UNITED STATES
DEPARTMENT OF THE INTERIOR
Douglas McKay, Secretary

BUREAU OF RECLAMATION
Wilbur A. Dexheimer, Commissioner
Clyde H. Spencer, Regional Director
Region 2

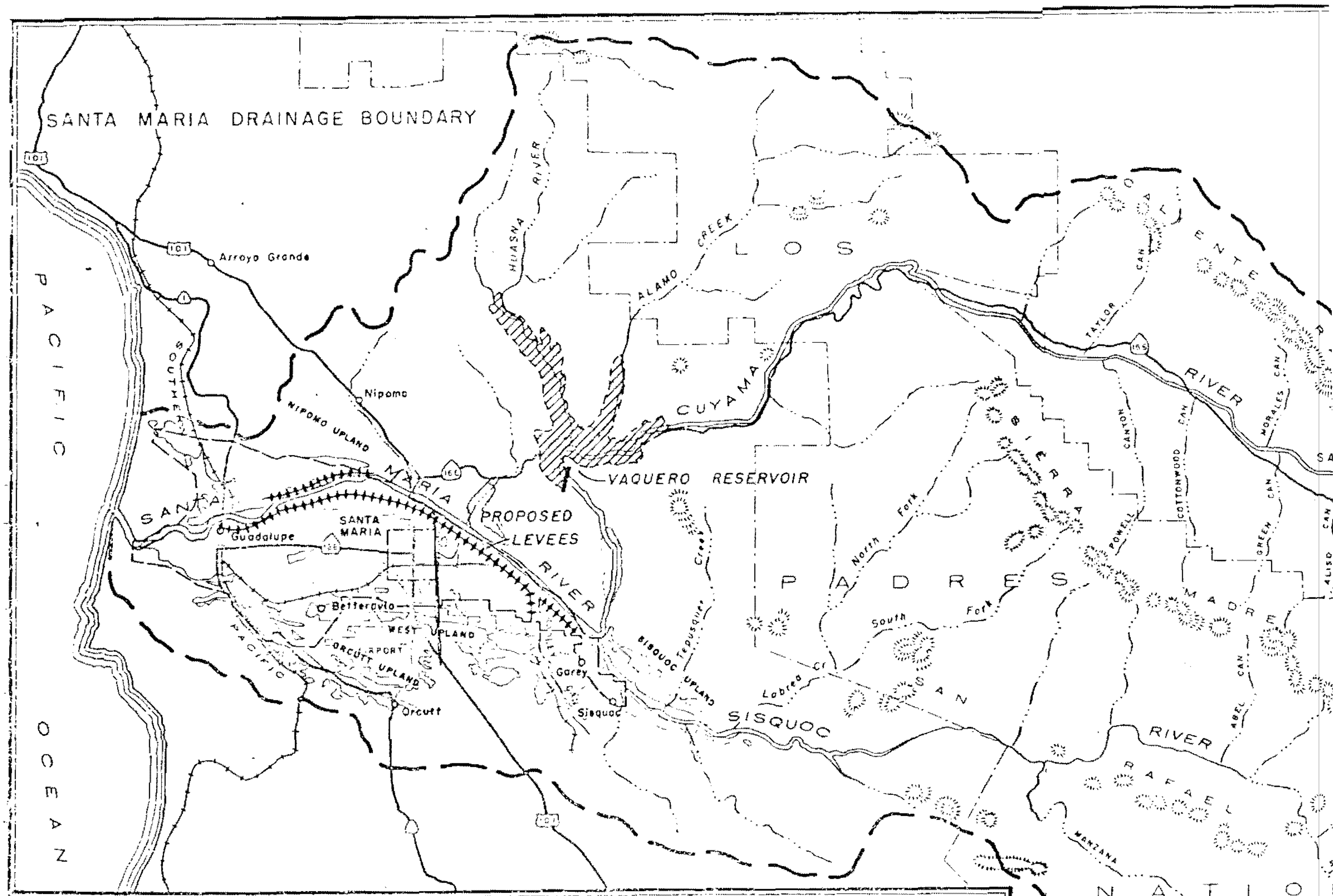
SANTA MARIA PROJECT, CALIFORNIA

DEFINITE PLAN REPORT

HYDROLOGY APPENDIX

SACRAMENTO, CALIFORNIA
September 1955

AM 00660



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

SANTA MARIA PROJECT

SCALE OF MILES
1 0 1 2 3 4 5

EXPLANATION

