R. Richardson	.	39.24	29	.....	44	40.96	41	40	45
9.111	A. C. Drake	.	38.43	30	+0.7	44	40.77	41	39	
9.210	Euford Rankins	.	40.76	30	-2.01	46	42.45	41	39	
13.211	Mattie Chambers	3	35.74	30	+0.8	46	37.18	41	30	
14.121	V. M. Chambers	.	40.75	30	+0.4	46	42.09	41	39	
14.37.3.113	Lois C. Hobbs	.	32.59	30	-1.18	45	34.72	40	39	42
14.112	R. W. Smith	3	34.62	30	-0.9	45	36.69	41	39	
16.421	School land	.	29.14	30	-0.9	43	31.42	39	39	
20.410	Doyle Hudgens	.	33.53	30	-2.3	45	35.36	41	40	
23.232	Lee Whitman	5	33.95	30	.....	..	.....	..	46	
27.130	J. R. Port	3	36.16	30	+0.1	46	37.89	41	30	
14.38.27.233	M. M. Gaines	.	35.40	30	-5.6	43	34.84	45	43	
27.240	do	5	36.80	30	.....	46	40.14	41	39	43-45

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued

Location number	Owner	See also Part	Water levels										Record	
			Jan. 1946 ¹ / Day		Change 1945-46		Highest		Lowest		Be- gan	Years missing		
			Level	Day	1945-46	1945-46	Level	Year	Level	Year				
14.38-28.120	Illa Cox	3, 5	25.40	30	-0.57	24.28	42	26.94	41	30				
15.35.35.112	Will Gorrell	.	39.74	1	+1.15	39.60	43	41.51	41	40				
15.36.8.131	Orren Beatty	3	40.09	30	-.07	39.98	44	41.65	41	30				
14.131	Ben Graham	.	.....	.	.....	42.38	45	43.52	41	41	46	
29.410	D. A. Hudgens	.	(a)	30	.....	41.89	42	43.94	41	39	46		
29.441	H. R. Fleming	.	(a)	30	.....	41.55	42	43.95	41	41	45, 46		
15.37.10.113	W. A. Simpson	3	34.69	30	-.03	34.66	45	36.63	39	38	40-42, 44			
21.330	R. W. Dean	3	29.36	30	-.16	29.20	45	33.46	41	31				
27.110	C. L. Naul	3	30.13	30	.....	29.38	43	30.13	46	42	45		
15.38.22.441	J. W. Motsenbocker	.	31.56	30	-1.01	29.72	42	32.50	41	40				
16.36.1.400	Lorene Faaley	.	42.74	1	-3.09	39.65	45	43.84	41	39				
4.Lot 12	E. H. Evers	4	44.80	28	-.40	f.43.50	43	f.45.05	41	35				
5.Lot 10	Mrs. Mary Corey	5	46.40	28	-.47	44.53	42	46.40	46	40				
5.Lot 14	W. B. Phillips	.	48.66	28	-1.59	45.23	42	48.66	46	39				
5.321	J. T. Gwinn	.	48.08	28	-1.78	44.81	42	48.08	46	39				
5.411	Mrs. E. J. Robinson	.	49.87	28	-2.48	45.72	42	49.87	46	39				
9.424	E. B. Varbo	.	51.21	28	-.95	50.76	44	52.48	41	38				
10.233	J. E. Simmons	.	52.29	28	-.27	50.22	42	52.61	41	40				
15.240	J. C. Griffin	.	43.34	28	-1.01	46.72	43	43.70	41	39				
27.133	State of New Mexico	3	49.38	23	+1.03	49.38	46	50.85	41	39				
16.37.19.200	H. T. Monteth	.	29.80	1	-.76	28.60	42	30.90	41	38				
33.110	Elbert Shipp	.	28.70	28	-.35	27.43	42	30.63	41	39				
16.38.25.144	J. S. and Rose Eaves	.	32.65	1	-.27	31.90	42	34.61	41	41				
28.444	J. L. Williams	3	30.78	1	+1.17	30.78	46	33.63	35	31	32			
35.110	Mrs. P. S. Bennett	.	35.35	1	-.98	34.02	44	36.57	41	40				
17.34.35.130	Phillips Petro. Co.	3	90.68	31	-.04	90.57	42	91.98	41	41				
17.35.35.120	do	3	39.12	31	-.20	38.85	44	41.45	41	41				
17.36.3.333	State of New Mexico	3	42.38	28	-.31	42.02	44	44.29	41	39				
17.37.13.310	John Catchings	.	26.67	1	-.32	26.05	44	28.84	41	39				
26.333	Mrs. D. E. Wilhoit	.	30.62	1	-3.75	26.21	43	30.62	46	38				
34.441	E. J. Caudill	.	25.90	1	-.49	24.60	45	27.22	41	41				
36.141	State of New Mexico	.	b.27.25	1	-1.75	23.78	42	26.15	40	39	41			
17.38.27.133	W. E. Manning	5	26.07	31	.....	.....	..	.....	..	46		
30.113	W. H. Martin	3	25.88	1	-.60	23.97	42	27.95	41	38				
30.312	C. M. Hawkins	3	23.39	1	-.46	26.47	42	30.44	41	30				
34.113	W. E. Busby	.	25.31	31	-.50	24.78	44	25.31	46	44				

* See footnotes at end of table.

Part 2. Water levels in January or February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January or February 1946, in feet--Continued

Location number	Owner	See also Part	Water levels										Record
			Jan. 1946 Level	1/ Day	Change 1945-46	Highest Level	Highest Year	Lowest Level	Lowest Year	Be- gan	Years missing		
18.36.27.111	State of New Mexico	3	39.62	31	-0.46	38.13	43	41.66	41	39			
18.38.2.131	Sam Dalmont	3	28.62	31	-.61	27.20	43	30.64	40	39			
4.232	J. R. Isaacs	3	23.55	31	-.47	22.17	43	25.59	40	30			
15.241	W. L. Greenon	3	27.97	31	-.45	26.77	43	29.16	41	40			
22.411	O. E. Key	5	35.34	31	-.57	34.43	43	35.67	41	40			
22.412	M. C. Younger	•	38.26	31	-.49	37.09	43	38.69	41	40			
23.131	Charles Mills	•	•••••	•	•••••	40.59	45	40.62	44	44	46		
26.343	J. F. Mattox	•	42.46	31	+1.77	40.30	43	44.23	45	40			
30.200	Mrs. Sadie Davis	3	23.95	31	-.25	23.70	45	27.56	31	31			
19.35.13.211	Clara Fowler	3	22.23	31	-.32	18.39	42	26.67	30	30			
24.222	F. K. Turner	•	19.52	31	-.32	18.00	42	20.38	41	39			
19.36.19.113	L. S. Evans	5	16.53	31	+37	15.18	42	17.93	41	39			
19.411	C. R. Jordan	•	16.87	31	-.05	16.44	42	ml 6.57	44	42			
32.111	S. F. Jordan	•	16.80	31	-.25	15.15	42	18.60	40	39			
32.321	E. T. Childers	•	26.77	31	-.37	23.80	42	26.77	46	42			
32.323	do	•	26.18	31	-.56	23.17	42	26.18	46	42			
19.37.1.231	Hobbs Country Club	5	25.33	31	-.56	24.77	25	25.33	46	45			
32.241	Mrs. E. A. Anderson	3	12.29	31	-.09	11.50	33	12.31	37	30			
19.38.2.122	A. C. Cheser	•	48.01	31	-1.67	43.59	42	48.01	46	40			
2.242	J. E. Nickson	•	46.42	31	-.85	44.88	42	46.97	41	41			
2.424	A. C. Cheser	•	44.88	31	-.36	44.00	43	46.54	41	41	42		
20.35.1.222	J. L. Wood	3	20.67	31	-.68	19.70	44	25.63	41	30			
20.37.9.110	W. H. Laughlin	3	29.43	31	-.82	27.18	43	42.40	38	30			
9.110a	do	3	28.70	31	-.85	26.36	43	37.12	41	41			

a Pumping.

b Pumping recently.

f From recorder charts.

i Jan. 28-31 or Feb. 1.

j Also 1937.

k Mar. 30.

m Also 1946.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946

Location number	12.36. 25.222	12.36. 27.212	12.36. 29.110	13.37. 13.132	14.35. 33.433	14.36. 13.211	14.37. 14.112	14.37. 27.130
Owner	State of N.M.	State of N.M.	Holt	Brown-field	Ander-son	Cham-bers	Smith	Fort
Jan. 29,30	20.93	35.60	29.38	28.32	.....	35.74	34.62	36.16
Feb. 1	.....	.....	.....	.....	40.08	.....	.....	.....
Mar. 22,23	21.00	35.63	29.95	28.41	40.09	35.75	34.66	36.19
May 24,25	21.02	35.67	.....	28.46	40.10	35.74	34.70	36.20
July 22,23	21.14	e35.6	c30.81	28.50	40.10	35.75	34.75	36.25
Sept. 25	21.12	35.58	.....	28.52	40.10	35.75	34.69	36.15
Nov. 26	20.26	33.62	.....	28.47	40.07	35.75	34.59	36.13
Location number	14.38. 28.120	15.36. 8.131	15.37. 21.330	16.36. 27.133	16.38. 28.444	17.34. 35.130	17.35. 35.120	17.36. 3.333
Owner	Cox	Beatty	Dean	State of N.M.	Will-iams	Petro-leum	Petro-leum	State of N.M.
Jan. 28,30, 31	25.40	40.09	29.36	49.38	.....	90.68	39.12	42.38
Feb. 1	.....	.....	.....	.....	30.78	.....	.....	.....
Mar. 21-23	25.28	40.08	a31.75	49.40	a31.68	90.66	39.17	42.40
May 24,25	25.26	40.10	a30.63	49.41	30.83	90.69	39.17	42.46
July 22,24, 25	25.88	40.12	b31.98	49.43	a29.97	90.58	39.18	42.56
Sept. 25,26	26.10	40.13	a29.76	49.37	131.67	90.60	39.20	42.56
Nov. 25,26	25.64	39.96	29.74	49.41	.....	90.32	38.64	42.25
Location number	17.38. 30.312	18.36. 27.111	18.38. 4.232	18.38. 15.241	18.38. 30.200	19.35. 13.211	19.37. 32.241	20.35. 1.222
Owner	Hawkins	State of N.M.	Isaacs	Greebon	Davis	Fowler	Ander-son	Wood
Jan. 31	.....	39.62	23.55	27.97	23.95	22.23	12.29	20.67
Feb. 1	28.39	.....	.....	.....	.....	.....	.....	.....
Mar. 21	28.43	39.61	23.58	28.36	23.97	22.27	12.33	20.75
May 23	28.79	39.70	23.53	29.95	24.04	22.31	12.24	20.92
July 22,24	c28.69	39.75	ce27.9	c47.50	24.13	22.36	12.31	21.00
Sept. 26	28.39	39.76	23.07	28.14	23.80	20.90	11.66	20.80
Nov. 25	c28.19	39.50	23.06	27.76	23.38	18.86	12.02	20.92
Location number	20.37. 9.110	20.37. 9.110a						
Owner	Laugh-lin	Laugh-lin						
Jan. 31	29.43	28.70						
Mar. 21	29.25	28.60						
May 23	29.68	28.89						
July 22	30.26	29.47						
Sept. 26	30.41	29.63						
Nov. 25	29.77	29.93						

a Pumping.

c Nearby well pumping.

e Dry at depth given.

i Measurement uncertain.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

12.36.29.110. E. D. Holt. Water-stage recorder removed Mar. 22, 1946.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 29	29.38	Feb. 12	29.38	Feb. 25	29.59	Mar. 10	29.76
30	29.38	13	29.38	26	29.61	11	29.73
31	29.39	14	29.40	27	29.70	12	29.72
Feb. 1	29.39	15	29.41	28	29.72	13	29.70
2	29.39	16	29.40	Mar. 1	29.72	14	29.76
3	29.39	17	29.40	2	29.75	15	29.73
4	29.38	18	29.40	3	29.69	16	29.70
5	29.38	19	29.50	4	29.67	17	29.76
6	29.40	20	29.55	5	29.74	18	29.73
7	29.39	21	29.60	6	29.77	19	29.78
8	29.39	22	29.64	7	29.77	20	29.78
9	29.39	23	29.68	8	29.79	21	29.85
10	29.39	24	29.62	9	29.81	22	29.87
11	29.39						

16.36.4.Lot 12. E. H. Byers. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Feb. 22, 23, Mar. 3-5, 44.70; Aug. 27, 28, 46.92.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	44.93	44.78	44.72	45.15	46.10	45.85	46.65	46.50	46.66	45.85	45.56	46.19
2	44.92	44.77	44.72	45.13	46.14	46.09	46.61	46.48	46.61	45.84	45.55	46.16
3	44.92	44.77	44.70	45.14	46.13	46.19	46.51	46.46	46.55	45.83	45.55	46.16
4	44.91	44.76	44.70	45.12	46.18	46.16	46.49	46.52	46.50	45.81	45.54	46.32
5	44.90	44.76	44.70	45.11	46.28	46.15	46.45	46.48	46.45	45.81	45.53	46.33
6	44.90	44.76	44.72	45.10	46.29	46.32	46.35	46.42	46.43	45.80	45.53	46.41
7	44.90	44.75	44.72	45.09	46.24	46.33	46.33	46.38	46.38	45.79	45.52	46.38
8	44.89	44.75	44.89	45.08	46.19	46.37	46.23	46.38	46.33	45.78	45.51	46.34
9	44.89	44.75	44.94	45.08	46.13	46.45	46.21	46.39	46.30	45.76	45.50	46.28
10	44.88	44.74	45.03	45.08	46.08	46.45	46.17	46.54	46.36	45.75	45.50	46.22
11	44.88	44.73	45.07	45.08	46.04	46.38	45.17	46.71	46.44	45.74	45.49	46.18
12	44.88	44.73	45.16	45.08	45.99	46.31	.....	46.68	46.41	45.73	45.49	46.15
13	44.88	44.73	45.29	45.24	45.93	46.26	.....	46.60	46.36	45.72	45.57	46.11
14	44.86	44.74	45.39	45.41	45.89	46.20	46.61	46.54	46.32	45.71	45.70	46.07
15	44.87	44.73	45.47	45.49	45.86	46.14	46.57	46.49	46.27	45.69	45.76	46.01
16	44.86	44.72	45.48	45.61	45.82	46.10	46.62	.....	46.24	45.68	45.89	46.00
17	44.85	44.72	45.46	45.65	45.79	46.07	46.63	46.41	46.21	45.67	46.03	45.96
18	44.83	44.71	45.43	45.63	45.76	46.04	46.66	46.36	46.18	45.66	46.07	45.93
19	44.83	44.72	45.39	45.60	45.85	46.00	46.73	46.33	46.14	45.65	46.13	45.91
20	44.82	44.71	45.36	45.58	45.87	45.98	46.77	46.29	46.11	45.64	46.21	45.87
21	44.82	44.71	45.33	45.55	45.94	45.93	46.80	46.27	46.07	45.63	46.30	45.84
22	44.81	44.70	45.32	45.53	45.94	45.93	46.80	46.43	46.06	45.63	.....	45.82
23	44.81	44.71	45.29	45.51	45.91	45.97	46.72	46.63	46.04	45.62	.....	45.80
24	44.81	44.71	45.28	45.48	45.88	46.02	46.68	46.81	46.01	45.61	46.46	45.78
25	44.80	44.70	45.26	45.48	45.84	46.12	46.63	46.87	45.97	45.60	46.50	45.83
26	44.80	44.71	45.25	45.65	45.80	46.23	46.52	46.89	45.94	45.60	46.46	45.93
27	44.79	44.72	45.24	45.77	45.77	46.33	46.47	46.92	45.92	45.58	46.41	46.06
28	44.78	44.71	45.20	45.84	45.76	46.46	46.42	46.92	45.91	45.58	46.37	46.21
29	44.77		45.19	45.88	45.73	46.54	46.36	46.86	45.89	45.57	46.31	46.32
30	44.78		45.17	45.98	45.71	46.63	46.35	46.79	45.87	45.57	46.26	46.31
31	44.78		45.16		45.71		46.40	46.71		45.56		46.25

Part 5. Miscellaneous data concerning observation wells

13.37.28.230. Hight. Drilled irrigation well, equipped with turbine pump. Measuring point, lip of $1\frac{1}{4}$ -inch hole in east side of pump base, 0.16 foot above concrete pump base and land-surface datum.

13.38.6.341. Fulton. Measuring point beginning Jan. 29, 1946, top of concrete pump base, north side of well, 0.52 foot above land-surface datum.

14.37.23.232. Whitman. Used drilled irrigation well, equipped with turbine pump, depth 140 feet. No casing. Measuring point, top edge of $\frac{3}{8}$ -inch hole in base of pump, east side of well. Subtract 0.25 foot from tape measurements to reduce to top of concrete well curb, 0.75 foot to reduce to land-surface datum. Water level, in feet below land-surface datum, 1945: July 27, 36.34.

14.38.27.240. Gaines. Water-level measurements previously reported for years 1943, 1944, and 1945 are for well 14.38.27.233.

14.38.28.120. Cox. Measuring point beginning July 23, 1946, top edge of Geological Survey washer nailed on east north-south 4- by 8-inch horizontal support for vertical shaft, 0.3 foot north of east vertical upright, 0.74 foot above land-surface datum.

16.36.5.Lot 10. Coxey. Measuring point beginning Jan. 28, 1946, top edge of casing, northwest side of well, 1.00 foot above land-surface datum. Pump removed from well.

17.38.27.133. Manning. Used drilled irrigation well, equipped with turbine pump, diameter 10 inches, depth 125 feet. Measuring point, top of concrete pump base, at land-surface datum. Water level, in feet below land-surface datum, 1944: July 27, 26.35.

18.38.22.411. Key. Formerly owned by E. C. Browning.

19.36.19.113. Evans. Measuring point beginning Jan. 31, 1946, east top edge of 7- by 10-inch timber on west side of well, north of notch, 0.60 foot above land-surface datum.

19.37.1.231. Country Club. Drilled irrigation and swimming pool well, equipped with turbine pump, diameter $12\frac{1}{2}$ inches, depth 126 feet. Measuring point beginning July 27, 1945, top edge of 1-inch hole in west side of pump, inside of pump case, 0.40 foot above raised concrete pump base, 1.70 feet above land-surface datum. Reference point established July 27, 1945, top of concrete floor around well, 0.40 foot above land-surface datum. Water levels, in feet below land-surface datum: May 15, 1944, 25.48; Jan. 12, 1945, 24.77; July 27, 1945, 27.87.

LUNA COUNTY (MIMBRES VALLEY)

By C. S. Conover

Part 1. General discussion

The Mimbres Valley, in which ground water is used extensively for irrigation, is in the southwestern portion of New Mexico, near Deming. Investigation of the ground-water resources of this area was continued in 1946 in cooperation with the State engineer of New Mexico. Data on early development of the area are contained in Geological Survey Bulletin 618 and Water-Supply Paper 345c. Results of continuation studies have been published in the 8th to 13th biennial reports of the State engineer of New Mexico. Results for the years 1938 to 1941 are to be published in a forthcoming report of the State engineer. Records of water levels in past years

in Luna County have been published in the following Geological Survey water-supply papers:

<u>Year of record</u>	<u>Water-Supply Paper</u>	<u>Page Nos.</u>
1927-39	886	423-449
1940	911	200-217
1941	941	228-243
1942	949	302-313
1943	991	256-268
1944	1021	249-262
1945	1028	252-267

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 the water level is essential as a major decline has occurred over a period of years making the recovery of water for irrigation costly.

Most of the development at the present time consists of deepening of present wells in order to tap additional aquifers. As the water in the deeper aquifers is under pressure, deepening of wells tends to temporarily reduce the pumping lift to a small extent. However, as all of the water appears to be part of the same hydrologic system, tapping of the deeper aquifers does not mean a new source of supply but does partially relieve the draft upon the shallow aquifers.

Water levels were measured in 127 wells distributed throughout the area in January 1946 by which time the major part of the recovery from the preceding summer's pumping had occurred. Comparing January readings from year to year gives the net annual change in water level. (See part 2 and figure 14.) Water levels were also measured in about 64 of these wells in March, May, July, September, and November in order to observe the varying seasonal fluctuations caused by pumping and the sporadic recharge from the Mimbres River. (See part 3.) Water-stage recorders were operated throughout the year on the same four wells as in preceding years and part of the year on another well. The daily readings obtained (see part 4) are helpful in completing the picture of the changing water levels. A total of 479 water-level measurements was made during the year on the observation wells, including 30 tape measurements made on the recorder wells. All measurements of water level were made by C. R. Murray and C. S. Conover.

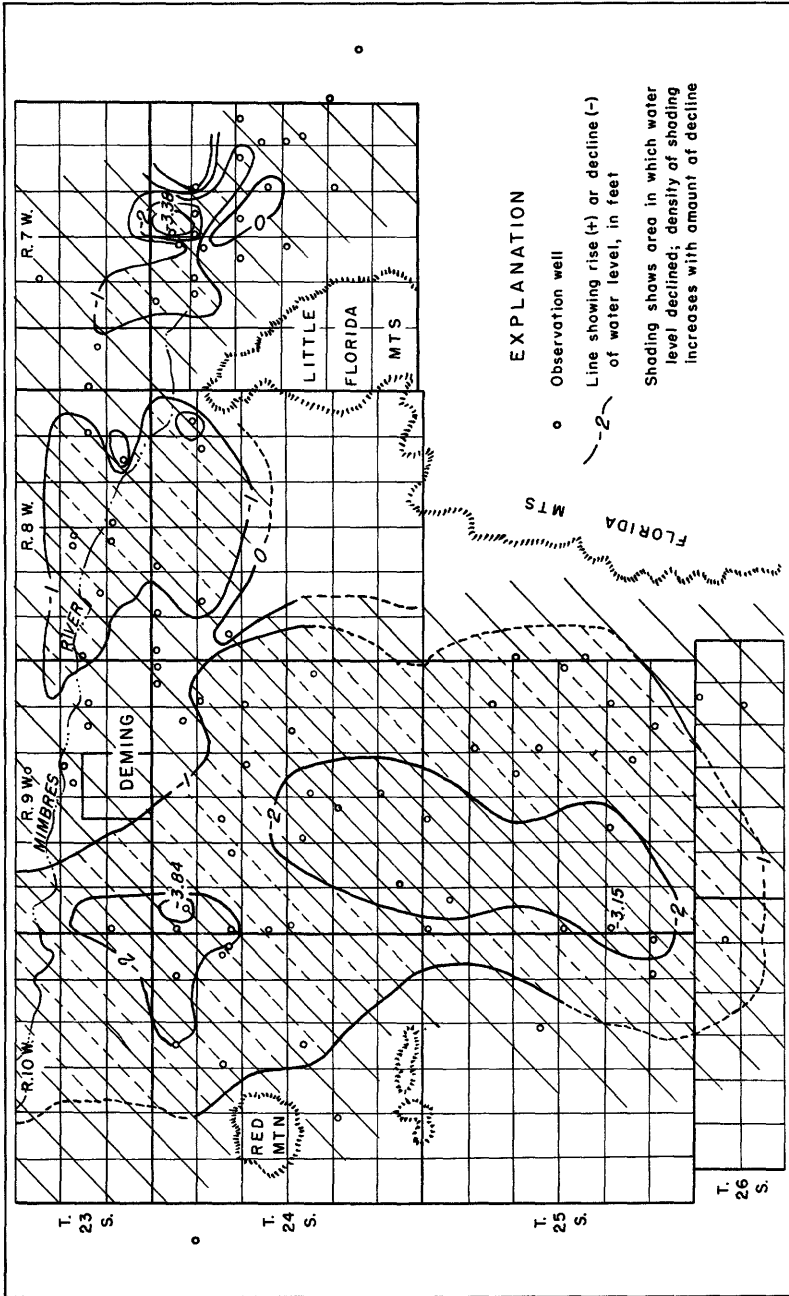


Figure 14.--Map of Mimbres Valley, Luna County, N. Mex., showing decline of water level from January 1946 to January 1947.

Precipitation and pumpage

Precipitation falling on the Mimbres Valley, particularly on the headwaters 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 reduces the amount of pumping necessary. In 1946 the precipitation at Deming, as reported by the U. S. Weather Bureau, was 7.79 inches, 1.93 inches below normal and 2.44 inches more than in 1945. The precipitation at Columbus, near the Mexican border, was 9.03 inches, 0.66 inch below normal, while that at Mimbres Ranger Station, in the area of the headwaters of the Mimbres River, was 15.30 inches, 3.07 inches below normal. Even though the precipitation exceeded that in 1945, the total was still somewhat below normal and did not materially affect the amount of pumping.

The acreage irrigated in the Mimbres Valley has continued to increase year by year, with an estimated 18,000 acres being irrigated in 1946. The increased acreage and the high price obtained for crops caused an increase in the amount of water pumped. On the basis of the ratings of 23 irrigation wells, which watered about 12 percent of the area irrigated and for which power records were available, it is estimated that 40,500 acre-feet of water was pumped for irrigation in 1946. An additional 1,700 acre-feet is estimated to have been used for domestic and industrial purposes, a slight reduction from 1945 as a result of cessation of activities of the Deming Army Air Field.

Fluctuations of water level

The net change in water level in the Mimbres Valley from January 1946 to January 1947 is given in figure 14. Water levels over practically all of the area declined to new lows. The largest recorded declines of over 3 feet occurred in two deep wells east of the Little Floridas and a deep well southwest of Deming. As the deeper aquifers have a higher head than the shallow aquifers, the decline of water level will be at a greater rate than that of the shallow aquifers. Water levels declined more than 2 feet over an area of about 29 square miles. This decline was confined to 4 areas, 1 of 22 square miles covering the western half of T. 25 S., R. 9 W. and the southwestern corner of T. 24 S., R. 9 W. in which most of the new development has occurred, another of about 6 square miles in the heavily

pumped area about 4 miles west of Deming, and 2 other small areas, of less than 1 square mile each, at the northern edge of the Little Floridas and in the pumped area east of the Little Floridas.

Declines of more than 1 foot occurred in principally 3 areas covering practically all of the irrigated area and totaling about 147 square miles, not including the area along the Mimbres River northwest of Deming. The area of decline west and south of Deming was the largest--122 square miles--while the area of decline east of Deming and northwest of the Little Floridas was 19 square miles, and the area northeast of the Little Floridas was about 6 square miles. A small area of rise enclosing two wells east of the Little Floridas was the result of abandoning the two wells in 1946 with a consequent small recovery of the drawdown caused by the past years of pumping. Other small areas of rise are indicated which are based upon individual wells.

Water levels in observation wells near the Mimbres River, about 13 miles northwest of Deming, all showed declines in excess of 1 foot from January 1946 to January 1947. One well showed a decline of 2.79 feet, and another well a decline of 5.91 feet. These declines indicate deficient recharge from the Mimbres River during 1946.

The increased area of decline of water levels in 1946 resulting from the increased pumpage is shown by the following table giving the comparative areas for preceding years:

<u>Year</u>	Area, in square miles, in which water levels declined more than	
	<u>1 foot</u>	<u>2 feet</u>
1941	36	5
1942	41	4
1943	100	10
1944	23	4
1945	133	9
1946	147	29

Because of the present area of development and the dry climatic conditions, it is expected that the water levels in the Mimbres Valley will continue to decline from year to year resulting in increased pumping lifts.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet

Location number	Owner	See also Part	Water levels				Record		
			Jan. 1946	Change 1945-46	Highest	Lowest			
		Level	Day	Level	Year	Level	Year		
21.10.6.112	Tom Tigner	3	8.73	11	6.57	33	9.05	44	29
21.11.13.411	Claude Irwin	3	39.77	11	24.65	32	44.50	40	29
13.411c	do	3	39.77	11	+1.22	39.77	39.99	45	45
35.310	State of New Mexico	3	50.88	11	-8.68	18.76	32	31.30	39
22.10.18.121	do	3	75.15	11	-0.88	68.51	30	75.15	46
20.210	do	3	91.72	11	-0.08	88.72	40	93.18	41
22.11.2.210	do	3	31.88	11	-3.52	21.11	30	31.89	46
13.122	do	3	66.93	11	-0.93	59.07	30	66.93	46
13.221	do	3	73.70	11	-1.83	66.06	30	73.70	46
14.222	do	3	59.46	11	-1.29	50.23	32	59.46	46
23.222	do	3	53.70	11	-1.09	47.43	42	60.30	37
23.7.17.242	Jack Smyer	3	94.29	9	-1.45	92.90	42	94.29	46
21.311	Unknown	3	70.38	9	-1.52	69.56	45	70.38	46
30.433	John Kelly	5	64.30	9	-1.11	58.42	40	64.30	46
30.Lot 16	H. T. Foster	3	23.04	8	-1.37	22.62	32	28.04	46
31.111	William Haas	3	659.51	1 2	-11.56	39.49	40	47.95	45
31.132	do	3	667.03	1 2	-17.98	40.60	40	49.05	45
33.211	Lewis and R. S. Smyer	3	65.20	9	-1.80	59.99	40	65.20	46
23.8.3.322	U. S. Government	3	132.28	9	-0.39	131.14	42	132.28	46
13.411	E. P. Peoples	3, 5	39.65	9	-0.23	34.67	30	38.65	46
25.311	Ed Remondini	3	22.74	8	-0.82	20.75	40	22.74	46
26.131	Geo. Snyder	3	37.10	8	-1.65	28.26	28	37.10	46
28.231	C. R. Lewis, Jr.	3	48.67	8	-1.90	43.50	42	48.67	46
28.241	do	3	48.04	8	-2.08	40.23	40	48.04	46
29.433	E. Krenek	3	50.44	8	-2.15	42.56	39	50.44	46
30.133	Lee Wilkerson	3	48.44	8	-1.27	44.92	39	48.44	46
32.323	H. H. Holliday	3	44.77	8	-1.03	33.22	29	44.77	46
33.221	Geo. Dowdle	5	41.27	8	-1.44	35.65	40	41.27	46
34.111	do	3	38.07	8	-1.46	33.52	40	39.07	46
34.211	E. B. Law	3	37.61	8	-1.87	27.50	29	37.61	46
35.233	Joe Remondini	3	29.58	8	+0.86	29.14	44	30.44	44
23.9.7.240	R. M. Wilson	3	89.22	11	-0.32	97.06	40	89.43	43
22.213	Roy Perkins	3	64.04	11	-0.54	58.77	32	64.04	46
25.311	Albert Ernst	3	57.90	8	-0.70	50.40	28	57.90	46
26.410	H. H. Ruebush	3	57.61	11	-0.72	53.64	39	57.61	46

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Jan. 1946		Change 1945-46	Water levels		Lowest Level	Year	Be-gan	Years missing	Record
			Level	Day		Highest Level	Year					
23.9.27.142	H. J. Thomas	3,5	62.87	9	-0.59	54.75	62.97	46	129	30,31, 33,34		
27.221	J. D. McDaniels	3,5	59.49	9	- .90	52.18	59.49	46	129	31,33		
31.110	Glen Neighbors	5	76.94	12	+2.82	75.38	79.76	45	40			
23.10.15.	State of New Mexico	(Measurements discontinued)										
24.6.29.300	Bill Birchfield	.	67.65	1 2	- .06	66.89	68.26	44	41	42		
30.111	do	.	68.60	1 2	- .47	66.16	68.60	46	41			
24.7.3.311	G. D. Hatfield	3	7.36	9	+1.99	7.36	9.35	45	45			
4.424	do	3	89.37	9	- .57	89.37	89.37	46	29			
5.211	R. M. Williamson	3	85.37	9	-1.16	86.90	85.37	46	32			30,33
8.212	J. M. McDougall	3	83.17	8	- .20	78.47	83.82	43	40			33,38
9.111	Smyer Bros.	3,5	84.66	8	- .80	77.25	84.79	44	39			44
9.241	G. D. Hatfield	4	91.49	8	- .74	84.60	91.80	44	40			
9.241a	do	3	22.25	9	- .76	21.49	22.25	46	45			
10.111	do	3,5	.....	..	.....	84.90	91.67	44	40			46
10.211	Fred Hasman	5	91.18	9	-2.40	82.47	91.18	46	40			
11.111	Edith E. Pollard	.	90.49	9	-2.91	74.69	90.49	46	39			42
13.212	Myrtle Franklin	.	71.92	1 2	- .49	66.55	71.92	46	40			
13.311	Robert Eggleston	5	78.87	1 2	-1.09	69.97	78.87	46	39			
14.221	J. H. Winslow	4	82.57	1 2	- .67	77.11	82.57	46	39			
14.331	Catherine Nordhaus	.	82.70	1 2	- .27	76.38	82.70	46	40			
15.122	Fred Abraham	.	82.71	1 2	- .33	79.36	82.71	46	39			
16.211b	Geo. Snyder	3	86.86	1 2	-1.05	81.08	86.86	46	42			
21.222	C. W. Gevvin	5	77.78	1 2	- .99	70.19	77.78	46	40			
24.111	Jasper Wilson	3	76.49	1 2	-1.07	69.79	76.49	46	40			
24.211	J. S. Hack	(Measurements discontinued)				68.37	73.24	45	40			46
24.312	Bill Birchfield	3	72.79	1 2	- .74	68.60	72.79	46	41			
26.113	do	3	71.63	1 2	- .71	69.59	71.63	46	43			
24.8.1.333b	F. K. Kretek	3	17.54	12	-1.68	15.86	18.00	44	40			
4.111	Foy Riley	4	39.59	8	-1.02	35.59	39.44	46	41			31-33, 35-37
5.111	R. A. Hackebell	.	46.14	8	- .17	34.52	46.14	46	29			
6.112	Deming Air Base	3	53.11	9	- .33	49.22	53.11	46	43			
7.451	Paul Hrna	.	44.39	10	-2.85	39.06	44.39	46	42			45
8.121	Mrs. J. F. Holiday	.	44.58	8	-1.28	40.21	44.58	46	39			
11.221	F. K. Kretek	3	17.37	12	-1.23	15.60	17.50	44	32			33,35
24.9.1.211	Deming Air Base	3	58.76	9	- .29	55.64	58.76	46	43			

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also part	Water levels										Record
			Jan. 1946		Change 1945-46		Highest		Lowest		Be-gan	Years missing	
			Level	Day	1945-46	1945-46	Level	Year	Level	Year			
24.9.1.222	Deming Air Base	3	55.81	9	-0.34	54.69	44	55.81	46	44			
2.421	Rosendo Trujillo	3, 5	57.71	10	-1.15	48.10	33	57.71	46	32	34, 35		
3.121	Jim Swartz	3	62.34	10	-.83	59.09	42	62.34	46	42			
6.311	J. B. Wells	3	80.36	9	-2.15	61.35	28	80.36	46	28	31, 33		
6.431	State of New Mexico	3	65.26	9	-3.12	57.90	42	66.26	46	42			
7.211	Emanuel Vocale	3	75.19	9	-3.48	67.49	42	78.76	41	39			
7.331	S. R. Moir	3	78.15	9	-1.44	66.10	30	78.15	46	30	31, 33		
8.112	E. F. Jonas	3	76.85	9	-1.29	61.90	31	76.85	46	30	33		
8.441	F. A. Eredecko	3	73.76	10	-1.41	68.60	40	73.76	46	40			
9.411	Joe Clary	3	69.50	10	-1.36	65.16	39	69.50	46	39			
12.111	E. H. Hatcher	3	57.75	10	-1.12	47.68	28	57.75	46	28	31, 32		
13.111	Mary E. Barrett	3, 5	32.34	10	-2.95	14.92	28	32.34	46	28	31, 33		
15.221	Joe Latonsky	3	66.17	10	-1.67	61.60	40	66.17	46	40			
18.311	Chas. Peter	3	76.68	9	-1.51	72.38	40	76.68	46	40			
19.111	Francis Ligocky	3	77.84	9	-1.58	72.82	40	77.84	46	40			
21.131	L. L. Gaskill	3	75.07	11	-1.84	59.33	29	75.07	46	28	33		
22.311	Joe Hrna	3	71.13	11	-1.63	69.50	45	71.13	46	45			
23.211	C. R. Isbell	3	72.23	10	-1.17	58.12	30	72.23	46	30	33		
24.421	W. F. Roberts	3	61.90	10	-1.01	57.99	41	61.90	46	40			
28.221	John Hrna	3	72.40	11	-1.47	62.88	41	72.40	46	41			
32.311	D. D. Roderick	3	75.70	11	-1.43	69.00	40	75.70	46	40			
34.111	H. C. Norwood	3				59.13	41	66.85	45	41	46		
			(Measurements discontinued; well filled)										
34.111a	V. V. Norwood	5	65.94	**	....	....	**	....	..	..	46	
24.10.1.311	R. V. Griggs	3	81.43	10	-1.89	78.45	42	82.27	44	41			
3.411	Josh Bryan	3	88.97	10	-1.52	79.17	30	88.97	46	30	31, 33, 34		
3.411b	do	3	81.40	10	-1.32	76.34	42	81.40	46	41			
10.311	John Titch	3	83.92	10	-1.10	75.53	30	83.92	46	30	33, 34, 36		
12.111	Morgan Garrett	3	83.92	10	-1.10	75.53	30	83.92	46	30	33, 34, 36		
12.431	Steve Hrna	4	81.61	9	....	79.69	39	85.01	44	39		
12.432a	do	3	80.93	9	-1.43	77.28	40	80.93	46	40			
12.432b	do	3	81.34	9	-1.42	78.05	40	81.34	46	40			
22.211	E. F. Hurt	3	71.86	10	-.88	69.61	42	71.86	46	42			
29.222	State of New Mexico	3	65.22	10	-.47	63.87	41	65.22	46	41			
24.11.1.353	J. D. Smith	3	100.11	10	-.30	99.78	44	100.11	46	44			
25.18.18.111	Spencer McCann	3	54.79	10	-1.53	50.00	40	54.79	46	40			

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels						Record		
			Jan. 1946		Change 1945-46		Highest				
			Level	Day	Level	Year	Level	Year		Lowest	Year	Be- gan	miss- ing
25.8.19.331	Unknown	4	61.80	10	-1.20	59.01	42	61.80	46	46	42
25.9.4.211	Val Miller		70.78	11	-1.74	63.70	41	70.79	46	41	41
5.111	P. M. Yates		69.32	11	-1.35	65.14	41	69.32	46	40	40
6.421	Roderick & Wheeler		72.83	11	-1.97	66.41	39	72.83	46	39	39
11.111	J. E. Anderson		67.45	10	-1.62	60.01	39	67.45	46	39	39
12.311	Jo Willa Cheek		61.60	10	-0.95	56.69	40	61.60	46	40	40
14.311	C. W. Gaines		62.05	12	-1.14	57.10	40	62.05	46	40	40
15.211	C. H. Paulk		65.92	12	-1.93	59.78	39	65.92	46	39	39
17.311	Tom Tjgner		(Measurements discontinued)								
19.111	Tom Marcak		67.65	12	-1.73	62.41	40	67.65	46	40	46
21.311	A. W. Speir		(a)	12	***	63.48	39	67.97	45	39	46
24.222	D. J. Schmelzla		52.17	10	-1.32	42.26	28	52.17	46	28	33
24.222a	do	5	52.15	10	***	***	**	***	**	**	46
25.111	Alan Crotchett	5	50.61	12	-1.01	47.54	40	50.61	46	40	40
27.422	E. A. Gray		57.86	12	-1.04	53.42	40	57.86	46	40	40
28.121	Leonard Zumwalt		70.25	12	-1.56	66.03	42	70.25	46	42	42
30.111	W. M. Robertson		62.45	12	-2.32	55.78	40	62.45	46	40	42
35.211	Joe Marcak		51.95	10	-0.92	47.21	39	51.95	46	39	39
25.10.15.422	C. H. Graves		59.80	12	-0.83	57.18	40	59.80	46	40	45
36.111	State of New Mexico		64.10	12	***	53.84	40	64.10	46	40	45
36.222	do		64.90	12	-2.01	56.94	39	64.90	46	39	45
26.9.2.221	T. R. Taylor		42.32	10	-0.69	39.69	41	42.32	46	41	42
4.331	R. E. Smyer		85.62	12	-1.66	52.28	41	85.62	46	41	41
11.211	State of New Mexico	5	39.90	10	-0.56	37.30	40	39.90	46	40	40
26.10.1.310	Theo. Eisen		61.64	12	-0.75	55.42	28	61.64	46	28	33,36-39
27.8.8.411	Bill Hirschfeld		23.79	12	-1.14	23.45	42	24.29	40	40	40
27.9.12.111	Waterloo School	3	27.12	12	+0.3	27.15	46	27.15	45	45	45
29.7.15.211	R. M. Marshall		6.35	12	+1.01	1.50	41	14.53	44	40	43
29.8.12.244	A. G. Anderson		7.55	12	-0.18	7.07	40	7.55	46	40	40
15.111	L. L. Burkhead		6.72	12	-0.07	6.44	k40	6.72	46	40	40

a Pumping.
 b Pumping recently.
 c From recorder charts.
 d February.
 e Mar. 3, 1929.
 f Also 1942.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946

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. 14.222
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. 11	8.73	38.77	30.88	75.15	31.88	66.93	73.70	59.46
Mar. 29	8.22	39.80	32.00	75.28	32.67	67.17	73.95	59.75
May 22	9.32	(a)	32.48	75.57	33.08	67.38	74.15	59.93
July 26	10.06	42.54	32.98	75.78	33.45	67.60	74.37	60.19
Sept. 25	10.36	43.69	32.78	75.92	33.57	67.80	74.51	60.38
Nov. 9	10.01	48.67	33.27	75.87	33.79	67.88	74.60	60.48
Location number	22.11. 23.222	23.7. 21.311	23.7. 30.L16	23.7. 31.111	23.8. 3.322	23.8. 13.411	23.8. 26.131	23.8. 32.323
Owner	State of N.M.	Un- known	Foster	Haas	U. S. Gov't.	Peeples	Snyder	Holiday
Jan. 8,9, 11	53.70	70.38	28.04	.....	132.28	38.65	37.10	44.77
Feb. 2	.....	.....	.....	59.51	.....	.....	.....	.....
Mar. 27-29	53.94	70.50	28.20	70.30	132.29	38.62	38.10	44.35
May 21,22	54.18	70.58	28.73	(a)	132.32	38.94	(c)	44.75
July 24-26	54.40	70.69	29.05	(a)	132.40	(a)	.....	45.24
Sept. 24,25	54.61	69.99	29.45	(a)	132.51	39.92	(c)	e45.8
Nov. 6,7, 9	54.70	69.70	29.48	76.87	132.57	39.47	40.72	e45.8
Location number	23.8. 34.111	23.8. 34.211	23.9. 22.213	23.9. 25.311	23.9. 27.142	23.9. 27.221	24.7. 3.311	24.7. 4.424
Owner	Dowdle	Law	Perkins	Ernst	Thomas	McDaniel	Hat- field	Hat- field
Jan. 8,9, 11	39.07	37.61	64.04	57.90	62.87	59.49	7.36	89.37
Mar. 27,28	.....	37.06	63.98	58.45	.....	59.56	6.93	87.77
May 21,22	.....	(a)	64.36	b59.47	63.39	a62.54	.....	a92.58
July 24,25	51.73	(a)	65.17	59.70	63.30	59.80	11.57	92.68
Sept. 24,25	50.51	44.52	65.10	(a)	63.56	60.00	18.06	93.83
Nov. 6-8	43.34	41.81	64.70	58.89	63.59	60.07	12.87	91.93
Location number	24.7. 5.211	24.7. 9.111	24.7. 9.241a	24.7. 10.111	24.7. 16.211b	24.7. 24.111	24.7. 24.312	24.7. 26.113
Owner	Will- iamson	Smyer Bros.	Hat- field	Hat- field	Snyder	Wilson	Birch- field	Birch- field
Jan. 8,9	85.37	84.66	22.25	.....	.....	.....	.....	.....
Feb. 2	.....	84.96	.....	.....	86.86	76.49	72.79	71.63
Mar. 27,28	85.26	83.53	22.32	17.53	b86.98	76.41	72.86	a73.68
May 22	a86.07	84.06	24.77	.....	87.12	76.56	72.94	a77.54
July 24	86.20	(a)	.....	28.67	b87.29	76.87	73.02	b72.67
Sept. 25	b86.67	(a)	.....	35.28	87.62	77.36	73.16	b76.12
Nov. 6,7	86.40	86.91	.....	22.51	87.56	77.30	73.27	72.18
Location number	24.8. 1.333b	24.8. 6.112	24.8. 11.221	24.9. 1.211	24.9. 1.222	24.9. 2.421	24.9. 6.311	24.9. 6.431
Owner	Kretek	Air Base	Kretek	Air Base	Air Base	Tru- jillo	Wells	State of N.M.
Jan. 9,10, 12	17.54	53.11	17.37	58.76	55.81	57.71	80.36	66.26
Mar. 27-29	17.72	52.46	17.22	58.18	55.20	57.76	79.47	c68.94
May 22,23	b24.60	.....	18.12	.....	.....	.....	(a)	c74.56
July 24,25	19.92	52.95	18.97	58.58	58.63	a58.41	(a)	acl20.58
Sept. 25,26	20.67	53.05	19.47	58.69	55.72	.....	(a)	76.72
Nov. 6-8	20.17	53.12	19.28	58.74	55.80	58.44	85.66	71.20

* See footnotes at end of table.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946--Continued

Location number	24.9. 7.331	24.9. 8.112	24.9. 9.411	24.9. 13.111	24.9. 19.111	24.9. 21.131	24.9. 23.211	24.10. 3.411
Owner	Moir	Jonas	Clary	Barrett	Ligocky	Gaskill	Isbell	Bryan
Jan. 9-11	78.15	76.85	69.50	32.34	77.84	75.07	72.23	88.97
Mar. 28,29	c15.75	76.13	69.74	31.46	77.96	c87.26	72.98	89.62
May 23	88.03	77.85	c82.81	48.59	79.19	d80.55	(a)	90.06
July 24,25	(c)	e79	c85.90	(a)	81.45	d86.87	(a)	90.48
Sept.25,26	85.02	e79	77.23	(a)	81.70	c87.80	75.94	90.73
Nov. 7,8	82.90	.....	73.48	b55.29	80.20	79.76	74.98	91.09
Location number	24.10. 3.411b	24.10. 10.311	24.10. 22.211	24.10. 29.222	25.8. 18.111	25.9. 6.421	25.9. 11.111	25.9. 21.311
Owner	Bryan	Tilch	Hurt	State of N.M.	McCann	Roder- ick & Wheeler	Ander- son	Speir
Jan. 10-12	81.40	83.92	71.86	65.22	54.79	72.83	67.45	(a)
Mar. 28,29	(a)	c91.02	71.94	65.27	55.46	73.35	67.02	69.50
May 23	c82.91	84.97	72.12	65.35	56.37	b76.34	69.67	(a)
July 25	(a)	87.25	72.41	65.46	59.82	b87.65	.....	(a)
Sept.26	83.73	86.55	72.78	65.55	58.43	78.99	73.11	74.27
Nov. 8	83.40	85.55	72.89	65.70	c57.82	76.76	b70.18	72.62
Location number	25.9. 24.222a	25.9. 28.121	25.9. 35.211	25.10. 36.222	26.9. 2.221	26.9. 11.211	27.8. 8.411	27.9. 12.111
Owner	Schmel- zla	Zumwalt	Marcak	State of N.M.	Taylor	State of N.M.	Birch- field	School
Jan. 10,12	52.15	70.25	51.95	64.90	42.32	39.90	23.79	27.12
Mar. 28,29	52.28	71.37	51.96	63.90	42.40	39.94	23.76	27.02
May 23	.....	b72.39	b52.75	(a)	b42.97	40.02	23.77	27.27
July 24,25	(a)	74.32	53.49	(a)	43.09	40.15	23.92	27.60
Sept.26	54.78	75.49	(a)	73.07	b43.68	40.32	23.93	27.75
Nov. 8	53.92	74.15	53.75	68.32	43.11	40.41	24.00	27.58

a Pumping.

b Pumping recently.

c Nearby well pumping.

e Dry at depth given.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

24.7.9.241. G. D. Hatfield. Water-stage recorder installed Aug. 7, 1946.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Jan. 9	h91.49	Aug. 25	92.21	Sept. 17	92.18	Oct. 14	91.86
Feb. 2	h91.12	26	92.19	18	92.18	15	91.86
Mar. 28	h90.59	27	92.16	19	92.18	16	91.85
May 22	h92.11	28	92.24	20	92.10	17	91.88
July 24	h92.73	29	92.28	21	92.08	18	91.88
Aug. 7	92.35	30	92.32	22	92.10	19	91.92
8	92.40	31	92.32	23	92.12	20	91.89
9	92.44	Sept. 1	92.37	24	92.06	21	91.88
10	92.45	2	92.37	25	h92.03	22	91.89
11	92.44	3	92.34	30	91.92	23	91.87
12	92.47	4	92.32	Oct. 1	91.88	24	91.87
13	92.53	5	92.30	2	91.86	25	91.88
14	92.50	6	92.28	3	91.86	26	91.88
15	92.50	7	92.25	4	91.85	27	91.94
16	92.52	8	92.24	5	91.92	28	91.93
17	92.52	9	92.25	6	91.84	29	91.89
18	92.45	10	92.23	7	91.85	30	91.92
19	92.41	11	92.19	8	91.84	Nov. 1	91.88
20	92.33	12	92.15	9	91.86	2	91.87
21	92.27	13	92.19	10	91.86	4	91.97
22	92.21	14	92.16	11	91.91	6	h91.95
23	92.19	15	92.16	12	91.85	7	h91.93
24	92.21	16	92.16	13	91.87	8	91.88

h Tape measurement at odd hour.