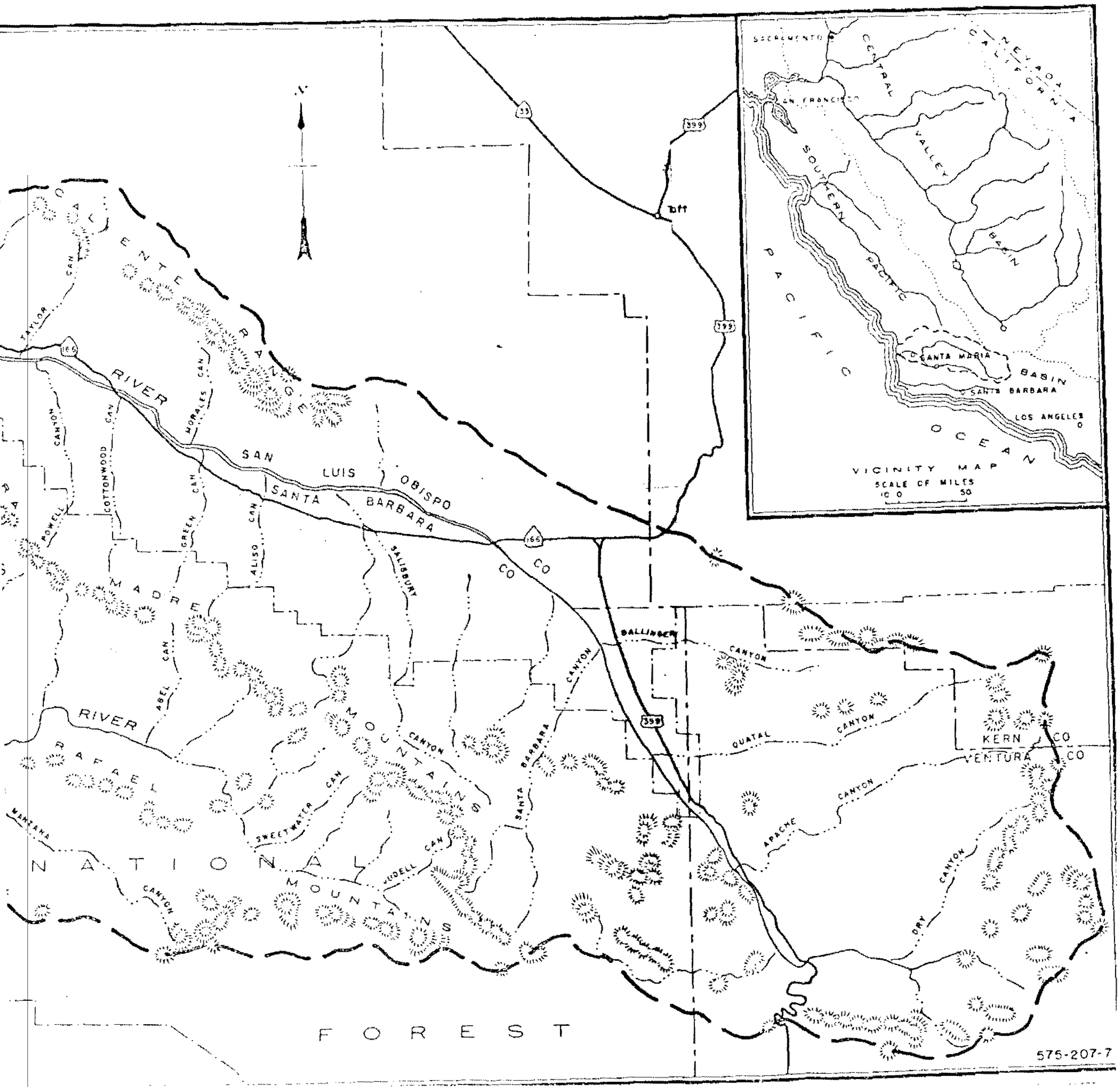
Irrigated Land

Irrigable Land

Proposed Levee

Santa Maria Conservation District

November 1951 Revised 5-26-55


SAN LUIS OBISPO CO
SANTA BARBARA CO
RIVER
MADRE
MOUNTAINS
RAFAEL
NATIONAL
FOREST
CUYAMA
KERN CO
VENTURA CO
PACIFIC OCEAN
SOUTHERN PACIFIC
CENTRAL VALLEY BASIN
SANTA MARIA BASIN
SACRAMENTO
SAN FRANCISCO
SANTA BARBARA
LOS ANGELES
NEVADA
CALIFORNIA
VICINITY MAP
SCALE OF MILES
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FOREWORD