24.7.14.221. J. H. Winslow. Water runs into well during periods of heavy rainfall. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Apr. 25, 81.71; Oct. 4-7, 84.75.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	82.88	82.57	82.30	81.98	81.89	82.72	83.42	83.92	84.39	84.72	84.34	84.00
2	82.87	82.57	82.29	81.96	81.91	82.72	83.45	83.95	84.41	84.73	84.32	83.98
3	82.86	82.56	82.27	81.96	81.94	82.72	83.49	83.97	84.43	84.74	84.32	83.97
4	82.85	82.54	82.24	81.95	82.00	82.72	83.52	83.99	84.45	84.75	84.30	83.95
5	82.83	82.56	82.25	81.95	82.06	82.72	83.54	84.01	83.29	84.75	84.28	83.95
6	82.83	82.53	82.23	81.95	82.10	82.73	83.56	84.02	83.62	84.75	84.26	83.93
7	82.82	82.51	82.23	81.94	82.16	82.73	83.58	84.04	84.31	84.75	84.24	83.93
8	82.80	82.50	82.21	81.95	82.21	82.72	83.61	84.06	84.46	84.73	84.21	83.92
9	82.80	82.50	82.21	81.95	82.24	82.72	83.63	84.08	84.50	84.72	84.21	83.91
10	82.78	82.49	82.19	81.94	82.30	83.73	83.65	84.10	84.51	84.71	84.20	83.90
11	82.77	82.48	82.16	81.95	82.35	82.74	83.68	84.12	84.51	84.69	84.19	83.89
12	82.76	82.48	82.17	81.95	82.40	82.73	83.70	84.14	84.50	84.67	84.17	83.89
13	82.75	82.47	82.15	81.94	82.44	82.74	83.71	84.15	84.50	84.66	84.15	83.88
14	82.75	82.45	82.13	81.94	82.49	82.77	83.74	84.17	84.50	84.64	84.13	83.87
15	82.74	82.44	82.12	81.94	82.53	82.80	83.77	84.18	84.49	84.63	84.13	83.85
16	82.73	82.42	82.12	81.94	82.57	82.83	83.78	84.18	84.48	84.60	84.12	83.84
17	82.71	82.42	82.11	81.94	82.61	82.85	83.79	84.19	84.49	84.59	84.10	83.83
18	82.70	82.41	82.11	81.93	82.64	82.87	83.80	84.19	84.50	84.58	84.09	83.82
19	82.70	82.40	82.09	81.93	82.66	82.92	83.81	84.19	84.52	84.56	84.08	83.81
20	82.69	82.38	82.09	81.93	82.68	82.96	83.81	84.20	84.53	84.54	84.07	83.81
21	82.69	82.38	82.08	81.92	82.70	82.99	83.82	84.21	84.55	84.53	84.07	83.79
22	82.66	82.37	82.07	81.91	82.71	83.03	83.82	84.22	84.56	84.51	84.05	83.78
23	82.65	82.36	82.05	.....	82.73	83.07	83.82	84.24	84.58	84.50	84.03	83.78
24	82.64	82.34	82.02	.....	82.75	83.11	83.81	84.26	84.60	84.48	84.02	83.77
25	82.62	82.33	82.02	81.71	82.75	83.16	83.81	84.27	84.62	84.46	84.03	83.75
26	82.62	82.32	82.01	81.87	82.74	83.20	83.82	84.29	84.63	84.45	84.02	83.74

24.7.14.221--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
27	82.62	82.31	82.00	81.87	82.74	83.24	83.83	84.31	84.65	84.43	84.01	83.73
28	82.61	82.30	82.00	81.87	82.74	83.28	83.83	84.32	84.67	84.41	84.00	83.72
29	82.59		82.00	81.87	82.74	83.33	83.86	84.34	84.69	84.39	84.00	83.71
30	82.59		82.00	81.88	82.73	83.38	83.72	84.35	84.71	84.38	84.00	83.69
31	82.57		81.99		82.73		83.81	84.37		84.36		83.69

24.8.4.111. Foy Riley. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Apr. 2, 38.94; Oct. 28, 30, 31, Nov. 1, 3-5, 40.73.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	39.44	39.23	.....	38.95	39.16	39.54	.....	40.22	40.48	40.71	40.73	40.63
2	39.43	39.22	.....	38.94	39.17	39.55	.....	40.23	40.49	40.71	40.71	40.63
3	39.42	39.21	.....	38.95	39.18	39.57	.....	40.24	40.50	40.71	40.73	40.63
4	39.41	39.19	.....	38.95	39.20	39.59	.....	40.25	40.50	40.70	40.73	40.62
5	39.39	39.20	.....	38.95	39.21	39.60	.....	40.26	40.52	40.71	40.73	40.61
6	39.40	39.19	.....	38.95	39.22	39.61	.....	40.27	40.52	40.71	40.71	40.60
7	39.40	39.18	.....	38.95	39.23	39.63	.....	40.28	40.53	40.71	40.71	40.59
8	39.39	39.17	.....	38.95	39.24	39.64	.....	40.28	40.54	40.71	40.70	40.59
9	39.39	39.17	.....	38.96	39.24	39.65	.....	40.29	40.55	40.71	40.70	40.58
10	39.39	39.16	.....	38.96	39.25	39.67	.....	40.30	40.56	40.71	40.70	40.57
11	39.38	39.15	.....	38.96	39.26	39.68	.....	40.30	40.57	40.72	40.70	40.57
12	39.38	39.14	.....	38.97	39.27	39.70	.....	40.31	40.58	40.72	40.70	40.57
13	39.36	39.15	.....	38.96	39.28	39.71	.....	40.32	40.58	40.72	40.70	40.57
14	39.35	39.15	.....	38.96	39.29	39.73	.....	40.32	40.59	40.72	40.69	40.57
15	39.35	39.14	.....	38.98	39.30	.....	.....	40.32	40.60	40.72	40.69	40.57
16	39.35	39.13	.....	38.99	39.32	.....	.....	40.33	40.61	40.71	40.69	40.56
17	39.34	39.13	.....	39.00	39.33	.....	.....	40.34	40.61	40.72	40.69	40.56
18	39.32	.....	.....	39.01	39.34	.....	.....	40.35	40.62	40.72	40.69	40.56
19	39.32	.....	.....	39.02	39.36	.....	.....	40.36	40.63	40.72	40.68	40.55
20	39.31	.....	.....	39.02	39.37	.....	.....	40.37	40.64	40.72	40.67	40.55
21	39.31	.....	.....	39.03	39.39	.....	.....	40.38	40.64	40.72	40.67	40.54
22	39.31	.....	.....	39.04	39.40	.....	.....	40.39	40.65	40.72	40.67	40.53
23	39.30	.....	.....	39.05	39.40	.....	.....	40.40	40.66	40.72	40.66	40.52
24	39.29	.....	.....	39.08	39.42	.....	40.14	40.41	40.66	40.72	40.64	40.51
25	39.28	.....	.....	39.08	39.43	.....	40.15	40.42	40.67	40.72	40.65	40.50
26	39.27	.....	.....	39.10	39.45	.....	40.15	40.43	40.67	40.72	40.65	40.49
27	39.26	.....	38.96	39.10	39.45	.....	40.16	40.44	40.67	40.72	40.65	40.49
28	39.26	.....	38.96	39.11	39.48	.....	40.18	40.45	40.68	40.73	40.65	40.49
29	39.24	.....	38.96	39.13	39.49	.....	40.18	40.46	40.69	40.72	40.64	40.49
30	39.23	.....	38.95	39.14	39.50	.....	40.19	40.47	40.70	40.73	40.63	40.48
31	39.24	.....	38.95	.....	39.51	.....	40.21	40.47	.....	40.73	.....	40.48

24.10.12.431. Steve Hrna. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Mar. 24, 80.37; Sept. 9, 86.37.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	81.84	80.97	80.90	80.51	81.32	81.91	84.22	85.31	86.24	85.49	84.57	83.87
2	81.80	80.94	80.82	80.49	81.31	81.93	84.28	85.35	86.26	85.46	84.56	83.85
3	81.74	80.90	80.80	80.52	81.31	81.95	84.31	85.38	86.29	85.41	84.58	83.87
4	81.72	80.86	80.79	80.52	81.31	81.95	84.36	85.42	86.31	85.36	84.38	83.84
5	81.67	80.90	80.79	80.54	81.31	81.96	84.39	85.44	86.33	85.31	84.56	83.81
6	.....	80.86	80.78	80.55	81.31	81.99	84.43	85.46	86.35	85.26	84.33	83.77
7	.....	80.84	80.77	80.56	81.32	82.03	84.45	85.51	86.36	85.20	84.31	83.74
8	.....	80.86	80.74	80.57	81.30	82.12	84.44	85.56	86.35	85.15	84.51	.....
9	81.60	80.94	80.71	80.60	81.31	82.21	84.43	85.59	86.37	85.10	84.34	.....
10	81.55	80.97	80.67	80.64	81.33	82.27	84.45	85.63	.....	85.05	84.36	.....
11	81.52	81.03	80.60	80.66	81.33	82.33	84.49	85.65	86.23	84.99	84.55	83.68
12	81.52	81.09	80.59	80.66	81.35	.....	84.53	85.67	86.19	84.93	84.33	83.67

g Estimated.

24.10.12.431--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
13	81.46	81.22	80.53	80.68	81.39	82.54	84.57	85.70	86.15	84.88	84.29	83.64
14	81.44	81.25	80.51	80.72	81.42	82.67	84.62	85.73	86.11	84.83	.....	83.61
15	81.44	81.20	80.51	80.77	81.44	82.81	84.64	85.76	86.17	84.79	.....	83.56
16	81.40	81.16	80.51	80.82	81.45	82.94	84.67	85.78	86.04	84.73	.....	83.53
17	81.37	81.16	80.49	80.89	81.47	83.06	84.71	85.81	86.01	84.70	.....	83.50
18	81.33	81.12	80.46	80.96	81.46	83.15	84.76	85.84	85.99	84.66	.....	83.45
19	81.30	81.09	80.43	81.06	81.49	83.27	84.80	85.86	85.96	84.63	.....	83.41
20	.....	81.05	80.43	81.17	81.52	83.37	84.85	85.90	85.93	84.59	.....	83.41
21	.....	81.02	80.42	81.28	81.57	83.47	84.87	85.92	85.91	84.56	84.03	83.37
22	.....	81.01	80.40	81.33	81.65	83.57	84.89	.....	85.89	84.48	83.99	83.34
23	81.21	80.99	80.39	81.35	81.71	83.65	84.92	86.00	85.86	84.48	83.95	83.31
24	81.15	80.95	80.37	81.36	81.79	83.73	84.96	86.03	85.81	84.46	83.95	83.28
25	81.11	80.91	80.39	81.37	81.83	83.81	85.02	86.06	85.75	84.43	83.93	83.22
26	81.10	80.90	80.47	81.35	81.83	83.88	85.10	86.08	85.71	84.42	83.92	83.14
27	.....	80.90	80.53	81.33	81.85	83.96	85.13	86.11	85.67	84.44	83.90	83.12
28	.....	80.88	80.55	81.33	81.88	84.01	85.17	86.14	85.63	84.44	83.86	83.10
29	.....	.....	80.54	81.33	.....	84.08	85.20	86.16	85.60	84.42	83.84	83.06
30	81.01	.....	80.54	81.32	81.90	84.15	85.24	86.19	85.55	84.41	83.84	83.02
31	80.99	.....	80.52	.....	81.90	.....	85.28	86.21	.....	84.38	.....	83.01

g Estimated.

25.9.4.211. Val Miller. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Jan. 6, 70.74; Dec. 23, 24, 73.25.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	70.75	70.79	70.80	70.84	71.01	.....	72.08	72.55	72.92	73.07	73.17
2	70.76	70.79	70.82	70.85	71.02	.....	72.09	72.57	72.92	73.05	73.18
3	70.75	70.80	70.79	70.86	71.03	.....	72.12	72.57	72.94	73.08	73.18
4	70.75	70.77	.....	70.86	71.03	.....	72.13	72.60	72.93	73.07	73.18
5	70.75	70.80	.....	70.86	71.05	.....	72.14	72.62	72.95	73.09	73.18
6	70.74	70.80	.....	70.86	71.06	.....	72.16	72.62	72.94	73.09	73.19
7	70.76	70.79	.....	70.86	71.08	.....	72.17	72.64	72.96	73.09	73.19
8	70.77	70.78	.....	70.86	71.08	.....	72.18	72.66	72.96	73.09	73.19
9	70.76	70.78	.....	70.87	71.09	.....	72.20	72.67	72.97	73.10	73.20
10	70.77	70.79	.....	70.87	71.09	.....	72.22	72.67	72.98	73.11	73.17
11	70.77	70.79	.....	70.88	71.10	.....	72.23	72.69	72.98	73.10	73.20
12	70.77	70.79	.....	70.88	71.10	.....	72.25	72.70	72.99	73.10	73.21
13	70.77	70.81	.....	70.88	71.12	.....	72.27	72.72	72.98	73.10	73.22
14	70.78	70.81	.....	70.89	71.12	.....	72.29	72.73	73.00	73.09	73.22
15	70.78	70.80	.....	70.90	71.13	.....	72.30	72.74	73.00	73.10	73.22
16	70.78	70.78	.....	70.91	71.14	.....	72.31	72.77	73.00	73.13	73.23
17	70.77	70.80	.....	70.92	71.15	.....	72.33	72.77	73.01	73.13	73.23
18	70.77	70.79	.....	70.93	71.16	.....	72.33	72.79	73.02	73.11	73.22
19	70.78	70.79	.....	70.94	71.16	.....	72.35	72.79	73.01	73.12	73.23
20	70.77	70.80	.....	70.95	71.17	.....	72.37	72.80	73.02	73.13	73.24
21	70.78	70.80	.....	70.96	71.18	.....	72.38	72.80	73.03	73.14	73.24
22	70.77	70.80	.....	70.97	71.19	.....	72.39	72.81	73.02	73.12	73.23
23	70.78	70.80	.....	70.97	71.19	.....	72.42	72.83	73.03	73.13	73.25
24	70.78	70.80	.....	70.97	.....	.....	72.43	72.84	73.04	73.13	73.23
25	70.78	70.79	.....	70.97	.....	71.99	72.45	72.84	73.04	73.15	73.25
26	70.79	70.79	.....	70.97	.....	72.00	72.47	72.85	73.05	73.15	.....
27	70.78	70.81	.....	70.97	.....	72.01	72.47	72.88	73.05	73.16	.....
28	70.79	70.80	70.85	70.98	.....	72.03	72.50	72.88	73.04	73.14	.....
29	70.78	.....	70.85	70.99	.....	72.04	72.51	72.87	73.06	73.16	.....
30	70.79	.....	70.84	71.00	.....	72.04	72.51	72.90	73.06	73.17	.....
31	70.79	.....	70.84	.....	.....	72.07	72.52	.....	73.05	.....	.....

Part 5. Miscellaneous data concerning observation wells

- 23.7.30.433. Kelly. Measuring point beginning Jan. 9, 1946, top surface of concrete well curb, at land-surface datum.
- 23.8.13.411. Peeples. Turbine pump installed prior to July 23, 1946. Measuring point beginning Nov. 6, 1946, west top edge of lower 3- by 12-inch timber, northeast side of turbine pump, 0.24 foot above land-surface datum.
- 23.8.33.221. Dowdle. Measuring point beginning Jan. 9, 1946, top of concrete curb, east side of well, 1.00 foot above land-surface datum.
- 23.9.27.142. Thomas. Turbine pump installed on well 23.9.27.142a, about 15 feet west, prior to May 1946 measurement. Measuring point beginning Nov. 7, 1946, raised to 0.86 foot above land-surface datum.
- 23.9.27.221. McDaniels. Formerly owned by R. E. Hardaway.
- 23.9.31.110. Neighbors. Well deepened in February 1945 to 315 feet. Measuring point beginning Jan. 12, 1946, top edge of rectangular hole in basal flange of pump, west side, 2.08 feet above land-surface datum.
- 24.7.9.111. Smyer Bros. Measuring point beginning Mar. 27, 1946, top of concrete well curb, south side of well, 0.71 foot below land-surface datum.
- 24.7.10.111. Hatfield. Diameter 16 inches. Deepened to 803 feet in March 1946. Measuring point beginning July 24, 1946, top of 16-inch casing, north side of well, 0.35 foot above land-surface datum.
- 24.7.10.211. Hassman. Measuring point, beginning Jan. 9, 1946, top of concrete well curb, north side of well, 0.50 foot below land-surface datum. Pump had been removed from well.
- 24.7.13.311. Eggleston. Measuring point beginning Feb. 2, 1946, top of concrete pump base, northeast side of well, 0.70 foot above land-surface datum.
- 24.7.21.222. Gevrin. Measuring point beginning Feb. 2, 1946, lowered to 0.35 foot above land-surface datum, now on east side of well.
- 24.9.2.421. Trujillo. Turbine pump removed and windmill installed prior to May 23, 1946. Measuring point beginning July 24, 1946, top edge of 3- by 5-inch pipe clamps, 0.64 foot above land-surface datum.
- 24.9.13.111. Barrett. Casing had been perforated about 2 weeks prior to measurement of May 23, 1946, from about 80 feet to 300 feet below land surface. Turbine irrigation pump on well.
- 24.9.34.111a. Norwood. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 488 feet. About 150 feet northeast of well 24.9.34.111. Measuring point, lower edge of basal flange of pump, west side, at land-surface datum. Reference point, top surface of north 8- by 8-inch pump support, at land-surface datum.
- 25.9.15.211. Paulk. Measuring point beginning Jan. 12, 1946, top surface of concrete well curb, east side of well, at land-surface datum.
- 25.9.24.222. Schmelzla. Formerly owned by G. P. Watkins. Pump removed.
- 25.9.24.222a. Schmelzla. Drilled irrigation well, equipped with turbine pump, diameter 12 inches, depth 122 feet. About 20 feet west-northwest of well 25.9.24.222. Measuring point, top of casing, west side of well, 1.19 feet above land-surface datum.
- 25.9.25.111. Crotchett. Measuring point beginning Jan. 12, 1946, top surface of concrete well curb, north side of well, 0.89 foot above land-surface datum.
- 26.9.4.331. Smyer. Windmill installed on well during 1945.

QUAY COUNTY (HOUSE AREA)

By C. S. Conover

Part 1. General discussion

The investigation of the ground-water resources of the House area, in Quay County, was continued in 1946 in cooperation with the State engineer of New Mexico. Records of water levels in observation wells in the House area have been published in the following Geological Survey water-supply papers:

<u>Year of record</u>	<u>Water-Supply Paper</u>	<u>Page Nos.</u>
1940-41	941	243-250
1942	949	314-318
1943	991	269-276
1944	1021	264-272
1945	1028	267-275

The letter N was added to the first segment of the well numbers in reports previous to 1945, but the distinguishing letter has been omitted in subsequent reports as all wells are north of the New Mexico base line.

Water levels are measured once a year, in January or February, in a large number of well in the House area many of which are also measured at bimonthly intervals. The water levels obtained at the first of the year, after recovery from the effects of pumping of the previous year has taken place, show the net yearly change in water levels. (See Part 2 and accompanying map.) The measurements of water level observed bimonthly show the varying fluctuations during the year as a result of changes in the rates and amount of pumping and precipitation. (See Part 3.) Water levels were measured in 65 wells in February 1946 of which about 59 were measured at bimonthly intervals. Water-stage recorders were operated on two of these wells in order to obtain a continuous record of the water level. A total of 350 measurements of water level was made during the year including 12 tape measurements made on the recorder wells. All measurements of water level were made by U. N. Bengé.

Fluctuations of water level

The fluctuations in water level in the House area are the result mainly of pumping of ground water for irrigation. Precipitation reduces the amount of pumping of ground water for irrigation and in periods of excessive rainfall recharges the water table. On the basis of incomplete reports at Hassell and Ragland, the precipitation during 1946 was below

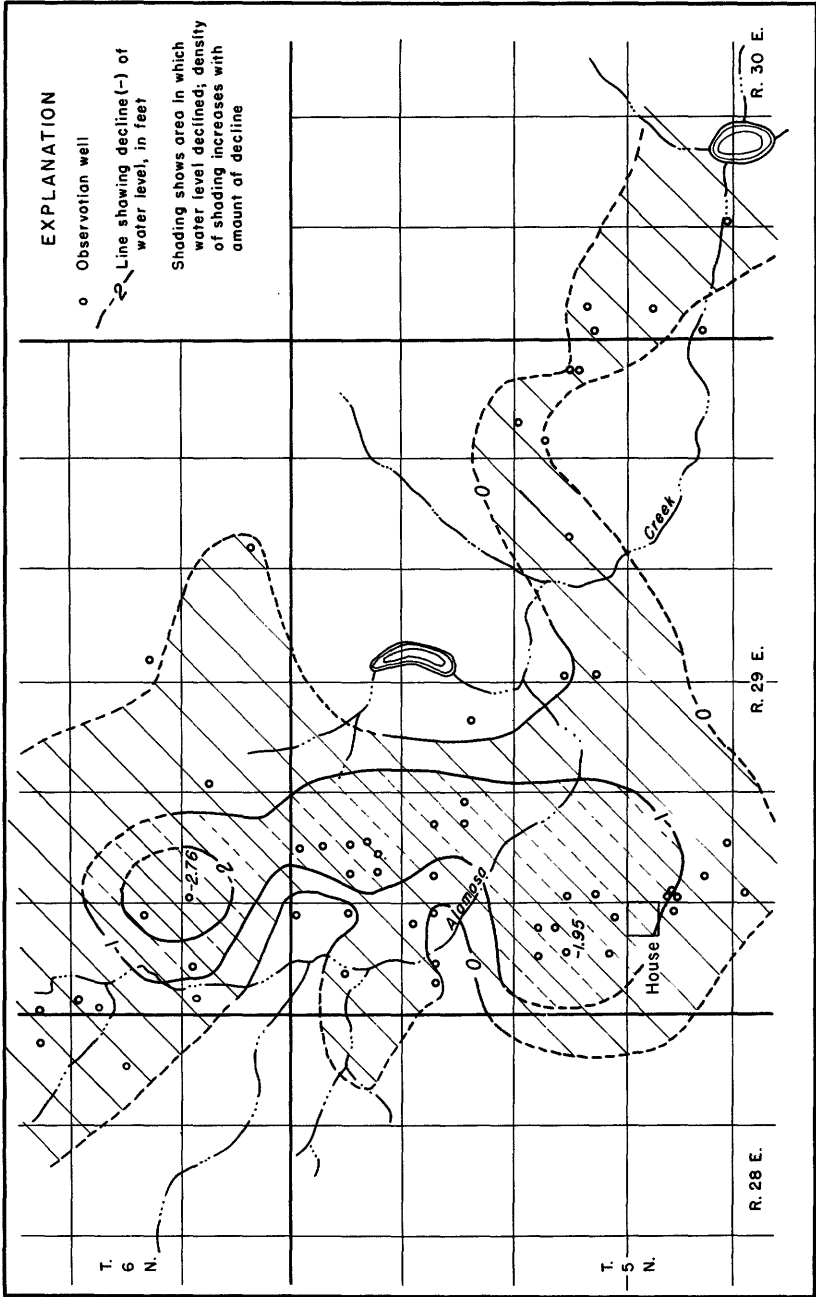


Figure 15.--Map of House area, Quay County, N. Mex., showing changes in water level from January-February 1946 to January 1947.

normal though probably not as much as in 1945. Heavy rains that occurred at Ragland in August and September, the latter part of the growing season, probably also occurred at House and reduced the amount of pumping of ground water for irrigation.

The pumping of ground water for irrigation in 1946 began about one month earlier than usual because of the deficient rainfall but probably stopped somewhat earlier than usual because of the rainfall in late August and in September. The amount of water pumped per acre may have been somewhat less than in 1945, but due to the increased acreage irrigated, the total pumpage of ground water exceeded that in 1945. It is estimated that 3,000 acres were irrigated in 1946. It is probable that about 6,600 acre-feet of water was pumped for irrigation in 1946. The amount of land irrigated has increased gradually since 1939 and there has been, in general, an increase in the amount of water used. However, the amount of water used per acre varies from year to year dependent upon the amount of precipitation in a particular year.

The ground-water levels declined in the House area from February 1946 to January 1947 in the area where ground water is used for irrigation. The main area in which the levels declined extended from about 1 mile south to about 5 miles north of House, and was from 1 to 2 miles wide. The maximum observed decline for 1946 of 2.76 feet occurred in a well in the northwest corner of sec. 32, T. 6 N., R. 29 E. The ground-water levels declined more than 1 foot over an area of about 6 square miles and more than 2 feet over an area less than 1 square mile from February 1946 to January 1947. Slight rises in water level were observed in outlying wells--in general, in wells removed from the immediate effects of pumping.

The water levels at the end of 1946 in wells near the center of heavy pumping were near or below the lowest level observed in 1941. The water levels in outlying wells at the end of 1946 were still above the lowest levels observed in 1941. Water levels will continue to fall from year to year as long as the present amounts of water are pumped. If additional pumps are installed the rate of decline will be accelerated somewhat. Slight rises may occur in a particular year due to a decrease in pumping as a result of either unfavorable economic conditions or excessive amounts of precipitation. However, the long-term trend will be a decline of water levels as long as ground water is pumped.

Part 2. Water levels in February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet

Location number	Owner	See also Part	Water levels				Record			
			Feb. 1946	Change 1945-46	Highest	Lowest	Be- gan	Years missing		
			Level	Day	Level	Year	Level	Year	Year	Year
5.28.1.212	D. C. Wyatt	3	50.08	6	-0.69	43.95	44	50.03	46	44
5.29.5.211	R. H. Currence	3	50.13	7	-1.38	48.68	44	50.13	46	44
5.231	do	3, 5	43.84	7	-1.49	42.35	45	43.84	46	44
5.321	J. F. Wallace	3, 5	40.70	7	.....	.....	..	.....	..	46
5.341	William Martin	3	33.21	7	-1.67	29.73	43	33.21	46	42
5.342	do	4	33.35	5	-1.37	30.15	43	34.26	41	41
5.411	A. R. Wallace	3	40.44	7	-1.28	37.95	43	40.44	46	43
5.413	do	3	33.87	7	-1.15	30.96	43	33.87	46	42
6.144	F. I. Austin	3, 5	25.45	7	-1.45	23.45	44	25.45	46	44
6.252	L. L. Poe	3, 5	32.68	7	.....	.....	..	.....	..	46
6.422	do	3	38.99	7	-2.75	36.24	45	38.99	46	45
7.141	D. L. Birch	3, 5	32.68	6	-1.39	29.26	43	32.68	46	43
7.142	do	3	18.83	6	-1.50	14.31	42	21.00	41	41
7.143	do	3	23.26	6	-1.17	22.46	42	24.38	41	41
7.221	C. P. McPride	3	29.57	7	-1.39	25.49	42	29.57	46	42
7.242	do	3	20.39	7	-1.45	18.44	44	20.39	46	44
8.114	J. C. Davenport	3	26.50	7	-1.27	22.75	42	27.88	41	41
8.232	G. W. Turner	3, 5	37.25	7	-0.76	34.19	43	37.25	46	42
8.412	W. W. Kuykendall	3	31.30	7	-0.69	27.84	43	31.30	46	42
8.422a	Bill Dwight	3	32.68	7	-0.65	32.03	45	32.68	46	45
9.400	W. Y. Head	3	23.97	6	-0.85	21.33	42	23.97	46	42
13.121	W. F. and Wylie Hudman	3, 5	476.94	6	+2.29	478.13	41	478.13	41	41
13.131	do	3, 5	57.39	6	-0.59	56.80	45	59.19	41	41
13.243	H. S. Crosby	3, 5	50.31	6	-0.06	50.25	45	50.31	46	45
13.421	W. F. and Wylie Hudman	3, 5	47.56	6	+0.01	46.61	43	47.97	42	41
14.500	R. A. Tullis	3	36.70	6	-1.15	35.55	45	36.70	46	45
15.311b	do	3	20.45	6	-0.70	17.91	43	20.45	46	43
15.331	do	3	34.78	5	-0.30	34.48	45	34.78	46	43
17.133	W. W. Kuykendall	4	33.88	5	-0.56	32.68	42	35.47	41	41
17.331	M. M. McErdree	3	36.94	5	-0.55	32.92	42	38.12	41	41
18.213	Dayton Harris	3, 5	37.62	6	-0.58	35.07	43	39.50	41	41
18.223	Carl Johnson	3, 5	32.62	6	-0.73	31.89	45	32.62	46	45
18.233	M. R. Wallace	3	46.90	6	-0.01	45.74	42	48.89	41	41
18.243	L. M. Wright	3	35.44	6	-0.61	34.83	44	35.44	46	45
18.433	Frank Davis	3, 5	52.27	6	+0.24	51.42	44	52.51	45	44
18.444	L. V. Vaughn	3	40.71	6	-0.28	36.70	42	41.59	41	41

43.

* See footnotes at end of table.

Part 2. Water levels in February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels							Record	
			Feb. 1946 Level	Day	Change 1945-46	Highest Level	Year	Lowest Level	Year	Be-gan	Years missing
5.29.19.244	Lester McCasland	3	50.16	5	-0.48	46.66	42	50.26	41	41	
20.131a	J. M. Thompson	3	51.60	5	-.58	48.49	43	51.60	46	43	
20.131b	do	3	50.85	5	+5.1	48.79	43	51.36	45	43	
20.133	Welton Henry	3	49.55	5	-.46	48.32	44	49.55	46	44	
20.314	Stanley Elliott	3, 5	52.68	5	-.48	52.20	45	52.68	46	45	
20.453b	D. J. Speed	3	49.67	5	-.99	46.99	43	49.67	46	41	
29.111	C. A. Morrow	3	66.93	5	-.26	65.91	43	67.11	41	41	
5.30.18.323	Jerry Thompson	5	39.73	6	.....	.....	..	.....	..	46	
18.331	do	3	34.80	6	+83	34.80	46	35.63	45	45	
19.132a	Ralph Hendrix	3	27.11	6	-.44	26.17	44	27.11	46	44	
19.313	co	3	18.73	6	-1.02	15.94	42	18.73	46	42	
20.333	Arthur Shaddon	3	22.23	6	-1.24	16.82	42	22.23	46	42	
31.442	T. W. Coleman	3	99.15	6	+0.8	99.15	46	99.77	44	44	
6.28.13.232	Irwin Estate	3	61.70	7	+1.4	61.70	46	61.84	45	45	
24.233	Byers Irwin	3	78.30	6	-.16	78.12	45	78.30	46	45	
24.423	R. J. Ferry	3	63.57	6	-.74	62.83	45	63.60	42	42	
25.411	R. A. Davenport	3	52.98	6	-.69	52.20	45	52.88	46	44	
6.29.19.313	R. W. Dean	3, 5	53.50	6	.....	.....	..	.....	..	46	
27.332	J. D. Green	3, 5	43.93	7	+2.7	43.93	46	44.20	45	45	
30.112	L. M. McDaniels	3	49.77	6	-1.04	48.08	43	51.12	41	41	
30.113	do	3	53.00	6	-1.13	51.29	43	54.34	41	41	
30.424	R. W. Dean	3, 5	73.23	7	.....	.....	..	.....	..	46	
31.114	Clyde Kuykendall	3	39.43	6	-.91	36.40	42	41.40	41	41	
31.122	C. H. Griggs	3	54.70	6	-.93	53.57	44	54.70	46	44	
32.111	Sam Morrow	3, 5	70.99	7	.....	.....	..	.....	..	46	
33.131	Frank Morrow	3	54.40	7	-.06	54.26	44	54.57	43	43	
35.314	P. R. Gates	3, 5	38.36	7	.....	.....	..	.....	..	45	
7.28.9.342	W. B. Giles	•	e2749	7	.....	.....	..	25.69	45	e27.8	46
35.333	Dayton Harris	3	129.32	7	+3.0	129.32	46	129.62	45	45	

a Pumping.

c Nearby well pumping.

e Dry at depth given.

f From recorder chart.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946

Location number	5.28.	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.
Owner	Wyatt	Curr- ence	Curr- ence	Wall- ace	Martin	Wall- ace	Wall- ace	Austin
Feb. 6,7	50.08	50.13	43.84	40.70	33.21	40.44	33.87	25.45
Mar. 28,29	50.15	a74.26	43.77	41.24	a44.61	40.53	34.23	26.03
May 30,31	50.21	(a)	44.50	46.56	42.33	a61.81	35.38	26.81
July 30,31	.....	53.60	45.67	46.25	37.60	44.66	36.41	26.54
Oct. 2	50.82	52.63	46.19	44.15	36.48	43.31	36.46	25.84
Dec. 2,3	50.86	51.86	45.76	42.83	35.28	42.52	35.92	25.64
Location number	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.
Owner	Poe	Poe	Birch	Birch	Birch	McBride	McBride	Daven- port
Feb. 6,7	52.68	38.99	32.68	18.83	23.26	29.57	20.39	26.50
Mar. 28,29	51.51	38.70	32.87	19.08	23.28	30.06	22.14	26.62
May 30,31	54.81	42.13	33.28	a44.40	23.33	31.02	26.16	28.65
July 30,31	54.13	43.63	34.19	20.24	23.38	32.30	23.84	a54.15
Oct. 2	53.74	40.77	33.48	17.70	23.35	30.07	20.73	29.40
Dec. 2,3	52.82	39.46	32.87	18.31	23.32	29.68	20.18	27.92
Location number	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.
Owner	Turner	Kuyken- dall	Dwight	Head	Hudman	Hudman	Hudman	Tullis
Feb. 6,7	37.25	31.30	32.68	23.97	a76.94	57.39	47.56	20.45
Mar. 28,29	37.13	31.22	32.58	a44.86	76.64	56.74	47.35	20.50
May 30,31	40.22	35.09	34.88	a37.77	b77.95	63.53	53.40	20.57
July 30	40.72	b36.07	(a)	23.93	78.03	60.01	48.46	20.66
Oct. 3	40.01	33.63	34.51	a30.05	a77.58	56.26	47.89	20.70
Dec. 2,3	39.15	32.84	34.11	23.95	a77.30	57.62	47.68	20.42
Location number	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.
Owner	Tullis	McEn- dree	Harris	John- son	Wall- ace	Bright	Davis	Vaughn
Feb. 5,6	34.78	36.94	37.62	32.62	46.90	35.44	52.27	40.71
Mar. 28,29	34.85	40.03	39.80	33.97	48.02	36.40	52.72	42.53
May 30,31	a55.75	(a)	(a)	34.69	53.49	37.66	54.35	45.69
July 30,31	35.29	(a)	(a)	(a)	a66.79	39.37	55.28	47.20
Oct. 2,3	35.13	40.88	40.70	34.96	51.56	39.70	55.13	44.43
Dec. 2,3	(a)	39.29	39.60	34.33	49.66	37.77	54.48	43.00
Location number	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.	5.29.	5.30.
Owner	McCas- land	Thomp- son	Thomp- son	Henry	Elliott	Speed	Morrow	Thomp- son
Feb. 5,6	50.16	51.60	150.85	49.55	52.68	49.67	66.93	34.80
Mar. 28,29	c50.61	(a)	c52.30	c50.01	52.69	a54.57	66.94	34.76
May 30,31	c52.10	(a)	c53.88	c51.60	52.85	a59.00	72.36	34.83
July 30	54.72	b56.01	56.38	54.20	52.78	60.48	67.55	34.82
Oct. 3	52.21	53.66	53.89	51.68	53.02	50.20	67.44	34.93
Dec. 2	51.36	52.84	53.08	50.85	53.09	50.00	67.32	34.96

* See footnotes at end of table.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946--Continued

Location number	5.30.	5.30.	5.30.	5.30.	6.28.	6.28.	6.28.	6.28.
Owner	19.132a	19.313	20.333	31.442	13.232	24.233	24.423	25.411
	Hendrix	Hendrix	Shaddon	Coleman	Irwin	Irwin	Ferrey	Davenport
Feb. 6,7	27.11	c18.73	22.23	99.15	61.70	78.30	63.57	52.88
Mar. 28,29	a50.21	c18.87	a23.35	99.07	61.44	79.38	(a)	52.85
May 30,31	32.01	c19.05	a22.67	99.00	61.46	80.66	64.09	b59.87
July 30,31	28.37	18.65	22.77	99.03	61.44	80.65	64.24	58.62
Oct. 2,3	27.80	18.51	a22.84	98.97	61.38	80.22	64.50	54.60
Dec. 2,3	27.53	18.24	22.86	98.99	61.58	79.33	64.10	53.71
Location number	6.29.	6.29.	6.29.	6.29.	6.29.	6.29.	6.29.	6.29.
Owner	19.313	27.332	30.112	30.113	30.424	31.114	31.122	32.111
	Dean	Green	McDaniels	McDaniels	Dean	Kuykendall	Griggs	Morrow
Feb. 6,7	53.50	43.93	c49.77	53.00	78.23	39.43	54.70	70.99
Mar. 29	53.50	43.90	50.06	53.44	83.98	40.27	57.68	a84.39
May 31	.....	43.88	50.77	56.37	85.36	b45.88	b63.64	76.86
July 30,31	.....	43.89	51.06	(a)	90.85	(a)	65.42	74.23
Oct. 2,3	.....	43.85	c50.73	54.26	83.64	40.74	58.20	53.73
Dec. 3	.....	43.85	c50.15	53.33	81.14	39.98	56.66	.....
Location number	6.29.	6.29.	7.28.					
Owner	33.131	35.314	35.333					
	Morrow	Gates	Harris					
Feb. 7	54.40	38.36	129.32					
Mar. 29	a68.65	38.68	129.36					
May 31	(a)	42.39	129.36					
July 31	a67.84	41.21	129.30					
Oct. 3	55.27	39.32	129.31					
Dec. 3	54.80	38.75	129.38					

- a Pumping.
- b Pumping recently.
- c Nearly well pumping.
- i Measurement uncertain.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

5.29.5.342. William Martin. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Feb. 25, 33.16; Sept. 9-13, 36.32.

Highest daily water level, in feet below land-surface datum, 1946 (From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	33.39	33.36	33.36	34.00	34.38	35.37	36.19	36.14	36.24	.....	35.71	35.43
2	33.39	33.32	33.38	33.94	34.39	35.42	36.16	36.10	36.22	36.05	35.71	35.37
3	33.36	33.31	33.34	34.02	34.40	35.47	36.21	36.08	36.25	36.05	35.76	35.39
4	33.31	33.27	33.40	33.98	34.47	35.49	36.21	36.09	36.25	36.00	35.77	35.36
5	33.32	33.32	33.44	33.94	34.48	35.51	36.19	36.09	36.25	36.00	35.69	35.32
6	33.41	33.30	33.53	33.93	34.52	35.55	36.19	36.09	36.25	35.99	35.67	35.31
7	33.46	33.26	33.53	33.94	34.56	35.60	36.20	36.09	36.25	35.98	35.68	35.30
8	33.43	33.28	33.60	33.96	34.55	35.63	36.22	36.09	36.27	35.98	35.64	35.31
9	33.50	33.26	33.63	34.00	34.61	35.68	36.22	36.10	36.32	35.95	35.65	35.31
10	33.50	33.25	33.65	34.05	34.65	35.72	36.22	36.09	36.32	35.96	35.66	35.26
11	33.49	33.25	33.59	34.12	34.69	35.74	36.26	36.11	36.32	35.96	35.67	35.24
12	33.54	33.22	33.63	34.11	34.72	35.79	36.19	36.11	36.32	35.92	35.65	35.25
13	33.45	33.26	33.70	34.12	34.77	35.85	36.18	36.11	36.32	35.94	35.63	35.27
14	33.42	33.31	33.69	34.15	34.79	35.89	36.21	36.12	36.25	35.92	35.67	35.23
15	33.47	33.25	33.72	34.21	34.84	35.93	36.23	36.15	36.24	35.90	35.55	35.23
16	33.44	33.25	33.85	34.23	34.85	35.95	36.23	36.16	36.24	35.86	35.64	35.20
17	33.43	33.25	33.93	34.29	34.87	35.95	36.23	36.16	36.24	35.86	35.58	35.27
18	33.35	33.24	33.90	34.28	34.88	35.95	36.22	36.21	36.26	35.85	35.54	35.17
19	33.37	33.27	33.88	34.30	34.92	36.01	36.23	36.23	36.26	35.88	35.51	35.16

5.29.5.342--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
20	33.40	33.22	33.83	34.33	34.99	35.99	36.19	36.27	36.16	35.85	35.50	35.19
21	33.46	33.24	33.86	34.37	34.97	36.03	36.19	36.28	36.15	35.84	35.52	35.18
22	....	33.24	33.89	34.39	35.00	36.05	36.19	36.28	36.15	35.83	35.52	35.15
23	33.44	33.24	33.88	34.40	35.05	36.07	36.19	36.26	36.19	35.78	35.43	35.16
24	33.35	33.19	33.87	34.40	35.10	36.10	36.19	36.26	36.19	35.77	35.41	35.16
25	33.33	33.16	33.90	34.42	35.15	36.13	36.19	36.30	36.14	35.78	35.49	35.12
26	33.41	33.23	33.96	34.40	35.16	36.14	36.19	36.29	36.10	35.78	35.49	35.06
27	33.36	33.26	33.94	34.36	35.17	36.15	36.15	36.28	36.11	35.83	35.45	35.08
28	33.34	33.26	33.90	34.38	35.23	36.17	36.17	36.28	36.13	35.83	35.43	35.06
29	33.29	...	33.95	34.35	35.28	36.19	36.17	36.30	....	35.77	35.40	35.10
30	33.37		34.01	34.34	35.28	36.19	36.11	36.23	....	35.80	35.41	35.08
31	33.35		33.99		35.33		36.11	36.21		35.76		35.05

5.29.17.133. W. W. Kuykendall. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Mar. 4, 33.81; Aug. 25-29, 37.51.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	34.04	33.90	33.84	34.40	35.10	35.57	36.54	37.17	37.47	....	36.61	36.30
2	34.04	33.89	33.83	34.39	35.12	35.59	36.57	37.18	37.46	37.06	36.56	36.28
3	34.03	33.89	33.82	34.41	35.15	35.62	36.60	37.19	37.44	37.03	36.55	36.28
4	34.01	33.87	33.81	34.43	35.17	35.65	36.62	37.22	37.42	....	36.55	36.27
5	34.00	33.88	33.82	34.45	35.19	35.67	36.65	37.25	37.37	....	36.53	36.26
6	34.02	33.87	33.83	34.47	35.19	35.70	36.67	37.26	37.28	....	36.52	36.24
7	34.03	33.86	33.86	34.53	35.23	....	36.70	37.28	37.26	....	36.51	36.22
8	34.01	33.87	33.90	34.55	35.25	35.75	36.73	37.31	37.27	36.96	36.49	36.21
9	34.02	33.86	33.90	34.59	35.27	35.80	36.76	37.33	37.29	36.95	36.48	36.20
10	34.03	33.85	33.94	34.62	35.28	35.83	36.78	37.36	37.31	36.95	36.48	36.18
11	34.01	33.85	33.95	34.66	35.30	35.84	36.82	37.37	37.33	36.93	36.47	36.18
12	34.02	33.84	33.96	34.68	35.31	35.88	36.84	37.37	37.34	36.93	36.46	36.18
13	34.02	33.84	34.00	34.70	35.32	35.93	36.88	37.39	37.35	36.89	36.45	36.16
14	34.01	33.86	34.00	34.72	35.32	35.96	36.89	37.40	37.35	36.88	36.43	36.15
15	34.01	33.85	34.03	34.74	35.32	36.00	36.92	37.41	37.34	36.87	36.42	36.13
16	34.01	33.84	34.07	34.76	35.33	36.04	36.92	37.40	37.33	36.85	36.42	36.12
17	34.01	33.83	34.12	34.78	35.34	36.06	36.94	37.40	37.32	36.84	36.42	36.13
18	34.00	33.83	34.14	34.79	35.33	36.09	36.96	37.42	37.31	36.83	36.40	36.11
19	34.00	33.84	34.17	34.81	35.35	36.14	36.99	37.44	....	36.83	36.39	36.10
20	33.99	33.83	34.19	34.82	35.36	36.18	37.02	37.46	....	36.79	36.37	36.10
21	33.99	33.83	34.21	34.85	35.36	36.22	37.06	37.47	....	36.76	36.37	36.07
22	33.97	33.84	34.23	34.88	35.37	36.25	37.08	37.48	....	36.75	36.36	36.06
23	33.97	33.85	34.24	34.91	35.37	36.29	37.10	37.50	....	36.74	36.34	36.06
24	33.96	33.84	34.27	34.94	35.38	36.32	37.12	37.50	....	36.72	36.34	36.05
25	33.95	33.82	34.28	34.95	35.40	36.35	37.14	37.51	....	36.70	36.34	36.04
26	33.94	33.83	34.30	34.98	35.42	36.38	37.16	37.51	....	36.68	36.32	36.02
27	33.93	33.83	34.32	34.99	35.44	36.41	37.17	37.51	....	36.68	36.31	36.01
28	33.93	33.83	34.34	35.03	35.45	36.45	37.17	37.51	....	36.66	36.30	36.00
29	33.90		34.36	35.05	35.48	36.47	37.17	37.51	....	36.65	36.30	36.00
30	33.91		34.39	35.08	35.53	36.50	37.17	37.50	....	36.63	36.30	36.00
31	33.90		34.39		35.55		37.17	37.48		36.63		35.99

Part 5. Miscellaneous data concerning observation wells

5.29.5.231. Currence. Formerly owned by C. C. Carpenter.

5.29.5.321. Wallace. Drilled irrigation well, equipped with turbine pump which was removed to new irrigation well about 75 feet west-southwest prior to measurement on July 31, 1946, diameter 16 inches, depth 108 feet. Measuring point beginning July 31, 1946, top of concrete pump base, 0.50 foot above land-surface datum. Water levels, in feet below land-surface datum, 1945: June 13, 44.82; Aug. 4, 44.85; Sept. 28, 43.02; Nov. 29, 41.00.

- 5.29.6.144. Austin. Formerly owned by H. O. Thomas.
- 5.29.6.222. Poe. Used drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 125 feet. Measuring point, lower edge of north side of pump base, through sloping hole in concrete pump base, 0.27 foot above concrete pump base, 1.27 feet above land-surface datum. Water levels, in feet below land-surface datum, 1945: Apr. 8, 52.27; June 13, 52.48; Aug. 3, 52.35; Sept. 28, 51.94; Nov. 30, 52.53, pumping recently.
- 5.29.7.141. Birch. Measuring point beginning July 31, 1946, top edge of Geological Survey washer tied on bottom of inverted tub over well, 0.30 foot above land-surface datum.
- 5.29.8.232. Turner. Formerly owned by Carl Johnson.
- 5.29.13.121. Hudman. Formerly owned by Arthur Shaddon.
- 5.29.13.131. Hudman. Formerly owned by Arthur Shaddon.
- 5.29.13.421. Hudman. Formerly owned by Arthur Shaddon. Measuring point beginning July 30, 1946, top outer edge of 1-inch hole in base of turbine pump, 0.02 foot above land-surface datum.
- 5.29.18.213. Harris. Formerly owned by A. R. Wallace.
- 5.29.8.223. Johnson. Formerly owned by A. R. Wallace.
- 5.29.18.433. Davis. Formerly owned by Chas. Willis.
- 5.29.20.314. Elliott. Turbine pump installed on well July 1946. Measuring point beginning July 30, 1946, top of casing south side, 1.00 foot above land-surface datum.
- 5.30.18.323. Thompson. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 88 feet. Measuring point, lower edge of the mouth of the discharge pipe. Subtract 3.62 feet from tape measurements to reduce to top of concrete pump base, 4.42 feet to reduce to land-surface datum. Water level, in feet below land-surface datum, 1945: June 11, 40.15.
- 6.29.19.313. Dean. Drilled irrigation well, equipped with turbine pump, depth 97 feet. Measuring point beginning May 31, 1946, lower edge of mouth of discharge pipe. Subtract 6.70 feet from tape measurements to reduce to land-surface datum.
- 6.29.27.332. Green. Formerly owned by S. W. Stribling.
- 6.29.30.424. Dean. Drilled irrigation well, equipped with turbine pump, depth 136 feet. Measuring point, top of casing, 0.20 foot above land-surface datum. Water level, in feet below land-surface datum, 1945: Nov. 29, 78.19.
- 6.29.32.111. Morrow. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 129 feet. Measuring point beginning Mar. 29, 1946, top inside edge of rectangular opening in south side of pump case, through slot in base of pump 0.86 foot above concrete pump base and top of casing, 1.36 feet above land-surface datum.
- 6.29.35.314. Gates. Drilled irrigation well, equipped with turbine pump, diameter 14 inches, depth 76 feet. Measuring point, top edge of opening inside of pump case, 0.08 foot above concrete pump base, 1.00 foot above land-surface datum. Water level, in feet below land-surface datum, 1945: Nov. 30, 38.61.