Purpose

The purpose of this appendix is to present the analysis of the hydrologic data and yield studies basic to the Definite Plan Report entitled, "Santa Maria Project, California" dated September 1955.

Acknowledgments

The basic data that are presented in this hydrologic inventory of the Santa Maria Basin have been gathered by several Federal, State and local organizations, including principally, the Geological Survey, U. S. Department of Interior; Corps of Engineers, U. S. Army; Forest Service, U. S. Department of Agriculture; Weather Bureau, U. S. Department of Commerce; Santa Maria Valley Water Conservation District; and the Pacific Gas and Electric Company.

This appendix contains data that had appeared in "Appendix I, Hydrology of the Santa Maria Basin" dated May 1952, and additional data obtained since that time. New data on ground water, water requirements, sedimentation and flood hydrology required revisions of these and other chapters of the 1952 appendix.

San Rafael Mountains; the Orcutt Upland rises gently southward to the Solomon and Casmalia Hills. A small alluvial area of about 21 square miles, known as the Sisquoc Plain, adjoins the Santa Maria Plain at Fugler Point and extends up the Sisquoc River about 7 miles. Most of the Santa Maria and Sisquoc Plains are intensively cultivated. In the past, little of the upland areas were cultivated or irrigated. Recently grain has been raised over a considerable part of these areas, and irrigation of vegetables and other crops has been introduced in the limited areas of the lower uplands. The Santa Maria Plain, the Sisquoc Plain, and the Uplands constitute the largest single agricultural district in Santa Barbara County.

The Cuyama River Basin drains essentially all of the northern half and easternmost portion of the Santa Maria Basin. It is characterized by a relatively flat valley floor entrenched by the river channel, flanked on the north by the dry semi-barren Caliente Mountains (maximum elevation 5,095 feet), and on the south by the rugged, chaparral-covered Sierra Madre Mountains (maximum elevation 5,880 feet). The tributaries to the Cuyama River are many and of short length and, except in the lower part where Alamo Creek and Huasna River join the main stream from the north, are relatively unimportant.

The Sisquoc River Basin consists mostly of the Sierra Madre Mountains on the north and the San Rafael Mountains (maximum elevation 6,828 feet) on the south. Most of the Sisquoc River Basin lies within Los Padres National Forest.

Climate

The climate in the Santa Maria Basin is characterized by a short rainy season in the winter and a long dry season the remainder of the year. In the coastal plain area the summers are of the cool, Mediterranean type, while the interior mountain valleys are hot. Winter rains are usually light and of short duration. However, this region is subject to frequent cyclonic storms from the Pacific Ocean, which occasionally result in floods when the rainfall continues for several days.

On the Santa Maria Plain, extreme temperatures are rare and frosts not severe, permitting the production of two or more crops per year. The growing season is 273 days at Santa Maria. The average mean annual temperature at Santa Maria is 57.7 degrees, varying from an average monthly mean minimum of 36.8 in January to an average monthly mean maximum of 79.0 in September. Recorded extremes are 21 and 109 degrees. The average annual percentage of clear days is 65 per cent at Santa Maria, the same as for Santa Barbara. The annual percentage of days with some sunshine is 80 per cent at both stations.

About 90 per cent of the precipitation occurs during the months of November through April. Mean seasonal precipitation ranges from about 11 inches on the coast to more than 35 inches on the higher mountains. Precipitation occurs as rain except for occasional light snowfall in mountain areas. Seasonal rainfall varies widely from year to year. During the 75-year period of record, the annual rainfall at Santa Maria has varied from 4.50 to 30.64 inches, averaging 14.01. At Ozena, on the upper Cuyama River, it has varied from 4.64 to 32.60 inches, averaging 13.58. The aridity of the Caliente Mountains is indicated by the record at Pattiway, on the divide near U. S. Highway 399 where the annual rainfall has varied from 3.18 to 19.02 inches, averaging only 9.67 inches.