ROOSEVELT COUNTY (PORTALES VALLEY)

By C. S. Conover

Part 1. General discussion

The investigation of the ground-water resources of Portales Valley, which began in 1931, was continued during 1946 in cooperation with the State engineer of New Mexico. Results of the investigation for the years 1931 to 1938 have been published in the 10th to 13th biennial reports of the State engineer, while results for the years 1938 to 1941 are to be published in a forthcoming report of the State engineer. Records of water levels in observation wells in Roosevelt County have been published in Geological Survey water-supply papers as follows:

<u>Year of record</u>	<u>Water-Supply Paper</u>	<u>Page Nos.</u>
1931-38	845	245-278
1939	886	449-467
1940	911	217-235
1941	941	251-270
1942	949	319-336
1943	991	276-295
1944	1021	275-290
1945	1028	276-289

Water levels are measured in a large number of observation wells in Portales Valley once a year, usually in January, when most of the recovery from the effects of pumping of irrigation wells in the preceding year has taken place. These measurements are given in Part 2 and show the net yearly changes in water level. (See fig. 16.) Water levels are also measured in a number of wells at bimonthly intervals in order to determine the varying seasonal trends caused by pumping and precipitation. (See Part 3.) In January 1946, 166 wells were measured. Of these wells, about 48 were also measured in March, May, July, September, and November. Water-stage recorders were operated on five wells for various intervals during 1946 in order to obtain a continuous record of water levels. (See Part 4.) A total of 417 measurements of water level was made during the year, including 27 tape measurements made on recorder wells. All measurements were made by U. N. Benge except those in January which were made by C. R. Murray.

Fluctuations of water level

The fluctuations in water level 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 occurring throughout the year. Fluctuations in water level also result from recharge to the water

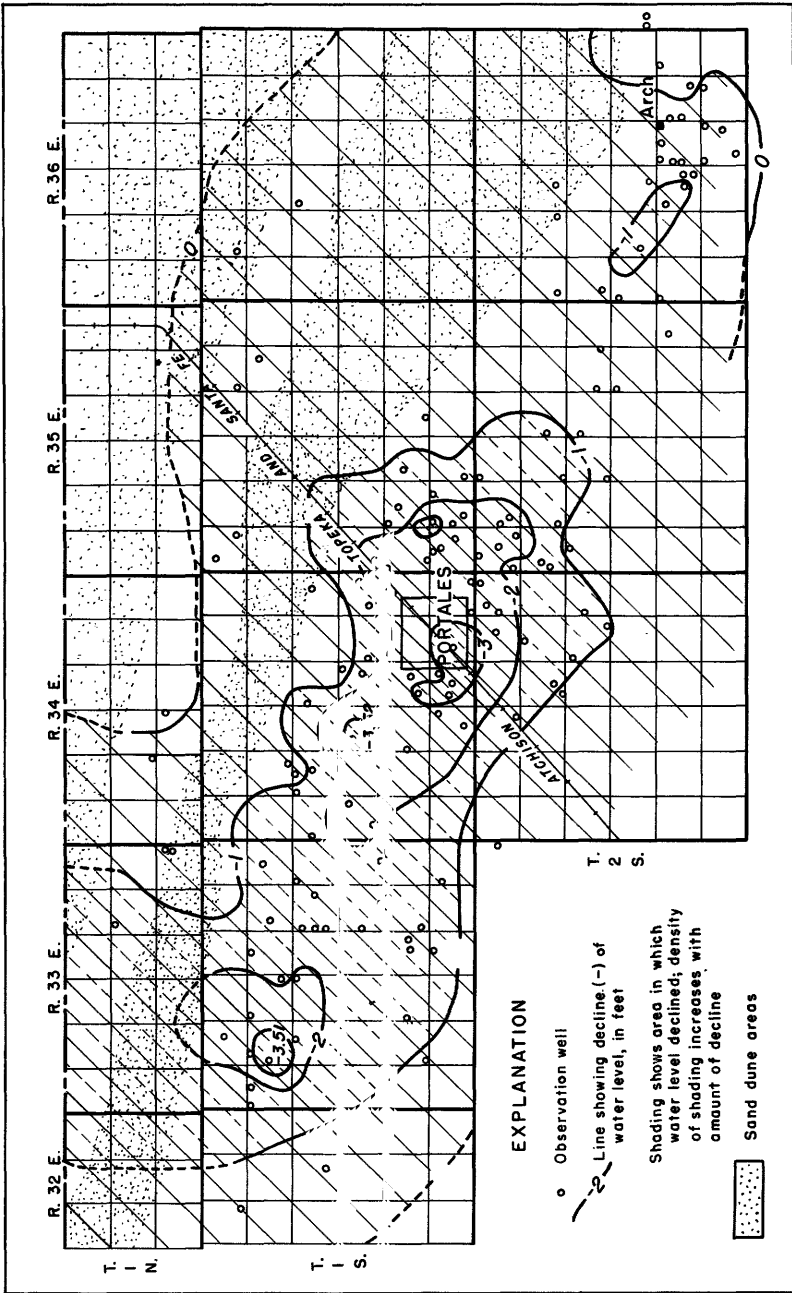


Figure 16.--Map of Fortales Valley, Roosevelt County, N. Mex., showing decline of water level from January 1946 to January 1947.

table in periods of excessive precipitation such as occurred in late 1941. The precipitation in the Portales Valley for 1946 was more than in 1945 although below normal at all stations except at Portales Evaporation Station. The precipitation at Floyd was 14.39 inches, 1.75 inches below normal; that at Portales Evaporation Station, 19.02 inches, 0.03 inch above normal; that at Portales, 14.89 inches, 3.97 inches below normal; and that at Arch, 9.25 inches, 7.80 inches below normal. The deficiency of precipitation was greater during the growing season, April through September, than for the year as a whole. The first part of the growing season, particularly in May, was deficient in rainfall while the latter part of the growing season in September and also in October had excessive amounts of rainfall.

The amount of ground water pumped in Portales Valley for irrigation in 1946 was approximately the same as in the preceding year. An increase in pumping was caused by an increase in the acreage irrigated and by an earlier start of the pumping season. However, these increases were offset by the decrease in pumping which resulted from the earlier stopping of the pumping season. A reconnaissance survey by the author in June 1946 indicated that about 24,500 acres was under irrigation. On the basis of ratings in 1944 and 1946 on 79 pumps irrigating about 24 percent of the total acreage, it is estimated that 37,000 acre-feet of ground water was pumped for irrigation in 1946. Revised estimates indicate that in 1944, 20,500 acres was irrigated and 23,500 acre-feet of water was pumped, and in 1945, 22,000 acres was irrigated and 37,500 acre-feet of water was pumped.

A large part of the increased irrigated acreage in the past 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 past years. As row crops are grown successfully in years of normal precipitation without the aid of irrigation, the actual acreage and amount of water pumped vary widely from year to year.

The ground-water levels in Portales Valley declined from January 1946 to January 1947 in an elliptical area surrounding Portales. The areal distribution of the decline was similar to that of preceding years but the magnitude of the decline in most of the area was somewhat less than for 1945. In a small area about 10 miles northwest of Portales the water table

declined in 1946 more than in 1945. The ground-water level in Portales Valley declined from January 1946 to January 1947 more than 1 foot over an area of about 113 square miles, more than 2 feet over an area of about 28 square miles, and more than 3 feet over an area of about 3 square miles. The maximum decline of more than 3 feet was centered in two areas, around sec. 8, T. 1 S., R. 33 E., about 10 miles northwest of Portales, and around sections 34 and 35, T. 1 S., R. 34 E., at the southwest edge of Portales. The decline in water level in 1946 was less than in 1945 in spite of nearly the same amount of pumpage. This was the result mainly of the earlier stopping, near the end of August, of the pumping season which allowed an extra month for recovery of the water levels. Also, some recharge may have occurred from the heavy rains in September and October.

The water levels at the end of 1946 in the heavily pumped area around Portales reached the lowest level on record, exceeding the previous low in 1941 by more than 3 feet in many wells. However, the water levels in wells outside of the heavily pumped areas were still above the low levels recorded in 1941. The slope of the cone of depression in the water table redeveloped since 1941 is thus steeper than the cone developed prior to 1941. It is expected that the water levels will continue to decline from year to year in Portales Valley as long as pumping continues at the present rate. A slight rise of water level may occur in a particular year due to a reduction in the amount of pumping that would result from either unfavorable economic conditions or a year of excessive precipitation. However, the long-term trend will be a decline in water level.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet

Location number	Owner	See also Part	1946			Water levels			Record		
			Jan. Level	Jan. Day	Change 1945-46	Highest Level	Highest Year	Lowest Level	Lowest Year	Be-gan	Years missing
1N.32.7.300	W. J. Crenshaw	3	16.30	25	-0.76	14.93	45	18.78	41	32	
1N.33.16.100a	Mr. Hardwick	.	22.02	26	-1.14	19.24	42	26.14	41	41	
16.100c	do	.	22.55	26	-.95	20.00	42	22.55	46	42	
26.120	Mary E. Miller	.	5.94	26	-1.07	3.54	42	12.06	39	39	43
36.400a	A. C. Woodburn	4	2.85	26	-1.56	f-1.57	42	f 8.23	41	32	37, 38
36.400b	do	3	6.27	26	-1.32	1.98	42	13.97	41	32	
1N.34.29.444	J. N. Teftertiller	.	15.69	27	-1.16	10.78	42	20.62	41	39	
33.224	Mrs. Lee Garrett	.	19.04	27	-1.36	10.96	42	23.15	41	39	
35.432	Earl McCollum	.	(a)	27	.....	21.54	39	22.88	44	39	45, 46
1.31.1.222	L. H. Lee	3	75.20	25	+4.40	75.20	46	75.60	45	45	
1.32.3.440	M. Nall	3, 5	31.73	25	-.99	24.35	42	39.68	32	32	
1.4.432	Robert Morrison	3, 5	44.14	25	-.51	43.63	45	44.14	46	45	
15.111	Mrs. J. P. Nash	.	42.0	25	.....	41.98	44	43.42	41	40	46
1.33.5.432	Clay Jones	.	17.40	25	-1.98	13.10	43	23.51	37	35	
7.111	E. L. Sisk	3	17.30	25	-2.14	12.17	42	22.02	41	40	
7.211	A. G. Smith	.	17.14	25	-1.85	15.29	45	17.14	46	35	
8.112	do	.	16.03	25	-2.00	11.69	45	22.30	37	35	
8.311	E. E. Marcus	.	16.68	25	-2.12	12.28	45	23.00	41	39	
9.111	Earl plank	5	17.72	25	-1.92	13.36	43	22.86	41	39	
9.442	John Adams	.	19.28	25	-2.63	12.88	43	22.48	37	35	36
10.211	O. B. Sherman	.	22.59	25	-1.52	18.63	45	25.74	39	39	41
10.313	Jfm Allen	3	20.63	25	-2.07	14.73	45	24.53	37	35	
11.312	C. F. Williams	5	22.95	25	-1.70	19.17	45	25.87	41	35	39
12.144	A. C. Woodburn	3	32.14	25	-1.14	28.61	32	34.42	41	32	34, 37
13.111	E. Elkins	.	24.21	22	-3.03	17.33	43	25.70	41	35	
13.431	Fuedje Black	.	.....	..	.....	19.23	42	29.88	41	35	43, 46
14.131	J. V. Miller	.	23.63	21	-3.14	13.99	42	23.69	41	35	44
14.311	Claude Elder	.	22.47	21	-3.42	11.81	42	22.47	46	36	40, 41
14.331	do	.	.....	..	.....	12.06	42	23.87	41	32	46
14.331c	J. E. Stacey	3, 5	23.11	21	-3.74	19.37	45	23.11	46	45	
14.421	Leon Jones	.	(Measurements discontinued; well filled)			15.33	42	26.57	41	35	46
14.421a	Adolph Pfnkart	5	24.53	25	.....	.....	..	.....	..	..	46
15.212	O. D. Minick	.	20.83	21	-2.38	13.44	42	23.20	41	35	
16.222	Rethel Church	3	17.88	25	-2.46	11.13	43	17.88	46	42	
17.221	R. F. Campbell	.	16.67	25	-2.39	11.06	43	21.37	37	32	

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels				Record	
			Jan. 1946 Level	Change 1945-46	Highest Level	Lowest Level	Year	Years missing
1.33.23.311	D. H. Smith	(Measurements discontinued; well filled)	15.84	42	26.15	41	35	46
23.311a	uo	5	25.61	21	.....	..	..	46
23.433	H. A. Miller	5	24.66	21	-3.05	15.73	42	27.09
24.111	J. E. Dictson	•	29.61	22	-4.03	18.40	42	32.28
24.433	J. E. Jones	•	26.52	22	-3.77	15.82	42	28.32
26.221	D. E. Thomas	•	24.67	21	-3.05	18.54	42	27.14
26.331	C. G. Norton	•	29.97	21	-2.71	22.56	43	32.27
27.311	J. A. Henley	•	.....	•	.....	36.55	43	45.18
27.411	J. W. McClary	•	32.83	26	-2.41	27.20	43	36.44
27.421	Luther Cooper	•	29.30	26	-2.55	23.31	43	29.30
28.311	J. J. Spires	3	43.58	26	-1.61	39.39	43	47.30
29.333	M. H. Rea	3	b32.62	26	-.67	29.73	43	37.03
30.	J. S. Lewis	•	.....	•	.....	(1)	..	1.98
34.211	R. T. Bilberry	3	25.39	21	-2.45	19.72	43	28.94
36.131	Edwin Johnson	•	36.96	26	-2.26	31.89	43	41.16
1.34.8.434	Bob Ledbetter	•	32.24	22	-1.57	28.33	43	36.64
13.412	Ben Donathan	3	52.02	25	-.48	51.50	44	56.44
15.131	E. R. Kemp	3, 5	49.25	26	.....	.....	..	.....
16.422	R. E. White	(Measurements discontinued)	.....	•	.....	42.33	43	47.96
17.111	W. D. Ware	•	33.16	22	-2.12	28.16	43	36.27
17.122	Bob Ledbetter	•	32.42	22	-1.95	27.59	43	36.34
17.233	L. E. Allison	3, 5	32.29	26	-3.32	25.10	43	35.20
17.241	B. F. Ray	•	28.51	26	-2.60	22.52	43	31.81
18.133	J. E. Tucker	•	31.91	22	-3.32	25.64	42	31.21
18.343	J. W. Terry	•	32.50	26	-5.39	21.19	42	35.52
19.223	A. H. Keswater	5	30.71	26	-5.31	19.03	42	31.06
19.341	Floyd Horne	•	28.51	22	-4.74	16.62	42	29.44
21.121	L. H. Lee	•	37.27	22	-4.58	26.36	42	38.03
21.141	Douglas Owen	•	37.32	22	-4.58	25.82	42	37.94
21.222	Elizabeth Tipton	(Measurements discontinued)	.....	•	.....	34.15	42	44.13
22.131	Mrs. W. E. Jergins	•	37.85	22	-3.47	33.25	41	39.25
22.222	Mrs. A. J. Goodwin	5	40.74	23	-1.07	38.17	43	43.52
22.421	R. C. Grunig	•	38.68	23	-3.40	28.89	42	39.25
22.443	Mable Jernigan	•	36.72	23	-4.30	23.65	42	36.76
23.211	Pope Long	•	.....	•	.....	36.89	42	41.99

* See footnotes at end of table.

Part.2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels					Record		
			Jan. 1946 Day	Change 1945-46	Highest Level Year	Lowest Level Year	Be-Gen missing	Years		
1.34.23.311	J. R. Mahaffey	.	36.36	-2.74	28.95	43	37.04	41	35	
23.313a	R. E. McDonald	3	35.97	-2.188	27.87	43	36.75	41	32	
23.42	E. L. Vandell	.	32.49	-2.22	27.27	43	34.05	41	35	
23.442a	S. B. Fletcher	.	34.27	-2.53	28.74	43	35.12	41	41	
24.243	J. T. Gornell	.	45.87	-1.57	42.45	43	48.14	41	37	
24.312a	W. A. Cummings	.	33.14	-1.43	29.40	43	33.14	46	42	
25.200	J. E. H. Young & Smith	.								
	Feed Pens	.	36.24	-2.36	28.20	42	36.89	41	35	38
25.211	J. E. H. Young	4	38.04	-2.09	32.54	32	39.21	41	32	
26.343a	Unknown	.	(Measurements discontinued; well filled)		24.33	43	34.26	41	40	46
27.211	J. F. Bowman	.	34.76	-4.48	20.95	42	34.76	46	32	
27.331	Lewis Kirby	.	32.42	.....	18.90	42	31.72	41	39	46
27.341	F. F. Smith	.	32.42	-4.21	17.24	42	32.42	46	35	
27.412	J. E. Plummer	.	33.61	.....	20.17	42	33.61	46	35	45
27.444	Mr. Huffman	.	.....	.....	17.95	42	31.44	41	35	38-40, 46
28.111	G. C. Morris	.	31.80	-4.45	18.54	42	31.80	46	42	
28.153a	Lee Daniels	.	33.68	-4.22	20.49	42	33.68	46	39	
28.211	G. B. Thomson	.	33.52	-4.26	19.74	42	33.52	46	35	38, 39
29.211	J. W. King	.	31.60	-5.55	17.98	42	31.60	46	35	
30.121	M. A. Pember	.	27.43	-3.96	16.55	42	29.17	41	35	
33.223a	W. W. Blakeley	5	28.84	.....	.....	..	.....	..	46	
35.451	W. A. Moore	3	17.00	-2.48	7.24	42	18.26	41	32	
34.143	J. A. Sanders	.	33.76	-3.54	24.00	43	33.97	41	35	42
34.232	J. W. Owens	.	32.17	-4.12	19.90	42	32.17	46	35	36
34.322	T. E. Mears	.	32.25	-3.72	20.70	42	32.25	46	35	
35.312	Eastern N. Mex. College	5	31.88	-4.40	20.06	42	31.88	46	35	
36.324	Mr. Tinsney	5	34.38	-20	23.05	42	34.38	46	35	43
36.333	Jim Landis	.	31.42	-4.47	18.54	42	31.42	46	41	
36.421	Earl McCollum	.	.....	.....	26.64	44	32.81	41	35	42, 43, 46
36.443	Foy Williams	.	.....	.....	19.37	42	33.20	46	35	
1.35.2.300	Eastern N. Mex. State Park	.	33.20	-5.25	.....	..	.....	..	46	
		.	43.95	-.41	43.52	44	48.07	40	36	
6.141	Audrey Ellis	3	5.89	-1.73	5.4	42	10.70	41	39	
6.400	J. C. Brown	3	10.21	-1.21	5.24	42	15.46	41	32	
11.241	Eunice McPherson	3	15.14	.....	14.03	43	19.02	41	41	

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels				Record
			Jan. 1946 Level	Change 1945-46	Highest Level	Lowest Level	
1.35.19.332	S. D. Foreman	.	40.90	25	37.80	43	44.45
19.432	D. A. Carroll	(Measurements discontinued)		.....	41.12	43	36.37, 39.46 45.46
27.344	H. J. McGroary	(Measurements discontinued)		.....	28.84	43	41
28.143	Mrs. Albina Krivanek	3	45.45	23	44.24	43	51.49
29.111	Clara Mullmeyer	5	38.50	23	35.26	43	41.69
29.142	R. F. Lee	5	37.41	23	33.15	43	40.78
30.111	E. F. Foreman	.	38.06	23	33.65	43	38.68
30.345	T. E. Livingston	.	31.47	20	22.67	43	32.37
31.122	Mary M. Kenyon	.	31.64	20	22.00	43	32.73
31.231	W. R. McCollum	.	29.53	23	19.23	43	31.60
31.331	R. A. Young	.	31.79	20	18.31	42	31.79
31.342	E. F. Moore	5	.....	..	19.37	43	31.15
31.412	Henry Feebe	5	30.40	23	.....	..	.....
31.421	do	(Measurements discontinued; well filled)		.....	18.98	42	30.60
32.111	Alvin George	.	27.31	20	19.65	43	30.52
32.212	R. H. Green	.	25.29	20	18.45	43	27.97
32.311	O. W. Doak	.	27.81	23	17.41	42	27.81
32.332	C. E. Lane	.	28.60	23	17.12	42	28.60
32.413	C. L. Hanies	.	25.20	23	14.77	42	25.55
33.331	L. C. Green	.	22.76	20	13.03	42	24.03
1.36.5.300	W. H. McDaniel	3	b33.34	27	32.84	43	36.01
6.100	O. W. Rivine	5	.....	..	37.08	42	40.73
10.100	State of New Mexico	5	(a)	27	.....	45	a30.20
2.53.1.422	W. E. and H. R. Skeen	5	26.58	26	.....	..	.....
7.232	John Morgan	5	49.54	26	.....	..	.....
2.54.1.114	E. C. Murrill	.	31.91	21	18.24	42	31.91
1.133	H. R. Knox	.	30.56	20	18.18	42	30.56
1.221	Poy Williams	.	32.85	20	18.98	42	32.85
2.233	Louisa Trout	4	45.60	21	f33.04	42	45.60
4.441	Maud Wallace	3	3.86	21	+4.17	42	6.00
10.324	Jim Cooper	3,5	23.45	24	.....	..	.....
10.343	J. E. Bollen	.	33.59	24	32.25	43	36.03
11.122	D. W. Bedinger	.	29.88	21	-2.75	42	30.56
13.133	E. W. McFarland	3	20.88	21	-1.79	45	20.88

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels				Highest Level	Highest Year	Lowest		Be-gan missing	Record
			Jan. 1946 Level	Day	Change 1945-46	Year			Level	Year		
2.34.14.113	J. P. Tarlton	.	28.26	24	-1.87	20.56	42	30.34	41	35		
14.443	J. M. Shim	.	34.89	21	-1.45	29.22	42	36.87	37	35		
15.212	L. W. Allen	.	(Measurements discontinued; well filled)			24.48	43	32.10	41	32	46	
2.35.4.111	W. E. Munsey	3	22.95	20	-3.83	12.94	42	24.08	41	35	36,37	
5.311	H. G. Black	.	25.60	24	-4.76	12.87	42	25.60	46	35		
5.341	H. R. Sadler	.	25.64	24	-4.46	13.45	42	25.64	46	35		
6.121	Dollie Clark	3	30.66	20	-5.54	16.73	42	30.66	46	32		
6.213	Beulah Ownby	.	.....	.	.....	16.87	42	29.67	35	35	37, 46
6.312a	Rugh Brassell	.	.....	.	.....	24.37	45	24.37	45	45	46
6.331	J. A. Aikens	.	25.80	24	-.65	12.96	42	25.80	46	35	36-38	
6.411	F. A. Jewell	.	27.72	24	-4.78	14.25	42	27.72	46	39		
6.443	Ora Johnson	3	25.41	24	-4.32	13.07	42	25.52	41	35		
7.134	A. L. Kelly	.	33.73	24	-2.64	24.01	42	34.85	41	37		
7.311	W. E. Elliott	3	16.47	24	-2.53	7.04	42	17.03	41	32		
8.331	D. L. Ray	5	27.32	24	-2.57	16.28	42	27.86	41	35	46	
9.211	Joe Maxwell	.	.....	.	.....	10.26	42	19.75	41	39	
9.333	C. E. Clark	.	26.08	20	-2.48	23.60	45	26.08	46	45		
10.211	S. H. Hare	5	17.25	24	-1.40	10.50	42	19.82	41	40		
14.313	1st Nat'l Bank, Portales	3	10.35	24	-1.72	6.79	42	11.21	41	39		
14.414	do	3	1.96	24	-2.01	+0.7	43	3.44	41	40		
15.131	do	3	1.99	24	-.95	+0.2	42	2.76	41	39		
16.333	A. J. Cline	3	7.98	24	-.81	4.12	42	8.51	41	39		
18.211	State of New Mexico	3	4.95	24	-.87	(1)	42	5.45	41	39		
19.133	J. A. Roberson	5	20.00	20	-1.06	24.68	42	31.11	37	32	46	
25.123	L. C. Puchanan	.	30.97	20	-1.06	16.59	43	24.73	37	36		
26.111	T. M. McCrary	3	18.11	27	-1.51	28.07	42	32.98	41	41		
2.36.7.332	Loren Johnson	3	17.78	27	-1.30	16.60	45	18.11	46	45		
6.432	S. W. Davis	3	18.89	27	-1.07	15.26	42	20.94	41	39		
9.431	T. E. Polly	3	14.04	27	-1.07	15.67	43	21.63	41	39		
18.341	Bob Stokes	3	20.87	20	-1.07	9.42	42	18.26	33	32		
19.113	E. O. Hobbs	3	13.27	24	-.99	16.93	42	22.96	41	41		
20.321	W. O. Davis	3	14.85	24	-1.13	8.12	42	16.50	32	32		
21.432	C. O. Statts	5	13.96	27	-.33	10.39	43	16.96	41	39	42	
25.112	W. D. Pate	.	.....	.	.....	8.13	42	16.50	41	39	

* See footnotes at end of table.