CHAPTER III

RUNOFF RECORDS

Sources of Runoff

The Santa Maria River drains a watershed of about 1,630 square miles at Fugler Point. About 70 per cent of this area is in the Cuyama River watershed and 30 per cent in the Sisquoc River watershed. The two tributaries contribute about equally to the flow at Fugler Point, however.

The Cuyama River traverses its long narrow watershed for a total length of about 110 miles. The average slope is 180 feet per mile for the upper 10 miles and 35 feet per mile for the lower 100 miles. Upon leaving the relatively flat Cuyama Valley the river enters a canyon 36 miles in length to emerge and join the Sisquoc River at Fugler Point and form the Santa Maria River. About 9 miles above this point its flow is greatly augmented by its two largest tributaries, Alamo Creek and Huasna River.

The Sisquoc River rises in the south-central part of the basin in the San Rafael Mountains and flows generally westward for about 50 miles to its confluence with the Cuyama River. The river flows in a well-defined channel through a canyon for the upper 42 miles. About 8 miles above its mouth, the river emerges into the Sisquoc River Valley through which it flows into the Cuyama River. The average slope is 105 feet per mile. The most important tributaries are Manzana, Labrea, and Tepusquet Creeks.

Available Discharge Records

The 10 stream-gaging stations maintained by the Geological Survey in the Santa Maria Basin are located on Plate 1. The stations essential to this report are listed in Table 3, together with their drainage area, period of record, length of record, and mean annual discharge in acre-feet. The records were extended over the 85-year period 1868-1952, principally by means of rainfall-runoff correlation graphs. Estimated records used in the operation study covering the 1930-48 period are based primarily on correlation of runoff rather than the rainfall-runoff relation used for estimating runoff prior to this period. The earlier estimates were used only to indicate that the 1930-48 period was representative of the long-term period. The rainfall index used in all of these graphs is the average of the indices for Suey Ranch, Musick, Sisquoc Ranch, Permasse Ranch and Upper Huasna, as shown in Table 2. The measured and estimated annual discharge records for each tributary are discussed separately.

Cuyama River

A stream-gaging station was first established on the Cuyama River just below the mouth of Buckhorn Canyon in October 1903, but was discontinued in December 1905. In December 1929 the present station was established 6.5 miles downstream at the bridge on State Highway 166, ten miles northeast of Santa Maria. The recorded and estimated annual discharge for 1868-1952 and rainfall in percentage of normal for 1868-1950 are presented in Table 4. The rainfall-runoff correlation graph used in extending the record back to 1868 is shown in Plate 3.

Cuyama River Depletion

That part of the runoff of the Cuyama River that consists of groundwater discharge, known as base flow, is subject to future depletion as a result of pumping for irrigation in the Cuyama Valley. The Geological Survey1/ has estimated the average annual base flow below the valley at 4 to 5 second-feet, or 2,900 to 3,600 acre-feet annually. This estimate was based on miscellaneous measurements below Cottonwood Creek, which indicated that the perennial low flow during the period 1942-46 varied from about 9 second-feet during the cold winter months, when evapo-transpiration losses are at a minimum, to about 1 second-foot during the hottest summer months, when such losses are at a maximum. Because the period of 1942-46 followed the excessively wet winter of 1940-41, the low flow may have been somewhat higher than average. Accordingly, the annual base flow subject to depletion was estimated as 3,000 acre-feet.

The groundwater discharge into the river channel occurs along a reach about 270 feet below the elevation of water table beneath the town of Cuyama, in the center of the irrigated area. This discharge, therefore, will not be entirely depleted until the overdraft for irrigation greatly lowers the water table, possibly 200

1/Upson, J. E., and Worts, G. F. Jr., Groundwater in the Cuyama Valley, California: U. S. Geological Survey Water Supply Paper 1110-B, 1951.

feet or more. At the end of 1949, waterlevels in most observation wells in the main portion of the valley were about 10 feet lower than the recorded peak in 1945.1/

Huasna River

The stream-gaging station on the Huasna River was established at the bridge on State Highway 166, eight miles northeast of Santa Maria in December 1929. The recorded and estimated annual discharge for 1868-1952 and rainfall in percentage of normal for 1868-1950 are presented in Table 5. The rainfall-runoff correlation graph used in extending the record back to 1868 is shown in Plate 4.