Part 2. Water levels in January 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels										Be- gan missing	Years missing
			Jan. 1946 Level	Jan. 1946 Day	Change 1945-46	Highest Level	Highest Year	Lowest Level	Lowest Year					
2.36.26.131	L. L. Bugz	3	12.08	24	-0.68	5.29	42	14.21	37	32				
26.311	J. S. Riley	.	11.62	24	-.52	5.09	42	13.56	37	36				
26.423	W. B. Cox	.	14.25	27	-.29	8.15	42	16.09	41	35		38,39		
27.111	B. L. Kennedy	.	13.28	24	-1.11	6.27	42	15.47	41	39				
27.131	do	.	13.33	24	-.93	6.54	42	15.26	37	36		41		
27.311	M. O. Pate	.	12.70	27	-1.00	5.58	42	14.79	37	37				
28.114b	J. M. Riley	3	13.81	24	-.91	7.04	42	15.86	41	32				
28.411	Morgan Trammell	4	14.19	24	-1.12	f 7.37	42	16.34	37	33				
28.421	C. A. Tevis	.	13.91	27	-1.01	7.06	42	15.96	137	36				
28.441	do	.	15.17	27	-1.19	8.26	42	17.05	41	35		42		
30.111	E. C. Sanders	.	15.73	27	-.93	11.60	43	17.74	k37	35				
34.111	L. B. Thornton	3	3.14	20	-.32	7.70	42	3.14	46	42				
34.222	M. F. Riley	.	14.67	24	-.84	8.18	42	16.59	41	36				
34.341	W. H. Davenport	.	9.39	24	-.73	4.01	42	11.01	41	35				
34.421	W. J. Murrill	3	18.15	27	-.59	12.39	42	20.05	37	36				
35.212	F. F. Dacus	3	9.32	27	-.70	4.24	42	10.64	41	39				
2.37.19.331	A. E. Whitehead	3	9.02	27	-.44	3.81	42	12.96	32	32		38		
19.341	W. H. McDougal	3	17.09	27	-.32	12.74	42	20.19	41	39				
21.312	C. R. Anderson	.	17.14	27	-.62	12.97	42	19.84	41	39				
	O. E. Pattison	5	12.36	27	.....	.....	.....	.....	.....	.....	.....	.....

a Pumping.

b Pumping recently.

c Nearby well pumping.

d Nearby well pumping recently.

e Dry at depth given.

f From recorder chart.

g Above land-surface datum, well inaccessible.

h March 1943.

i Also 1941.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946

Location number	1N.32. 7.300	1N.33. 36.400b	1.31. 1.222	1.32. 3.440	1.32. 14.432	1.33. 7.111	1.33. 10.313	1.33. 12.144
Owner	Crenshaw	Woodburn	Lee	Nall	Morrison	Sisk	Allen	Woodburn
Jan. 25,26	a16.30	6.27	75.20	31.73	44.14	17.30	20.63	32.14
Mar. 26	a16.68	6.32	75.10	32.42	44.04	17.20	23.85	(a)
May 29	a16.58	7.41	75.02	33.17	46.39	(a)	.....	(c)
July 27,29	a16.89	8.40	75.29	33.89	a66.43	(a)	.....	.....
Sept.30	a16.64	7.52	75.30	34.10	46.31	21.57	.....	.....
Nov. 29	15.90	6.42	75.03	32.70	45.40	19.27	.....	.....
Location number	1.33. 14.331c	1.33. 16.222	1.33. 28.311	1.33. 29.333	1.33. 34.211	1.34. 13.412	1.34. 15.131	1.34. 17.233
Owner	Stacey	Bethel Church	Spire	Rea	Bilberry	Dona- than	Kemp	Allison
Jan. 21,25, 26	23.11	17.88	43.38	b32.62	25.39	52.02	49.25	32.29
Mar. 26,28	23.01	19.76	43.39	32.67	25.67	52.22	49.19	32.22
May 28,29	a47.75	18.74	a63.70	(a)	b30.32	52.25	(a)	b43.45
July 26,29	a45.55	19.60	45.72	33.13	b30.94	52.40	50.90	36.00
Sept.27,30	28.04	20.43	45.47	33.37	29.71	52.49	51.38	35.94
Nov. 27,29	25.39	20.17	44.75	33.03	27.40	52.66	50.86	34.26
Location number	1.34. 22.222	1.34. 23.313a	1.34. 33.431	1.35. 2.300	1.35. 3.141	1.35. 6.400	1.35. 11.241	1.35. 28.143
Owner	Goodwin	McDonald	Moore	State Park	Ellis	Brown	McPherson	Kri- vanck
Jan. 23,21 27	40.74	35.97	17.00	43.95	5.89	10.21	15.14	45.45
Mar. 26,27	39.45	35.77	17.20	44.13	5.63	10.19	15.15	b46.19
May 27-29	41.15	37.98	18.07	a51.97	6.06	10.22	15.25	46.56
July 25,26, 29	41.27	39.44	19.23	44.53	6.79	10.48	15.57	46.63
Sept.27,28, 30	41.34	39.55	20.05	44.44	7.05	10.82	15.56	46.58
Nov. 27,30	40.39	38.53	19.31	44.55	6.14	10.72	15.45	46.67
Location number	1.36. 5.300	1.36. 16.100	2.34. 4.441	2.34. 10.324	2.34. 13.133	2.35. 4.111	2.35. 6.121	2.35. 6.443
Owner	McDaniel	State of N.M.	Wallace	Cooper	McFarland	Munsey	Clark	John- son
Jan. 20,21 24,27	b33.34	(a)	3.86	23.45	20.28	22.95	30.66	25.41
Mar. 25-27	a34.00	b18.94	4.25	c25.90	21.33	24.14	30.23	24.99
May 27,28	a33.68	b18.98	5.08	c31.00	c23.78	b32.93	34.33	29.29
July 25,26	a33.69	b19.03	5.93	c29.16	c24.14	26.04	37.80	32.75
Sept.27,28	33.51	19.04	5.04	25.62	22.44	27.92	37.07	31.16
Nov. 27,30	a33.99	a27.54	4.56	24.59	21.84	24.69	34.74	29.15
Location number	2.35. 7.311	2.35. 14.313	2.35. 14.414	2.35. 15.131	2.35. 16.333	2.35. 18.211	2.36. 7.332	2.36. 8.432
Owner	Elliott	Bank	Bank	Bank	Gline	State of N.M.	John- son	Davis
Jan. 24,27	16.47	10.35	1.96	1.99	7.98	4.95	18.11	17.78
Mar. 27	16.36	10.05	2.15	2.13	7.88	4.97	18.20	17.81
May 27,28	17.50	10.79	3.36	2.86	8.53	6.17	18.28	b25.03
July 25,26	18.71	11.55	4.08	3.74	9.14	7.26	b20.46	(a)
Sept.28	a19.12	11.74	3.88	3.51	9.06	6.52	18.94	20.22
Nov. 27,30	18.49	11.04	3.04	2.87	8.41	16.98	18.64	18.73

* See footnotes at end of table.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946--Continued

Location number	2.36. 18.341	2.36. 20.321	2.36. 26.131	2.36. 27.311	2.36. 30.111	2.36. 34.341	2.36. 35.212	2.37. 19.331
Owner	Stokes	Davis	Bugg	Riley	Thorn- ton	Mur- rill	White- head	McDou- gal
Jan. 20,24, 27	14.04	13.27	12.08	13.81	3.14	18.15	9.02	17.09
Mar. 25,27	14.15	b15.29	11.95	14.50	3.33	17.99	8.76	17.25
May 27,28	14.49	14.98	12.54	16.38	4.29	18.69	9.36	17.37
July 25,26	14.75	(a)	13.36	18.25	5.29	(b)	10.47	17.54
Sept. 28	15.22	15.42	13.26	15.92	5.23	19.41	10.32	16.83
Nov. 30	14.85	14.70	12.40	14.97	4.24	18.88	9.31	16.22

- a Pumping.
- b Pumping recently.
- c Nearby well pumping.
- i Measurement uncertain.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

1N.33.36.400a. A. C. Woodburn. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Oct. 12, 2.52; Aug. 26, 5.10.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.02	2.82	2.83	2.90	3.28	3.98	4.52	4.85	4.80	3.85	2.88	2.97
2	3.01	2.82	2.85	2.91	3.29	4.00	4.56	4.88	4.79	3.87	2.89	2.99
3	3.00	2.81	2.82	2.92	3.30	4.03	4.57	4.89	4.78	3.89	2.90	2.99
4	3.00	2.80	2.82	2.94	3.32	4.05	4.59	4.91	4.78	3.89	2.91	3.00
5	2.99	2.80	2.83	2.95	3.34	4.07	4.58	4.90	4.79	3.33	2.90	3.00
6	3.00	2.83	2.83	2.95	3.35	4.10	4.51	4.92	4.81	3.23	2.79	2.99
7	3.02	2.82	2.84	2.96	3.37	4.13	4.46	4.93	4.79	2.73	2.72	2.98
8	3.00	2.82	2.85	2.97	3.38	4.16	4.43	4.94	4.76	2.63	2.70	2.98
9	3.00	2.83	2.85	2.98	3.39	4.17	4.42	4.95	4.74	2.57	2.70	2.98
10	2.99	2.81	2.85	3.00	3.40	4.15	4.43	4.97	4.74	2.55	2.73	2.99
11	2.98	2.81	2.82	3.02	3.43	4.15	4.46	4.99	4.74	2.53	2.77	2.95
12	3.00	2.81	2.82	3.05	3.45	4.16	4.44	5.01	4.72	2.52	2.79	2.91
13	3.02	2.81	2.82	3.05	3.46	4.19	4.45	5.02	4.72	2.54	2.81	2.90
14	2.98	2.84	2.81	3.05	3.48	4.20	4.47	5.03	4.71	2.57	2.84	2.90
15	2.97	2.84	2.81	3.06	3.52	4.21	4.52	5.04	4.70	2.57	2.83	2.90
16	2.96	2.83	2.83	3.08	3.55	4.23	4.56	5.04	4.69	2.59	2.84	2.91
17	2.95	2.93	2.85	3.09	3.57	4.25	4.59	5.04	4.67	2.60	2.87	2.93
18	2.90	2.82	2.87	3.10	3.62	4.26	4.62	5.05	4.69	2.64	2.89	2.97
19	2.88	2.83	2.86	3.12	3.65	4.28	4.64	5.06	4.67	2.67	2.90	2.98
20	2.87	2.83	2.85	3.14	3.66	4.30	4.64	5.06	4.62	2.71	2.91	2.98
21	2.87	2.83	2.85	3.15	3.70	4.31	4.63	5.05	4.58	2.73	2.91	3.00
22	2.87	2.83	2.86	3.16	3.71	4.33	4.63	5.07	4.57	2.73	2.93	3.01
23	2.86	2.83	2.86	3.19	3.72	4.34	4.65	5.08	4.58	2.73	2.93	3.00
24	2.86	2.82	2.85	3.20	3.75	4.35	4.67	5.08	4.58	2.74	2.92	3.01
25	2.83	2.80	2.85	3.21	3.79	4.37	4.69	5.09	4.58	2.76	2.93	3.01
26	2.84	2.81	2.86	3.23	3.82	4.41	4.72	5.10	4.58	2.78	2.94	2.99
27	2.83	2.83	2.86	3.26	3.85	4.43	4.74	5.09	4.58	2.80	2.95	2.99
28	2.82	2.83	2.85	3.28	3.87	4.45	4.77	5.02	4.50	2.83	2.96	2.99
29	2.80		2.85	3.29	3.89	4.47	4.79	4.95	3.93	2.85	2.96	3.01
30	2.80		2.87	3.27	3.93	4.49	4.81	4.86	3.86	2.85	2.96	3.03
31	2.82		2.88		3.96		4.83	4.82		2.87		3.04

1.34.25.211. J. B. H. Young. Water-stage recorder removed Sept. 23, 1946. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Feb. 25, 37.88; Sept. 27, 41.36.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Nov.
1	38.12	38.01	37.94	38.36	.....	39.61	.....	40.89	41.25	.....
2	.....	38.00	37.95	38.36	.....	39.64	.....	40.91	41.26	.....
3	.....	37.98	37.94	38.37	.....	39.66	.....	40.95	41.26	.....
4	.....	37.97	37.97	38.37	39.17	39.68	.....	40.97	41.26	.....
5	.....	37.98	37.99	38.35	.....	39.72	.....	40.97	41.25	.....
6	.....	37.98	38.00	38.37	.....	39.75	.....	41.01	41.25	.....
7	.....	37.97	38.01	38.37	.....	39.77	.....	41.04	41.23	.....
8	38.10	37.98	38.06	.....	.....	39.80	.....	41.06	41.22	.....
9	38.11	37.97	38.09	.....	39.24	39.82	.....	41.08	41.20	.....
10	38.10	37.96	38.11	.....	.....	39.83	.....	41.11	41.18	.....
11	38.10	37.95	38.12	.....	.....	39.86	.....	41.13	41.18	.....
12	38.10	37.96	38.13	.....	.....	39.88	.....	41.15	41.16	.....
13	38.09	37.96	38.14	.....	39.33	39.92	.....	41.17	41.16	.....
14	38.07	37.95	38.15	.....	.....	.....	.....	41.16	41.17	.....
15	38.08	37.94	38.17	.....	.....	.....	.....	41.21	41.18	.....
16	.....	37.94	38.19	.....	.....	39.95	.....	41.22	41.21	.....
17	.....	37.93	38.21	.....	.....	39.97	.....	41.24	41.21	.....
18	.....	37.92	38.23	.....	39.45	.....	.....	41.25	41.21	.....
19	.....	37.91	38.23	.....	.....	.....	.....	41.27	41.20	.....
20	38.04	37.91	38.26	.....	39.50	.....	.....	41.28	41.18	.....
21	38.04	37.91	38.30	.....	.....	.....	.....	41.31	41.16	.....
22	38.03	37.91	38.31	.....	.....	.....	.....	41.32	41.15	.....
23	38.03	37.91	38.34	.....	.....	.....	.....	41.34	41.14	.....
24	38.02	37.89	38.35	.....	.....	.....	.....	41.36	.....	.....
25	38.03	37.88	38.35	.....	.....	.....	h40.76	41.38	.....	.....
26	38.04	37.92	38.36	.....	39.49	.....	40.77	41.39	.....	.....
27	38.03	37.91	38.37	.....	39.50	.....	40.79	41.13h	41.36	h40.61
28	38.02	37.92	38.37	.....	39.52	.....	40.81	41.19	.....	.....
29	38.01	.....	38.37	38.99	39.55	.....	40.82	41.22	.....	.....
30	38.01	.....	38.37	.....	39.57	.....	40.83	41.23	.....	.....
31	38.01	.....	38.36	.....	39.59	.....	40.86	41.24	.....	.....

h Tape measurement at odd hour.

2.34.2.233. Louisa Trout. Lowest recorded water level, in feet below land-surface datum, 1946: Aug. 29, 54.62.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Mar.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	50.72	51.38	51.98	52.02	50.94	.....	49.42
2	50.75	.....	51.99	52.00	50.95	.....	49.38
3	50.72	.....	52.00	51.94	50.98	50.08	49.38
4	50.82	.....	51.97	51.85	50.99	50.05	49.34
5	50.82	.....	51.99	51.80	50.97	50.03	49.32
6	50.84	.....	51.95	51.73	50.84	50.00	49.30
7	50.82	51.90	.....	51.68	50.82	50.00	49.29
8	51.04	51.80	52.03	51.66	50.82	49.96	49.28
9	50.95	51.90	52.12	51.65	.....	49.94	49.29
10	50.86	51.92	52.22	51.65	.....	49.93	49.28
11	51.19	51.97	.....	51.68	.....	49.96	49.28
12	51.32	51.95	52.13	51.67	.....	49.94	49.29
13	51.37	52.08	52.24	51.67	50.70	49.92	49.28
14	51.32	.....	52.28	.....	50.67	49.87	49.28
15	51.30	.....	52.32	51.39	50.64	49.84	49.26
16	51.16	.....	52.20	51.35	50.60	49.84	49.26
17	51.33	.....	52.25	51.28	50.58	49.80	49.27
18	51.32	.....	52.17	51.25	50.55	49.77	49.27
19	51.30	.....	.....	51.20	50.52	49.74	49.27
20	51.24	.....	.....	.....	50.45	49.71	49.27
21	45.60	.....	.....	51.22	51.23	.....	.....	50.44	49.71	.....
22	45.62	.....	.....	51.22	51.21	.....	51.07	50.42	49.70	49.23
23	45.68	.....	.....	51.20	51.27	.....	51.03	50.39	.....	49.22

2.34.2.233--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Mar.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
24	45.67	.....	.....	51.19	51.45	.....	51.00	50.35	.....	.....
25	45.72	46.37	.....	51.62	51.43	.....	50.99	50.32	.....	.....
26	.....	46.42	49.35	51.60	51.41	.....	50.98	50.30	.....	.....
27	.....	46.38	49.27	.....	51.70	.....	50.98	50.28	49.58	.....
28	.....	46.38	49.27	.....	51.53	52.39	50.97	50.25	49.53	.....
29	.....	.....	49.35	.....	51.53	52.62	50.95	.....	49.50	49.15
30	.....	.....	49.70	.....	51.75	51.30	50.94	.....	49.50	.....
31	.....	.....	50.75	.....	51.84	52.40	.....	.....	.....	.....

2.36.28.114b. Morgan Trammell. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Mar. 3, 14.08; Aug. 30, 31, Sept. 2, 15.35.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.27	14.18	.....	14.09	14.46	15.11	15.44	15.86	16.34	16.16	15.87	15.57
2	.....	14.18	.....	14.09	14.48	15.13	15.44	15.89	16.35	16.16	15.85	15.56
3	.....	14.18	14.08	14.11	14.48	15.15	15.45	15.92	16.34	16.16	15.85	15.55
4	.....	14.17	.....	14.13	14.50	15.17	15.46	15.94	16.33	16.15	15.85	15.54
5	.....	14.17	.....	14.13	14.51	15.18	15.48	15.95	16.33	16.14	15.83	15.53
6	.....	14.17	.....	14.13	14.52	15.20	15.49	15.96	16.32	16.13	15.82	15.52
7	14.25	14.17	.....	14.14	14.54	15.22	15.51	15.98	16.31	16.12	.....	15.51
8	.....	.....	14.13	14.15	14.56	15.23	15.52	15.99	16.30	16.11	.....	.....
9	.....	.....	14.13	14.15	14.57	15.24	15.54	16.01	16.29	16.10	.....	.....
10	.....	14.13	14.13	14.16	14.58	15.24	15.55	16.02	16.28	16.09	15.75	.....
11	.....	14.13	14.13	14.18	14.60	15.25	15.56	16.03	16.28	16.08	15.74	.....
12	.....	14.13	14.13	14.20	14.62	15.26	15.58	16.05	16.27	16.07	15.73	.....
13	14.23	14.13	14.13	14.20	14.64	15.26	15.59	16.06	16.26	16.06	15.72	.....
14	.....	14.13	14.12	14.19	14.66	15.27	15.60	16.08	16.25	16.05	15.70	.....
15	.....	14.12	14.12	14.19	14.69	15.28	15.61	16.10	16.24	16.04	15.69	15.45
16	.....	14.12	14.12	14.19	14.72	15.29	15.62	16.11	16.23	16.02	15.69	15.45
17	.....	14.12	14.12	14.18	14.75	15.31	15.63	16.13	16.22	16.01	15.69	15.45
18	.....	14.12	14.12	14.18	14.78	15.31	15.64	16.14	16.21	16.00	15.68	15.44
19	.....	14.12	14.12	14.18	14.81	15.32	15.65	16.17	16.20	16.00	15.67	15.44
20	14.20	14.12	14.12	14.19	14.85	15.33	15.66	16.18	16.19	15.98	15.66	15.43
21	14.20	14.12	14.12	14.21	14.86	15.34	15.68	16.21	16.18	15.97	15.66	15.43
22	14.20	14.11	14.12	14.25	14.88	15.35	15.69	16.23	16.17	15.96	15.65	15.42
23	14.20	.....	14.12	14.27	14.91	15.35	15.70	16.26	16.16	15.95	15.64	15.42
24	14.19	14.09	14.12	14.30	14.94	15.35	15.72	16.28	16.15	15.95	15.63	15.41
25	14.19	.....	14.13	14.32	14.97	15.38	15.73	16.30	16.15	15.94	15.63	15.41
26	14.19	.....	14.14	14.34	14.99	15.39	15.75	16.31	16.15	15.93	15.62	15.40
27	14.19	.....	14.14	14.37	15.01	15.40	15.76	16.33	16.15	15.92	15.61	.....
28	14.19	.....	14.12	14.40	15.04	15.41	15.78	16.34	16.16	15.91	15.60	.....
29	14.19	.....	14.12	14.44	15.05	15.42	15.80	16.34	16.17	15.90	15.59	15.39
30	14.18	.....	14.11	14.45	15.07	15.43	15.82	16.35	16.17	15.89	15.57	15.38
31	14.18	.....	14.10	.....	15.09	.....	15.84	16.35	.....	15.88	.....	15.38

Part 5. Miscellaneous data concerning observation wells

1.32.3.440. Nall. Pump removed prior to July 29, 1946. Measuring point beginning July 29, 1946, top of casing level with concrete pump base, 0.40 foot above land-surface datum.

1.32.14.432. Morrison. Measuring point beginning May 29, 1946, top of concrete well curb, north side of well, 0.50 foot above land-surface datum. Pump removed from well in January 1946, reinstalled in July 1946.

1.33.9.111. Plank. New reference point established Jan. 25, 1946, centerline of horizontal metal bar embedded in west face of concrete weir box on east side of well, 0.67 foot above land-surface datum.

- 1.33.11.312. Williams. Measuring point beginning Jan. 25, 1946, top edge of casing, east side of well, 0.40 foot above land-surface datum.
- 1.33.14.31c. Stacey. Formerly owned by D. A. Alexander.
- 1.33.14.421a. Pinkert. Drilled irrigation well, equipped with turbine pump, diameter 12 inches. About 400 feet north of well 1.33.14.421. Measuring point, lip of 3/4-inch hole in east side of pump base, 0.12 foot above concrete pump base and land-surface datum.
- 1.33.23.311a. Smith. Drilled irrigation well, equipped with turbine pump. 45 feet southwest of well 1.33.23.311. Measuring point, top edge of 3/4-inch hole in west side of basal flange of pump, 0.17 foot above concrete pump base, 0.59 foot above land-surface datum of well 1.33.23.311.
- 1.33.23.433. Miller. Measuring point beginning Jan. 21, 1946, north lower edge of north east-west 6- by 6-inch pump support, 0.57 foot above land-surface datum.
- 1.33.26.221. Thomas. Measuring point beginning Jan. 21, 1946, top west edge of east 6- by 6-inch north-south pump support, 4.02 feet below land-surface datum.
- 1.34.15.131. Kemp. Drilled irrigation well, equipped with turbine pump. Measuring point, top edge of 3/4-inch hole in base of pump, 0.08 foot above concrete pump base, 0.50 foot above land-surface datum. Water level, in feet below land-surface datum, 1945: Nov. 27, 49.26.
- 1.34.17.233. Allison. Old pump removed, new turbine pump installed. Measuring point beginning July 29, 1946, top inside edge of 5/8-inch hole in base of pump shell, 0.36 foot above concrete pump base, 0.28 foot above land-surface datum.
- 1.34.19.223. Keswater. Measuring point beginning Jan. 26, 1946, top of concrete pump base, 0.49 foot above land-surface datum. Pump removed from well.
- 1.34.33.223a. Blakeley. Drilled irrigation well, equipped with turbine pump. Measuring point, top surface of concrete floor of pump house, 0.48 foot above land-surface datum of well 1.34.33.223 a few feet west of this well.
- 1.34.35.312. College. Measuring point beginning Jan. 20, 1946, raised to 0.77 foot above concrete pump base, 2.32 feet above land-surface datum.
- 1.34.36.324. Disney. Measuring point beginning Jan. 20, 1946, raised to 0.35 foot below land-surface datum.
- 1.35.29.142. Lee. Measuring point beginning Jan. 23, 1946, lip of east $\frac{1}{2}$ -inch hole in south side of pump base. Subtract 0.45 foot from tape measurements to reduce to land-surface datum.
- 1.35.31.412. Beebe. Used dug and drilled irrigation well, equipped with turbine pump. Measuring point, top of concrete well curb, 0.59 foot above land-surface datum.
- 2.33.1.422. Skeen. Drilled irrigation well, equipped with turbine pump, diameter 12 inches, depth 145 feet. Measuring point, top of casing and concrete pump base, 0.50 foot above land-surface datum. Water level, in feet below land-surface datum, 1945: Nov. 26, 26.35.
- 2.33.7.232. Morgan. Unused drilled well, diameter 12 inches, depth 150 feet. Measuring point, top edge of center opening of truck wheel over well, at land-surface datum. Water level, in feet below land-surface datum, 1945: Nov. 25, 50.01.
- 2.34.10.324. Cooper. Abandoned drilled domestic well, diameter 12 inches, depth 62 feet. Measuring point, top of casing at north side, 1.50 feet above land-surface datum. water levels, in feet below land-surface datum, 1945: June 9, 21.78; July 31, 22.29; Sept. 24, 23.22; Nov. 23, 23.43.
- 2.35.9.211. Maxwell. Well dry and partly filled. Measurements discontinued after Mar. 27, 1946. Water level, in feet below land-surface datum, 1946: Mar. 27, 18.93.

- 2.35.10.211. Hare. Windmill installed on well prior to measurement of Jan. 24, 1946.
- 2.35.25.123. Buchanan. Water level, in feet below land-surface datum, 1946: Mar. 25, 20.11.
- 2.36.21.432. Statts. Formerly owned by Sam H. McC arson.
- 2.37.21.312. Pattison. Drilled irrigation well, equipped with turbine pump, diameter 20 inches, depth 111 feet. Measuring point, top of casing, at land-surface datum. Water level, in feet below land-surface datum, 1945: Sept. 26, 26.64, pumping recently.

SIERRA COUNTY (HOT SPRINGS AREA)

By C. R. Murray

Part 1. General discussion

Water levels were measured in the observation wells at Hot Springs during 1946 in cooperation with the State engineer of New Mexico. These measurements continue the record begun in 1939 when the investigation of the thermal wells and springs was started under the cooperative program. A report covering the general phases of the investigation was prepared in 1941 and is to be published in a forthcoming biennial report of the State engineer. Water-level measurements made in past years have been published in the following Geological Survey water-supply papers:

<u>Year of record</u>	<u>Water-Supply Paper</u>	<u>Page Nos.</u>
1939-40	911	235-240
1941	941	270-274
1942	949	336-340
1943	991	295-299
1944	1021	291-294
1945	1028	290-295

Water levels are measured periodically so as to detect any changes that may occur which might indicate a change in the amount of thermal water available. A few measurements of the temperature of the thermal water are also made during the year to detect any changes which occur in the quantity of heat being supplied to the water. Chemical analyses of the water are made occasionally to note any change in the mineral content of the water which might occur. Water levels were measured in 11 wells in January, 10 wells in March, 13 wells in May, 11 wells in July, 10 wells in September, and 12 wells in November, making a total of 67 measurements during the year. Water-stage recorders were operated on 3 wells throughout the year, of these one was on an artesian well, No. 6, one a shallow well dug into the alluvium, No. 6a, and one a well dug into the Magdalena limestone near the upper edge of the spring area, No. 25. (See part 4.)

Fluctuations of water level and artesian head

Since the thermal water of the Hot Springs area discharges into the Rio Grande either directly or indirectly, the stage of the river is the major factor at present in controlling the pressure in the artesian wells and the water levels in the shallow-water wells. As power is developed at Elephant Butte Dam, above Hot Springs, the stage of the river is maintained at a fairly constant elevation and water levels and artesian pressures at Hot Springs are fairly stable. In 1946, because of drought conditions, the amount of water which could be released from Elephant Butte Dam was limited and water levels at Hot Springs remained in their relatively low position, but they were slightly above their 1945 position. The bimonthly measurements indicate that water levels, in general, varied only slightly from January to March, at which time they reached their high position for the year and then declined to their lowest positions in July. Recovery then occurred throughout the remainder of the year and at the end of the year water levels were little different than they had been at the beginning of the year. The following net average changes, in feet, were obtained for the artesian wells measured: January to March, +0.06; March to May, -0.03; May to July, -0.21; July to September, +0.09; September to November, +0.12; November to January 1947, +0.10, giving an average annual net change of +0.02. Measurements of water levels made in 1946 and prior years do not show any serious depletion of the thermal water and indicate that a limited amount of additional development can take place safely.

Part 2. Water levels in January 1946 and highest and lowest recorded levels, in feet with reference to land-surface datum, and change from January 1945 to January 1946, in feet

Field No.	Location Lot R/lock	Owner	See also Part	Water levels					Record Years missing		
				Jan. 1946 Level	Change 1945-46 Day	Highest Level	Lowest Level	Year			
2	17	H. L. Lockhart	3	.....	.	.....	+1.20	42	44	41	46
3	17	do	3	.....	.	.....	+1.23	42	44	41	46
4	21	C. E. James	3	+4.40	6	-.44	+1.28	42	+4.0	39	39
5	12	J. E. Malone	3	-.80	6	-.48	+1.13	42	-.80	46	39
6	4	C. E. James	4	+6.61	6	-.40	f+1.57	42	f+.52	41	41
6a	4	do	4	-1.62	6	-.21	f-1.24	42	f-1.64	44	42
12	8	Mr. Mathis	3	+3.70	6	-.40	+4.53	42	+3.69	44	39
18	7	W. R. Whitehead	3	-1.77	6	-.32	-1.19	42	-1.92	39	39
19	12	Bill Green	3	-.91	6	-.32	-.20	42	-.98	39	39
25	4	Jim Knox	4	-7.85	6	-.19	f-6.95	42	f-7.99	44	39
27	4	Ben Graham	3	+2.14	6	-.38	+2.97	42	+2.13	40	39
30	1	G. L. Mills	3	-1.47	6	-.46	-.63	42	-1.48	40	39
33	2	C. E. James	3	-.49	6	-.36	+.28	42	-.48	34	41

f From recorder chart.

1 Mar. 1939, Feb. 1940, Feb. 1941, Mar. 1942, Apr. 1943, Jan. 1944, Jan. 1945.

1 Also 1946.

Part 3. Water levels, in feet with reference to land-surface datum, showing seasonal changes during 1946

Field No.	Owner	Lock-hart	Lock-hart	James	Malone	Mathis	White-head	Green	Graham	Mills	James
Jan. 6	.....	.....	.....	+0.40	-0.80	+3.70	-1.77	-0.91	+2.14	-1.47	-0.48
Mar. 27	.....	.....	.....	+.42	(a)	+3.78	-1.72	-.88	+2.21	-1.39	-.40
May 21	+.03	+.07	+.40	+.40	a-1.04	+3.75	-1.77	-.93	+2.24	-1.43	-.43
July 23	+.05	+.09	b1	+.15	b-.96	+3.43	b-2.07	-1.26	1+1.92	-1.70	c-.72
Sept., 26	+.09	+.12	1	+.15	.....	+3.51	-1.93	-1.12	1+1.92	-1.67	-.60
Nov. 5	+.22	+.26	1	+.15	-.85	+3.62	-1.83	-1.02	+2.07	-1.57	-.51

a Pumping. b Pumping recently. c Nearby well pumping. 1 Below level given.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

6 Lot 4, block 8. C. E. James. Highest and lowest recorded water levels, in feet above land-surface datum, 1946: Oct. 4, 0.85; July 28, 0.42.

Highest daily water level, in feet above land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.65	0.63	0.60	0.71	0.70	0.64	0.56	0.45	0.44	0.51	0.65	0.61
2	.65	.63	.60	.72	.70	.61	.56	.56	.43	.52	.66	.61
3	.68	.63	.63	.68	.70	.59	.57	.53	.44	.53	.57	.61
4	.67	.65	.62	.69	.68	.60	.58	.48	.49	.85	.57	.62
5	.67	.65	.62	.70	.71	.61	.58	.47	.49	.73	.59	.63
6	.66	.62	.62	.71	.71	.61	.58	.48	.49	.64	.60	.66
7	.63	.65	.63	.70	.68	.62	.55	.49	.49	.61	.62	.68
8	.65	.65	.61	.71	.70	.60	.55	.49	.47	.60	.65	.63
9	.66	.62	.61	.70	.70	.61	.55	.49	.46	.60	.61	.62
10	.63	.65	.64	.70	.71	.59	.55	.48	.47	.60	.57	.65
11	.62	.67	.66	.68	.69	.64	.53	.47	.48	.55	.54	.67
12	.61	.69	.69	.71	.67	.66	.53	.48	.48	.58	.55	.65
13	.63	.65	.69	.73	.65	.65	.53	.50	.48	.57	.57	.63
14	.68	.64	.73	.73	.65	.64	.51	.50	.47	.57	.61	.63
15	.68	.64	.72	.71	.65	.65	.51	.50	.45	.59	.61	.64
16	.65	.65	.65	.70	.66	.65	.50	.50	.44	.62	.55	.64
17	.65	.65	.61	.71	.65	.62	.52	.50	.44	.61	.52	.65
18	.70	.64	.63	.73	.66	.63	.52	.46	.45	.60	.57	.66
19	.70	.63	.66	.73	.64	.60	.52	.45	.44	.58	.59	.67
20	.69	.64	.68	.73	.64	.60	.52	.45	.47	.56	.60	.66
21	.66	.64	.67	.72	.66	.60	.49	.47	.48	.57	.60	.63
22	.65	.63	.65	.72	.66	.56	.51	.47	.47	.59	.58	.62
23	.65	.62	.65	.70	.64	.57	.52	.47	.45	.61	.60	.62
24	.65	.62	.68	.71	.63	.58	.45	.47	.46	.60	.61	.62
25	.67	.65	.69	.71	.63	.58	.45	.45	.48	.61	.57	.66
26	.65	.65	.69	.70	.63	.59	.45	.46	.49	.62	.57	.66
27	.63	.61	.70	.72	.65	.59	.46	.47	.50	.56	.58	.66
28	.64	.61	.73	.70	.61	.59	.42	.47	.49	.60	.62	.67
29	.65		.72	.68	.63	.59	.43	.47	.46	.62	.62	.69
30	.64		.70	.69	.64	.56	.44	.46	.50	.60	.63	.69
31	.61		.71		.64		.45	.47		.61		.70

6a Lot 4, block 8. C. E. James. Highest and lowest recorded water levels, in feet with reference to land-surface datum, 1946: Aug. 2, +0.16; July 28-30, -1.93.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.62	1.62	1.65	1.64	1.70	1.77	1.89	1.90	1.83	1.80	1.63	1.67
2	1.62	1.61	1.66	1.64	1.70	1.79	1.89	1.16	1.85	1.79	1.62	1.68
3	1.63	1.61	1.66	1.65	1.70	1.80	1.88	.32	1.87	1.78	1.64	1.69
4	1.62	1.60	1.65	1.65	1.70	1.81	1.81	1.63	1.79	....	1.66	1.69
5	1.62	1.60	1.65	1.65	1.69	1.81	1.80	1.78	1.78	....	1.68	1.68
6	1.62	1.61	1.66	1.65	1.69	1.81	1.81	1.83	1.79	....	1.67	1.67
7	1.62	1.61	1.65	1.65	1.70	1.81	1.84	1.83	1.79	1.29	1.67	1.65
8	1.64	1.60	1.66	1.65	1.71	1.82	1.85	1.83	1.81	1.47	1.66	1.66
9	1.63	1.61	1.65	1.66	1.71	1.81	1.86	1.83	1.81	1.57	1.66	1.66
10	1.63	1.61	1.65	1.66	1.71	1.82	1.86	1.82	1.83	1.60	1.68	1.67
11	1.63	1.60	1.64	1.67	1.71	1.82	1.87	1.83	1.82	1.62	1.69	1.65
12	1.63	1.60	1.63	1.67	1.73	1.81	1.87	1.83	1.81	1.64	1.71	1.65
13	1.62	1.60	1.63	1.65	1.74	1.82	1.88	1.83	1.80	1.64	1.71	1.65
14	1.53	1.61	1.62	1.65	1.75	1.82	1.89	1.82	1.81	1.65	1.69	1.65
15	1.51	1.62	1.62	1.65	1.74	1.82	1.91	1.80	1.83	1.65	1.68	1.66
16	1.51	1.62	1.63	1.66	1.74	1.82	1.92	1.80	1.83	1.64	1.69	1.66
17	1.52	1.62	1.63	1.66	1.75	1.84	1.91	1.79	1.84	1.63	1.71	1.66
18	1.51	1.62	1.64	1.66	1.75	1.83	1.91	1.82	1.84	1.64	1.73	1.66
19	1.51	1.63	1.64	1.65	1.76	1.85	1.90	1.83	1.84	1.65	1.72	1.66
20	1.52	1.63	1.63	1.65	1.76	1.85	1.89	1.85	1.84	1.67	1.70	1.65

1 Above land-surface datum.

6a Lot 4, block 8--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
21	1.53	1.63	1.63	1.66	1.76	1.84	1.91	1.84	1.83	1.68	1.69	1.66
22	1.56	1.63	1.63	1.65	1.75	1.86	1.92	1.83	1.84	1.67	1.70	1.67
23	1.57	1.63	1.63	1.67	1.75	1.86	1.91	1.83	1.85	1.66	1.70	1.67
24	1.59	1.64	1.63	1.68	1.76	1.87	1.91	1.83	1.85	1.65	1.70	1.68
25	1.59	1.63	1.62	1.68	1.76	1.87	1.91	1.83	1.84	1.65	1.70	1.69
26	1.59	1.63	1.64	1.68	1.77	1.87	1.91	1.83	1.82	1.64	1.72	....
27	1.60	1.64	1.65	1.68	1.77	1.85	1.91	1.83	1.80	1.66	1.71	....
28	1.61	1.65	1.64	1.69	1.79	1.85	1.93	1.83	1.80	1.66	1.69	....
29	1.61		1.64	1.70	1.78	1.86	1.93	1.83	1.81	1.65	1.68	1.66
30	1.61		1.64	1.70	1.77	1.88	1.93	1.83	1.81	1.64	1.67	1.66
31	1.62		1.65		1.76		1.91	1.82		1.64		1.67

25 Lot 4, block 93. Jim Knox. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Oct. 4, 7.56; July 14-22, Aug. 19, 20, 25, 30, Sept. 1-3, 17, 7.93.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.84	7.82	7.84	....	7.80	7.82	7.90	7.91	7.93	7.90	7.80	7.72
2	7.84	7.82	7.84	....	7.80	7.83	7.90	7.88	7.93	7.90	7.79	7.72
3	7.84	7.81	7.82	....	7.80	7.85	7.90	7.88	7.93	7.90	7.86	7.72
4	7.83	7.81	7.82	....	7.81	7.84	7.90	7.91	7.91	7.56	7.86	7.71
5	7.83	7.82	7.82	....	7.79	7.84	7.91	7.90	7.91	7.79	7.83	7.70
6	7.83	7.82	7.81	....	7.79	7.83	....	7.90	7.91	7.86	7.79	7.68
7	7.85	7.81	7.81	....	7.80	7.83	....	7.90	7.91	7.87	7.78	7.66
8	7.84	7.81	7.82	....	7.80	7.85	....	7.90	7.92	7.88	7.76	7.70
9	7.84	7.84	7.82	....	7.80	7.84	....	7.90	7.91	7.88	7.78	7.71
10	7.84	7.81	7.83	....	7.79	7.85	....	7.90	7.91	7.90	7.80	7.68
11	7.83	7.80	7.80	....	7.80	7.84	....	7.91	7.92	7.89	7.82	7.66
12	7.85	7.80	7.79	....	7.81	7.85	....	7.91	7.92	7.88	7.82	7.67
13	7.82	7.82	7.80	....	7.82	7.86	....	7.90	7.92	7.88	7.80	7.69
14	7.81	7.82	....	....	7.82	7.86	7.93	7.90	7.92	7.87	7.76	7.69
15	7.81	7.82	7.80	....	7.82	7.86	7.93	7.90	7.92	7.87	7.77	7.68
16	7.81	7.82	....	....	7.82	7.86	7.93	7.90	7.92	7.86	7.81	7.68
17	7.81	7.82	7.81	....	7.83	7.88	7.93	7.90	7.93	7.86	7.84	7.68
18	7.80	7.82	7.80	....	7.82	7.88	7.93	7.92	7.92	7.86	7.80	7.67
19	7.80	7.81	....	....	7.82	7.89	7.93	7.93	7.92	7.87	7.78	7.66
20	7.80	7.81	7.80	....	7.82	7.90	7.93	7.93	7.91	7.88	7.76	7.67
21	7.80	7.81	7.80	....	7.81	7.89	7.93	7.92	7.91	7.87	7.77	7.70
22	7.81	7.82	7.80	....	7.81	7.91	7.93	7.91	7.92	7.87	7.78	7.70
23	7.81	7.83	7.80	....	7.81	7.90	7.91	7.91	7.92	7.84	7.75	7.70
24	7.82	7.81	7.79	....	7.82	7.90	7.91	7.92	7.91	7.86	7.74	7.69
25	7.81	7.80	7.79	....	7.82	7.90	7.91	7.93	7.91	7.84	7.75	7.66
26	7.81	7.80	7.80	....	7.82	7.90	7.91	7.92	7.90	7.83	7.76	7.67
27	7.82	7.82	7.80	7.80	7.81	7.90	7.91	7.92	7.91	7.86	7.75	7.66
28	7.82	7.82	7.79	7.79	7.83	7.90	7.92	7.92	7.91	7.84	7.71	7.66
29	7.82		7.79	7.80	7.82	7.90	7.92	7.92	7.92	7.82	7.71	7.64
30	7.82		7.80	7.80	7.82	7.90	7.91	7.93	7.91	7.83	7.71	7.63
31	7.83		....		7.82		7.91	....		7.83		7.64

TORRANCE COUNTY (ESTANCIA VALLEY)

By C. R. Murray

Part 1. General discussion

The water-level measurement program started in Estancia Valley in 1941 in cooperation with the State engineer of New Mexico was continued in 1946. The area was first studied in detail by O. E. Meinzer in 1909, the results of the investigation being published in Water-Supply Paper 275. Records of water levels measured since the inception of the current program have been published in Geological Survey water-supply papers as follows:

<u>Year of record</u>	<u>Water-Supply Paper</u>	<u>Page Nos.</u>
1941	941	275-282
1942	949	340-344
1943	991	299-305
1944	1021	296-302
1945	1028	295-301

Fluctuations of water level

Water levels were measured in 63 wells in February, 63 wells in May, and 67 wells in September making a total of 196 measurements during the year. (See parts 2 and 3.) A water-stage recorder was operated throughout the year on well 7.8.27.221. (See part 4.)

Recharge to the ground-water body, which depends on the amount of precipitation received, was less than normal. Estancia reported 12.24 inches of precipitation, 0.98 inch below normal, Mountainair, 14.95 inches, 1.37 inches below normal, and McIntosh, for which no record for the month of March is available, recorded 11.16 inches, 2.24 inches below normal for the 11 months reported. Precipitation during July and August was, in general, above average and contrasted with the dry first half of the year. There was a marked increase in ground-water development activities in Estancia Valley in 1946; however, many of the new wells were completed too late in the season to be used. It is estimated that about 725 acres was irrigated and that perhaps 1,000 acre-feet of water was used. About 1,400 additional acres of land was plowed to be made ready for irrigation in 1947. Considerable ground water is pumped by stock wells scattered throughout the valley, and transpiration and evaporation also are extensive as the water table is near the surface over considerable areas, where salt grass abounds, and at the surface in the salt lakes, which occupy the lowest parts of the valley.

Water levels from February 1946 to February 1947 rose in 37 wells and fell in 16 wells for which records are comparable, the average change for these 53 wells being a rise of 0.08 foot. In the southernmost wells measured, those near Willard and to the south and east of Willard, water levels showed about the average rise as given above. A short distance farther to the north and to the west, however, in the Mesteno Arroyo area, most wells showed declines of a few tenths of a foot. Irrigation wells both in this part of the valley and elsewhere, which had been completed shortly before February 1946 measurements, almost universally showed rises in water level by February 1947. These rises apparently are caused by recharge to the shallow aquifers by water rising from the deeper aquifers penetrated by the wells, the water in the latter being under greater pressure and thus creating a minor "cone of recharge". In Tajique Arroyo, a few miles north of Mesteno Arroyo, declines also took place. These declines are probably the result of pumping water for irrigation. In both Mesteno and Tajique Arroyos water levels rose rapidly following the abnormal precipitation of 1941, reached high positions in January 1942, and had started to decline in most wells in these areas by February 1943. Part of the decline in these areas in 1946 may be a continuation of this long-term decline. From Estancia north for about the 20 miles to Moriarity, water levels in most observation wells rose from a few hundredths to several tenths of a foot. This rise appears to be a continuation of the slow general rise which has been taking place in this part of Estancia Valley since 1941. Many of the wells in this area attained their highest position of record at the close of 1946.

It is expected that, with the increased use of ground water for irrigation along the western side of Estancia Valley, a downward trend in water levels will start shortly and that within the next few years distinct cones of depression will begin to form around areas of concentrated pumping.

Part 2. Water levels in February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet

Location number	Owner	See also Part	Water levels						Record		
			Feb. 1946 Level	Feb. 1946 day	Change 1945-46	Highest Level	Highest Year	Lowest Level	Lowest Year	Be-gan	Years missing
4.8.1.144	J. M. Harper	3	52.91	20	+1.14	52.91	46	54.70	44	42	
24.222	M. E. Ottosen	3	55.96	20	+0.05	55.96	46	57.23	41	41	
4.9.6.444	Red Ball Camp	3	35.54	20	+1.19	35.54	46	36.66	41	41	
7.441	Unknown	3	53.03	20	-0.05	52.68	143	53.39	44	42	
10.133	Homer Arnn	3	17.35	20	+0.19	17.35	46	18.22	41	41	
5.7.15.212	Ewing School	3	115.33	20	+1.13	115.33	46	117.88	41	41	
5.8.4.343	Unknown	3	31.58	21	-1.15	30.24	42	32.71	44	42	
11.221a	J. V. Chamberlin	3	10.62	20	-0.84	9.78	45	10.62	46	45	
12.111	do	3	14.29	20	-0.42	12.04	43	17.10	41	41	
15.131	Joe Begley	3	5	20	.....	.....	..	.....	..	..	46
15.313	Charles Rattan	3	5	20	.....	.....	..	.....	..	..	46
17.113	Madison Davis	3	5	20	.....	.....	..	.....	..	..	46
17.241	Ray Prown	3	41.82	20	-0.48	40.78	43	41.82	46	42	
17.311	do	3	27.58	20	-0.39	26.92	42	30.43	41	41	
17.323	do	3	27.58	20	+0.01	26.05	42	29.66	41	41	
17.334	do	3	11.56	20	-0.54	9.80	42	13.61	41	41	
21.111	R. B. Ford	3	27.64	20	.....	.....	..	.....	..	..	46
24.311	E. E. Wallace	3	21.93	20	.....	.....	..	.....	..	..	46
25.212	Homer Arnn	3	24.52	20	-0.50	22.45	42	24.52	46	42	
25.222b	do	3	25.52	20	-0.47	23.33	42	27.92	41	41	
30.121	Unknown	3	26.09	20	-1.10	22.68	42	29.66	41	41	
36.341	Mrs. Iva Moe	3	45.18	20	+0.07	45.18	46	46.69	41	41	
5.9.31.331	Homer Arnn	3	32.64	20	+0.03	32.64	46	34.10	41	41	
5.10.27.444	Unknown	3	40.47	20	+0.03	40.47	46	40.78	41	41	
6.8.1.244	J. H. Wiggins	3	21.21	19	+0.41	20.95	44	21.62	45	42	
3.221	Ellison Timmins	3	26.86	19	-0.06	26.18	42	26.86	46	41	
11.433	Pablo Lucero	3	6.26	19	-1.16	5.55	43	6.26	46	42	
12.133	Aurileo Prito	3	18.69	19	-0.65	16.90	43	18.69	46	41	
15.444	Estancia Cemetery	3	30.40	19	-0.05	29.99	43	31.04	41	41	
16.222	McGee Estate	3	58.71	21	-0.01	58.66	44	59.47	41	41	
24.111	Aurileo Brito	3	10.78	20	-1.20	6.22	42	10.78	46	41	
27.134	R. M. Sprull	3	20.48	21	+1.01	19.59	43	21.49	45	42	
30.434	J. W. Langley	3	37.57	21	-1.21	25.63	42	40.69	41	41	
6.9.9.222	Unknown	3	10.52	21	-5.66	4.84	45	11.93	43	41	
6.10.25.344	C. A. Blackwell	3	41.81	20	+0.04	41.81	46	42.38	42	42	
27.444	Major Dean	3	20.34	20	+0.03	20.34	46	20.77	41	41	

* See footnotes at end of table.