Alamo Creek

The stream-gaging station on Alamo Creek was established at the bridge on State Highway 166, 9 miles northeast of Santa Maria, in October 1943. The recorded and estimated annual discharge for 1868-1952 and rainfall in percentage of normal for 1868-1950 are presented in Table 6. The rainfall-runoff correlation graph used in extending the record back to 1868 is shown in Plate 5. In order to extend the latter graph to higher discharges than the available annual measurements afforded, additional annual runoff values were estimated by summation of daily flows obtained from the graph of the relation between daily flows of the Huasna River and Alamo

1/Wilson, H. D., Jr., Water levels in observation wells in Santa Barbara County, California, in 1949: U. S. Geological Survey duplicated report, November 1950, p. 7

Creek, presented in Plate 6. These two adjacent watersheds possess similar characteristics of topography, soil, and vegetal cover.

Sisquoc River

The stream-gaging station on the Sisquoc River near Sisquoc was first established 7 miles east of Sisquoc in December 1929, and discontinued in October 1933. It was reestablished in October 1943. The recorded and estimated annual discharge for 1868-1952 and rainfall in per cent of normal for 1868-1950 are presented in Table 7. The estimated discharges were obtained from the rainfall-runoff relations shown in Plate 7. In order to extend the latter graph to higher discharges than the available annual measurements afforded, recourse was taken to the relationship between the runoff at this station and that of the Santa Ynez River at Gibraltar Dam, as disclosed by the Geological Survey1/ This comparison indicated that the runoff at the Sisquoc station was about 80 per cent of that at Gibraltar Dam, shown in Table 8. This relationship was used to obtain the higher points on the rainfall-runoff relationship (Plate 7).

The stream-gaging station on the Sisquoc River near Garey was established 3-1/2 miles southeast of Garey in February 1941. There is a considerable underground flow past this point. The record from

1/Worts, F. F., Jr., and Thomasson, H. G. Jr., Geology and Ground-water Resources of the Santa Maria Valley Area, Santa Barbara County, California U. S. Geological Survey Water Supply Paper 1000, 1951.

this station is used in the project operation and yield studies, involving the combined natural surface flow at Fugler Point. The recorded and estimated annual discharge for 1868-1952 and rainfall in percentage of normal for 1868-1950 are presented in Table 9. The discharges for 1868-1929 were obtained from the rainfall-runoff correlation graph shown in Plate 8. The discharges for 1930-1940 were obtained from the relationship between the annual discharges of the Sisquoc and Cuyama Rivers shown in Plate 9.

Vaquero Damsite

The discharge of the Cuyama River at Vaquero Damsite includes that measured at the gaging stations on the Cuyama River, Alamo Creek, Huasna River and from some 16 square miles of additional drainage area below the gaging stations. On the basis of relative areas the average annual flow into Vaquero reservoir from the ungaged area is estimated to be about 970 acre-feet. For convenience it is assumed this runoff pattern will be similar to that occurring on the Huasna River and can therefore be computed as 6.6 per cent of the Huasna River flows. The total annual discharge at Vaquero Damsite is obtained by adding the discharges of the Cuyama River, Huasna River, Alamo Creek and the ungaged area as shown in Table 10.

Round Corral Damsite

The discharge of the Sisquoc River at Round Corral Damsite is assumed the same as at the upper gaging station near Sisquoc (Table 7) since the site is only 2 miles upstream therefrom.

Summary of Runoff

The recorded and estimated annual discharge records are combined in Table 10 to show the estimated annual discharge at Fugler Point over the 19-year period together with the 19 and 85 year average discharge. For convenience the surface flow at Fugler Point was assumed to be the sum of that at the Vaquero Damsite and that at the Garey gaging station. The small runoff from the ungaged areas below these points is counterbalanced by the percolation between these stations and Fugler Point. The annual long-term discharge and rainfall in per cent of normal above Fugler Point are presented graphically in Plate 10.