Part 2. Water levels in February 1946 and highest and lowest recorded levels in January or February, in feet below land-surface datum, and change from January 1945 to January 1946, in feet--Continued

Location number	Owner	See also Part	Water levels				Record						
			Jan. 1946 Level	Day	Change 1945-46	Highest Level Year		Lowest Level Year	Be-gan	Years missing			
7.7.12.342	DeHart Estate		3	42.02	22	(Measurements discontinued)	40.38	45	45.39	41	41	41	46
12.444	C. R. Roland		3	25.53	22	+0.6	42.02	46	46.45	41	41	41	
7.8.1.231	Myrtle Homan Estate		3	25.53	22	+0.59	25.53	46	c26.27	44	42	42	
1.423	Floyd Stump		3	24.16	22	+0.43	24.16	46	24.79	42	41	41	
9.444	Clayton Norman		3	57.81	22	+1.11	57.81	46	62.45	41	41	41	
10.221	H. W. Rice		3	16.35	22	+0.02	16.35	46	17.52	42	42	42	
10.244	Ted Maxfield		3	18.11	22	+4.26	18.11	46	a22.37	45	42	42	
12.433	G. M. Belknap		5	21.73	21	+0.40	21.73	46	23.53	41	41	41	45
16.422	Jim Frgood		3,5	45.88	22	.....	45.88	46	45.61	41	41	41	
23.311	O. L. Austin		3,5	17.87	22	+0.05	17.85	42	18.33	41	41	41	
23.324	do		3,5	2.20	22	+0.02	f 2.03	42	2.45	41	41	41	
24.433	R. T. Floyd		3	25.20	21	-0.70	23.68	42	25.20	46	41	41	
25.411	H. P. Prunnell		3,5	21.46	22	+0.15	21.26	42	22.13	41	41	41	
26.121	Mrs. T. M. McCloskey		3,5	(Measurements discontinued)	22	+0.15	f 3.65	44	3.98	44	43	43	46
26.141	Mr. Richter		3,5	5.30	22	.....	.....	..	.....	..	..	..
27.221	Wagner Estate		4,5	19.32	22	+0.05	f19.26	46	19.83	41	41	41	
33.123	F. A. Fincheloe		3	30.55	19	-0.47	29.24	42	32.35	41	41	41	
33.424	F. C. Hayes Estate		3	52.71	19	+0.09	52.71	46	53.34	42	41	41	
35.111	W. W. Dunn		3	18.78	19	-0.13	17.95	42	19.22	41	41	41	
35.532	do		3	(Measurements discontinued)	19	-0.13	14.99	42	16.08	41	41	41	46
7.9.5.211	Unknown		3	18.96	22	+0.08	18.96	46	19.22	42	42	42	
10.333	Mr. Price		3,5	14.95	22	+0.45	14.95	46	15.40	45	42	42	43,44
8.8.10.244	Dennis Willite		3	66.43	21	.....	65.21	43	66.43	46	43	43	45
26.222	Unknown		3	6.68	21	+0.07	6.68	46	7.52	42	42	42	
8.9.8.111	do		3	25.34	22	-0.34	23.77	42	25.34	46	42	42	
29.111	Mrs. Harry Bigger		3	21.91	22	.....	20.89	42	21.91	j46	44	44	
29.111a	do		3	20.93	22	+0.68	20.93	46	21.70	44	44	44	
9.8.26.121	Unknown		3	21.00	22	-0.51	19.60	43	21.00	46	42	42	
9.9.32.131	G. L. Dean		3	6.18	22	-0.27	5.90	43	6.88	41	41	41	44
32.131a	do		3	6.20	22	-0.41	5.79	45	6.68	44	44	44	

a Pumping.

c Nearby well pumping.

f From recorder chart.

i Also 1942.

j Also 1945.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946

Location number	4.8.	4.9.	4.9.	5.7.	5.8.	5.8.	5.8.	5.8.
Owner	24.222 Otto- son	7.441 Unknown	10.333 Arnn	15.212 School	4.343 Unknown	11.221a Chamber- lin	12.111 Chamber- lin	15.131 Begley
Feb. 20,21	55.96	53.03	17.35	115.33	31.58	10.62	14.29	14.74
May 13,14	55.93	52.92	17.20	115.42	31.69	10.64	14.25	16.49
Sept. 4,5	55.95	52.98	17.35	115.53	31.52	(a)	14.70	15.27
Location number	5.8.	5.8.	5.8.	5.8.	5.8.	5.8.	5.8.	5.8.
Owner	15.313 Rattan	17.113 Davis	17.241 Brown	17.311 Brown	17.323 Brown	17.334 Brown	21.111 Ford	24.311 Wall- ace
Feb. 20	20.57	45.01	41.82	27.98	27.58	11.56	27.64	21.93
May 13,14	21.32	45.94	42.40	28.72	28.31	11.92	27.89	(a)
Sept. 4,5	21.15	45.25	42.06	28.49	28.17	12.15	28.02	23.14
Location number	5.8.	5.8.	5.8.	5.8.	5.9.	5.10.	6.8.	6.8.
Owner	25.212 Arnn	25.222b Arnn	30.121 Unknown	36.341 Moe	31.331 Arnn	27.444 Unknown	1.244 Wig- gins	3.221 Timmins
Feb. 19,20	24.52	25.52	26.09	45.18	32.64	40.47	21.21	26.86
May 13,14	24.59	25.56	c26.15	45.13	32.58	40.45	20.85	26.76
Sept. 4-6	24.84	.....	26.59	45.14	32.64	40.43	20.83	26.77
Location number	6.8.	6.8.	6.8.	6.8.	6.8.	6.8.	6.8.	6.10.
Owner	11.433 Lucero	12.133 Brito	15.444 Ceme- tery	16.222 McGee	24.111 Brito	27.134 Sprull	30.434 Langley	25.344 Black- well
Feb. 19-21	6.26	18.69	30.40	58.71	10.78	20.48	37.57	41.81
May 13,14	6.11	18.66	30.19	58.72	10.97	20.33	37.78	41.80
Sept. 4-6	....	18.93	30.65	58.75	b14.16	20.79	b37.94	41.79
Location number	6.10.	7.7.	7.8.	7.8.	7.8.	7.8.	7.8.	7.8.
Owner	27.444 Dean	12.444 Roland	1.231 Homan	9.444 Norman	10.221 Rice	10.244 Max- field	16.422 Ergood	23.311 Austin
Feb. 20,22	20.34	42.02	25.53	57.81	16.35	a18.11	43.88	17.87
May 13-15	20.29	42.15	25.85	57.80	16.35	17.29	43.98	b18.65
Sept. 4,6	20.26	41.39	c25.84	57.79	16.06	16.99	44.10	18.48
Location number	7.8.	7.8.	7.8.	7.8.	7.8.	7.8.	7.8.	7.9.
Owner	23.324 Austin	24.433 Floyd	25.411 Brun- nell	26.141 Rich- ter	33.123 Kinch- eloe	33.424 Hayes	35.111 Dunn	5.211 Unknown
Feb. 19,21, 22	2.20	25.20	21.46	5.30	30.55	52.71	18.78	18.96
May 14,15	2.27	24.39	21.47	5.03	30.47	52.64	18.73	18.93
Sept. 6	2.45	23.50	21.48	4.63	30.37	52.63	18.52	18.94
Location number	7.9.	8.8.	8.9.	8.9.	8.9.	9.9.	9.9.	
Owner	10.333 Price	26.222 Unknown	8.111 Unknown	29.111 Bigger	29.111a Bigger	32.131 Dean	32.131a Dean	
Feb. 21,22	14.95	6.68	25.34	21.91	20.93	6.18	6.20	
May 15	14.83	6.65	25.37	21.21	21.63	6.14	6.18	
Sept. 6	14.81	6.50	24.20	21.58	21.82	5.93	6.03	

a Pumping.

b Pumping recently.

c Nearby well pumping.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

7.8.27.221. Wagner Estate. Water-stage recorder installed Dec. 6, 1945. Highest and lowest recorded water levels, in feet below land-surface datum, 1946: Mar. 14, 15, 24, 25, Apr. 2, 19.21; July 13, 20.70.

Highest daily water level, in feet below land-surface datum, 1945
(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Dec. 6	19.47	Dec. 13	19.45	Dec. 20	19.44	Dec. 26	19.42
7	19.46	14	19.45	21	19.44	27	19.43
8	19.46	15	19.45	22	19.43	28	19.42
9	19.46	16	19.45	23	19.41	29	19.41
10	19.45	17	19.44	24	19.42	30	19.41
11	19.45	18	19.44	25	19.42	31	19.42
12	19.44	19	19.45				

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	19.41	19.35	19.27	19.25	.....	20.10	20.63	20.35	19.98	19.73	19.58	19.48
2	19.41	19.35	19.25	19.21	.....	20.12	20.61	20.36	19.98	19.72	19.58	19.48
3	19.40	19.35	19.24	19.33	19.61	20.15	20.59	20.35	19.98	19.71	19.58	19.48
4	19.40	19.32	19.23	19.29	19.61	20.16	20.58	.....	19.96	19.71	19.60	19.48
5	19.39	19.35	19.24	19.29	19.60	20.17	20.56	.....	19.95	19.71	19.57	19.47
6	19.39	19.35	19.25	19.30	19.60	20.19	20.56	.....	19.92	19.70	19.57	19.45
7	19.40	19.33	19.25	19.29	19.58	20.22	20.61	.....	19.91	19.70	19.57	19.45
8	19.40	19.33	19.27	19.30	19.56	20.26	20.65	20.28	19.90	19.70	19.55	19.45
9	19.40	19.35	19.26	19.30	19.55	20.29	20.66	20.27	19.90	19.70	19.55	19.45
10	19.39	19.35	19.24	19.29	19.53	20.30	20.68	20.26	19.89	19.70	19.56	19.45
11	19.39	19.33	19.23	19.30	19.52	20.31	20.69	20.25	19.88	19.69	19.56	19.45
12	19.41	19.33	19.23	19.28	19.53	20.32	20.69	20.23	19.87	19.68	19.56	.....
13	19.39	19.34	19.23	19.28	19.52	20.33	20.70	20.23	19.87	19.68	19.56	.....
14	19.39	19.35	19.21	19.27	19.52	20.36	20.68	20.20	19.86	19.67	19.53	.....
15	19.39	19.35	19.21	19.27	19.54	20.39	20.66	20.19	19.86	19.67	19.53	.....
16	19.39	19.34	19.24	19.27	19.57	20.40	20.64	20.19	19.84	19.66	19.54	.....
17	19.39	19.30	19.25	19.28	19.64	20.42	20.62	20.18	19.84	19.66	19.54	19.43
18	19.38	19.30	19.24	19.30	19.69	20.45	20.60	20.15	19.82	19.66	19.54	19.42
19	19.38	19.30	19.24	19.35	19.74	.....	.....	20.16	19.82	19.66	19.53	19.40
20	19.37	19.31	19.22	19.40	19.80	.....	.....	20.16	19.80	19.66	19.52	19.40
21	19.38	19.32	19.22	19.46	19.83	.....	.....	20.15	19.78	19.65	19.52	19.40
22	19.37	19.32	19.23	19.52	19.85	.....	.....	20.14	19.78	19.63	19.51	19.40
23	19.37	19.32	19.22	19.53	19.86	.....	.....	.....	19.78	19.62	19.48	19.41
24	19.38	19.30	19.21	19.53	.....	20.58	20.48	.....	19.77	19.62	19.48	19.40
25	19.36	19.29	19.21	19.57	19.94	20.58	20.48	.....	19.76	19.61	19.48	19.39
26	19.36	19.29	19.22	19.57	19.96	20.59	20.44	.....	19.75	19.61	19.50	19.37
27	19.37	19.27	19.22	19.58	20.00	20.61	20.42	.....	19.74	19.61	19.50	19.37
28	19.36	19.26	19.24	19.59	20.01	20.61	20.40	.....	19.74	19.61	19.49	19.38
29	19.33	.....	19.25	19.64	20.03	20.61	20.40	20.01	19.75	19.59	19.48	19.39
30	19.35	.....	19.27	19.65	20.05	20.63	20.39	20.01	19.74	19.59	19.48	19.38
31	19.36	.....	19.25	.....	20.07	.....	20.37	20.00	.....	19.59	.....	19.38

Part 5. Miscellaneous data concerning observation wells

5.8.12.111. Chamberlin. Measuring point beginning Sept. 4, 1946, top edge of casing, level with 2- by 2-foot concrete pump base, 0.70 foot above land-surface datum. Casing has been cut off.

5.8.15.131. Begley. Used drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 125 feet. Measuring point, top edge of 1½-inch hole in north side of pump base, 0.20 foot above top of casing, 0.70 foot above land-surface datum. Water levels, in feet below land-surface datum, 1945: May 8, 13.68; Sept. 6, 43.32, pumping.

5.8.15.313. Rattan. Unused drilled irrigation well, no equipment, diameter 16 inches, depth 225 feet. Measuring point, top of casing, 0.50 foot above land-surface datum.

- 5.8.17.113. Davis. Used drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 148 feet. Measuring point, lower inner edge of rectangular hole in pump shell, 0.75 foot above concrete platform and land-surface datum. Water levels, in feet below land-surface datum, 1945: May 8, 43.29; Sept. 6, 46.75.
- 5.8.17.311. Brown. Measuring point, base of pump, raised Sept. 5, 1946, to 0.63 foot above land-surface datum.
- 5.8.21.111. Ford. Drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 169 feet. Measuring point, bottom edge of 3/4-inch hole in northwest side of casing, 0.50 foot above land-surface datum.
- 5.8.24.311. Wallace. Drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 200 feet. Measuring point beginning Sept. 4, 1946, lower inside edge of mouth of discharge pipe. Subtract 3.50 feet from tape measurements to reduce to land-surface datum.
- 5.8.25.212. Arnn. Formerly owned by Mrs. Gregory.
- 5.8.25.222b. Arnn. Formerly owned by Mrs. Frances Backer. Windmill removed from well prior to May 13, 1946, measurement.
- 5.9.31.331. Arnn. Formerly owned by G. L. McBeth. Measuring point beginning Feb. 20, 1946, lip of 3/4-inch hole in base of pump, south side, 0.72 foot above concrete pump base, 1.22 feet above land-surface datum.
- 6.8.1.244. Wiggins. Former owner unknown.
- 6.8.3.221. Timmins. Well deepened to 195 feet prior to September 1946 measurement.
- 7.8.9.444. Norman. Former owner unknown.
- 7.8.12.433. Belknap. Measuring point beginning Feb. 21, 1946, lower edge of tee-fitting forming spout of pitcher pump, 1.55 feet above well platform, 2.05 feet above land-surface datum.
- 7.8.16.422. Ergood. Formerly owned by B. F. Strotman. Windmill out of order Feb. 22, 1946.
- 7.8.23.311. Austin. Formerly owned by J. P. Morgan.
- 7.8.23.324. Austin. Formerly owned by J. P. Morgan.
- 7.8.25.411. Brunnell. Formerly owned by R. T. Floyd.
- 7.8.26.141. Richter. Unused drilled irrigation well, diameter 18 inches, depth 100 feet. Measuring point, top of casing, 1.50 feet above land-surface datum. Water levels, in feet below land-surface datum, 1945: May 8, 8.90; Sept. 7, 5.70.
- 7.8.27.221. Wagner. Water-stage recorder installed Dec. 6, 1945.
- 7.9.10.333. Price. Windmill out of order Feb. 22, 1946, and removed prior to May 15, 1946.

VALENCIA COUNTY (GRANTS-BLUEWATER AREA)

By C. S. Conover

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, at the head of Bluewater Canyon above the town of Bluewater. 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 wells.

The first successful irrigation well was drilled in August 1944 in SW $\frac{1}{4}$ sec. 29, T. 12 N., R. 10 W. Following this, other successful wells were obtained until, by the end of 1945, 12 successful irrigation wells had been drilled and by the end of 1946 the number had increased to 16.

A program of measuring water levels in observation wells and getting other data pertaining to ground water in the area was begun in February 1946 in cooperation with the State engineer of New Mexico.

Water levels were measured in February 1946 in 16 wells and again in May, July, September, October, November, and December, in about 15 wells in addition to other wells which will be reported in the succeeding year. (See part 3.) As 1946 is the first year of record of these wells, part 2 for Valencia County is not included in this report.

A water-stage recorder was installed in November 1946 on well 12.11.9.222, about 0.25 mile from the channel of Bluewater Creek and about 1 mile from the nearest pumped well. Water levels measured in wells throughout the year show the effects of pumping and recharge upon the water in the aquifer and give valuable information concerning the hydrologic character of the aquifer.

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 Dam and Bluewater Canyon. Recharge to the aquifer also occurs from the various canals and from return of irrigation water applied upon the lands.

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 causes only a minor change in the amount of pumping necessary.

The precipitation at Bluewater in 1946, as reported by the U. S. Weather Bureau, was 10.76 inches, only 0.55 inch below normal, while that at Grants was 9.93 inches.

It is estimated that about 4,500 acres was irrigated by ground water in 1946, consisting primarily of carrots and beans and that about 9,000 acre-feet of water was pumped. The pumpage in 1945 is estimated at about 3, 500 acre-feet, as only about 7 wells were finished in time for the growing season. Surface water was not used for irrigation in 1946 because of the small amount in storage.

Fluctuations of water level

Water levels reached their highest stages in the early part of March before the beginning of the heavy pumping season. During the pumping season the water levels declined steadily, with only minor rises during cessation of pumping, and reached their lowest stages generally in late September after which the water levels rose until the beginning of the next year's pumping season. The lowering of the static water level in most of the wells during the pumping season in 1946, from February to September or October, was from 7 to 9 feet with a maximum recorded decline of about 15 feet in an unused well, 12.11.9.222. Part of the decline in this well is probably due to lack of recharge as it is near a recharge area of Bluewater Creek which, in that stretch, has no perennial flow. The rate of recovery of water levels after cessation of the pumping season was considerably less than the rate of drawdown during the pumping season. Consequently, a net deficit in the stage of the water levels was exhibited at the end of the year. The average decline in water levels from February 1946 to February 1947 was about 5 feet with a maximum recorded decline of 11.9 feet occurring in the well 12.11.9.222. The smallest recorded decline of 3.3 feet occurred in an unused well, 11.10.10.111, a few hundred feet from an irrigation well. The water in this unused well is probably sealed off somewhat from the water in the aquifer as evidenced by the continued decline of water level throughout the year.

As pumping of ground water is a new discharge imposed upon a previously more or less stable ground-water system, the annual 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 ground-water discharge in the swamp area from Grants southward to San Rafael. As 1946 was the first

complete year of use of ground water for irrigation experienced by the farmers, it is probable that the amount of pumping per acre will decrease somewhat in succeeding years as more efficient use is made of the ground water. This more efficient use will be encouraged by the higher cost of pumping water as compared with the former lower cost of surface water. It is probable that in scattered years enough water would be available in Bluewater Reservoir to furnish an adequate surface supply of water to the area, in which case little pumping would be done and the ground water would be replenished to some extent. 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 less than during 1946 unless an increase in irrigated acreage occurs.

Part 3. Water levels, in feet below land-surface datum, showing seasonal changes during 1946

Location number	11.10. 4.211	11.10. 8.222	11.10. 9.222	11.10. 9.242	11.10. 10.111	11.10. 16.121	11.10. 16.142	12.10. 23.233
Owner	Church & Harden	Milan	Stanley & Card	Card	Hard- ing	Wilson	Wilson	Jacobs
Feb. 26,27	57.97	57.85	54.49	52.24	51.92	46.47	45.50	115.59
May 9	(a)	(a)	(a)	c59.70	bc57.25	(a)	47.93	(a)
July 10-12	.....	.....	(a)	63.98	53.35	a54.96	51.00	.....
Sept. 3,4	64.02	65.37	61.20	.....	54.18	52.96	50.90	122.13
Oct. 1,2	63.86	65.49	61.25	59.05	54.47	53.06	51.05	122.35
Nov. 6,7	63.19	64.37	60.50	58.38	54.87	52.52	50.80	121.25
Dec. 3	63.09	63.83	60.08	57.98	54.97	52.15	50.53	120.74
Location number	12.10. 29.434	12.10. 30.412	12.10. 30.421	12.10. 32.111	12.11. 9.222	12.11. 10.431	12.11. 22.414	12.11. 24.223
Owner	Stanley & Card	Freas	Hard- ing	Church & Harden	Church & Harden	John	Hassell	Church & Harden
Feb. 26,27	69.23	90.04	88.38	82.09	115.70	103.67	110.59	100.18
May 10	.....	(a)	a97.86	(a)	120.52	(a)	.....	(a)
July 12	.....	.....	.....	(a)	130.62	.....	122.79	.....
Sept. 3,4	78.19	98.67	96.90	90.20	129.38	.....	122.31	c109.91
Oct. 1,2	75.15	99.23	97.53	(a)	130.13	.....	123.22	(a)
Nov. 6-8	74.20	97.11	95.37	88.70	128.55	.....	121.45	c107.93
Dec. 3,4	74.05	96.36	94.58	87.97	128.20	.....	121.55	106.63

a Pumping.

b Pumping recently.

c Nearby well pumping.

Part 4. Highest daily water levels in wells equipped with automatic water-stage recorders

12.11.9.222. J. C. Church and E. E. Harden. water-stage recorder installed Nov. 9, 1946.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Nov. 10	128.40	Nov. 13	128.47	Nov. 16	128.41	Nov. 19	128.29
11	128.47	14	128.30	17	128.45	20	128.15
12	128.52	15	128.30	18	128.36	21	128.27

12.11.9.222--Continued.

Highest daily water level, in feet below land-surface datum, 1946
(From recorder charts)

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Nov. 22	128.32	Dec. 2	128.15	Dec. 12	127.84	Dec. 22	127.88
23	128.14	3	128.15	13	127.91	23	127.92
24	128.01	4	128.12	14	127.92	24	127.92
25	128.10	5	128.05	15	127.89	25	127.84
26	128.25	6	127.94	16	127.82	26	127.70
27	128.27	7	127.87	17	127.85	27	127.69
28	128.21	8	127.91	18	127.83	28	127.61
29	128.15	9	127.95	19	127.80	29	127.75
30	128.16	10	127.92	20	127.83	30	127.69
Dec. 1	128.21	11	127.80	21	127.88	31	127.77

Part 5. Miscellaneous data concerning observation wells

11.10.4.211. J. C. Church and E. E. Harden. Used drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 150 feet. Reference point, top of concrete pump base, 2.00 feet above land-surface datum.

11.10.8.222. Salvador Milan. Used drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 165 feet. Reference point, top of concrete pump base, 2.50 feet above land-surface datum.

11.10.9.222. Dean Stanley and A. R. Card. Used drilled irrigation well, equipped with turbine pump, diameter 20 inches, depth 480 feet. Reference point, top of concrete pump base, 4.00 feet above land-surface datum.

11.10.9.242. A. R. Card. Unused drilled domestic well, equipped with pressure pump, diameter 7 inches, depth 125 feet. Measuring point, top of casing, 1.80 feet above land-surface datum.

11.10.10.111. Milton Harding. Unused drilled stock well, diameter 6 inches. Windmill pump removed prior to measurement on Nov. 6, 1946. Measuring point, top edge of casing southwest side of well, 0.50 foot above land-surface datum. Water level, in feet below land-surface datum, 1944: Nov. 6, 52.82.

11.10.16.121. Frank Wilson. Used drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 155 feet. Reference point, top of concrete pump base, 1.50 feet above land-surface datum.

11.10.16.142. Frank Wilson. Used drilled domestic and stock well, equipped with windmill, diameter 8 inches, depth 52 feet, deepened in July 1946 to 83 feet. Measuring point beginning July 10, 1946, top of steel plate over casing, 0.45 foot above land-surface datum. Water level, in feet below land-surface datum, 1944: Nov. 6, 41.50.

12.10.23.233. John Jacobs. Used drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 865 feet. Reference point, top of concrete pump base, 1.22 feet above concrete floor of pump house and 1.72 feet above land-surface datum.

12.10.29.434. Dean Stanley and A. R. Card. Used drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 205 feet. Reference point, top of concrete pump base, 1.68 feet above land-surface datum. Water level, in feet below land-surface datum, 1944: Oct. 14, 65.46.

12.10.30.412. Fred Freas. Used drilled irrigation well, equipped with turbine pump, diameter 16 inches, depth 225 feet. Reference point, top of concrete pump base, 2.00 feet above land-surface datum.

12.10.30.421. Milton Harding. Used drilled irrigation well, equipped with turbine pump, diameter 18 inches. Measuring point, top edge of 16-inch casing, 2.00 feet above land-surface datum. Reference point, top of stake nailed to east side of power-line pole about 30 feet northwest of well, 1.15 feet above land-surface datum.

12.10.32.111. J. C. Church and E. E. Harden. Used drilled irrigation well, equipped with turbine pump, diameter 20 inches, depth 253 feet. Reference point established Sept. 3, 1946, top of concrete pump base, 2.12 feet above land-surface datum.

12.11.9.222. J. C. Church and E. E. Harden. Unused drilled well, diameter 18 inches, depth 500 feet. Measuring point, top edge of 18-inch casing, west side of well, 2.00 feet above land-surface datum. Water-stage recorder installed Nov. 9, 1946.

12.11.10.431. Burton John. Used drilled irrigation well, equipped with turbine pump, diameter 14 inches, depth 500 feet. Measuring point, top edge of casing, east side of well, 2.00 feet above land-surface datum.

12.11.22.414. Hassell. Unused drilled well, diameter 20 inches, depth 440 feet. Measuring point beginning July 12, 1946, top edge of casing, north side of well, 2.55 feet above land-surface datum.

12.11.25.223. J. C. Church and E. E. Harden. Used drilled irrigation well, equipped with turbine pump, diameter 18 inches, depth 238 feet. Reference point, top of concrete pump base, 2.80 feet above land-surface datum.