Outflow of the Santa Maria River

Except for a negligible amount of valley drainage, the outflow of the Santa Maria River is measured at the gaging station near Guadalupe. This station was established by the Geological Survey at State Highway 1 bridge 5-1/2 miles above the mouth of the river in January 1941. The annual discharge recorded at this station between 1941 and 1948 together with the 1930-1940 annual discharge, determined from the relationship between daily flows at Fugler Point and Guadalupe (Plate 18), are shown in Table 11. The record was not extended beyond this period since only the 1930-1948 discharges were required for the reservoir operations studies and long-term averages based on rainfall records indicated this to be a representative period. The 1930-1948 average discharge of 30,900 acre-feet compares favorably with the Geological Survey estimate[1] of 33,000 acre-feet based on a study of monthly seepage losses in the Santa Maria River channel.

1/ Worts, G. F., Jr., and Thomasson, H. G., Jr., op. cit.

Santa Maria River channel near mouth. View looking southwest across channel from sand dunes near mouth. White areas across channel are dunes.
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CHAPTER IV

GROUND-WATER RESOURCES

The geology and ground-water resources of the Santa Maria Valley area have been investigated and reported by the U. S. Geological Survey[1], in cooperation with the County of Santa Barbara. The material in quotation marks below is from that report.

Gound-Water Occurrence

"The main water body of the Santa Maria Valley area extends continuously from the head of the Sisquoc Plain on the east to the Pacific Ocean on the west, and is contained within the unconsolidated deposits which fill the major syncline underlying the valley. Minor arms extend up the tributary tongues of alluvial material, principally those along the Cuyama and Sisquoc Rivers. The containing formations include the alluvium, the Orcutt and Paso Robles formations, and the Careaga sand; also, locally the terrace and channel deposits. Its bottom is considered to be at the base of the Careaga sand. In the deeper parts of the basin, the water may be of poor chemical quality.

"The main water body is as much as $8\frac{1}{2}$ miles wide, and underlies about 110,000 acres. Its maximum thickness is about 1,300 feet beneath the Sisquoc Plain and 2,800 feet beneath the Orcutt Upland near Orcutt. The average thickness is roughly 1,000 feet..

"Beneath the eastern and larger part of the area about 80,000 acres of the main water body is unconfined" (Zone B); "however, beneath the western part of the Santa Maria Plain" (Zone A) "about 30,000 acres is

1/ Worts, G. F., Jr., and Thomasson, H. G., Jr., Geology and Groundwater Resources of the Santa Maria Valley Area, Santa Barbara County, California; U.S. Geological Survey Water Supply Paper 1000, 1951.

confined beneath the upper member of the alluvium. In turn, the area of confined water has two parts - an eastern part where the head of water is below the land surface, and a western part where the head is above the land surface and where there are flowing wells..

"The eastern boundary of confined water is somewhat irregular and intangible, but in general, it is roughly along the line between Ranges 34 and 35 West..

"The area of unconfined water is one of potential recharge, and is called the intake area because there water is able to infiltrate from the land surface down to the water table of the main water body. On the other hand, in the area of confined water, there is essentially no infiltration from the land surface because of the low permeability of the confining beds."

<u>Natural Recharge</u>

Recharge to the main water body is derived from two primary sources: seepage losses from streams and infiltration of rain. Essentially, all the seepage loss reaches the water body, and takes place chiefly in the upper 14 miles of the Santa Maria River, but in part through the channel deposits in the lower 8 to 10 miles of the Cuyama and Sisquoc Rivers. This seepage loss has ranged from 4,800 to 150,000 acre-feet, and has averaged about 56,400 acre-feet a year for the 16-year period, 1930-45, determined as the difference between inflow from the headwaters and outflow at Guadalupe. Recharge from infiltration of rain has been estimated on the basis of type of land cover and type of underlying deposits, using estimates of deep penetration of rain derived from work done mostly in nearby Ventura County. Estimates of infiltration for 1930-45 range from none in years when there is less than 12 inches to about 80,000 acre-feet in 1940-41, and have averaged nearly 14,000 acre-feet a year. Total recharge from both sources to the main water body has averaged about 70,000 acre-feet a year during the period 1930-45.

Natural Discharge

Natural discharge during the period 1929-44 has been chiefly in the form of ground-water outflow to the sea from beneath the confining beds of the upper member of the alluvium. Subsurface outflow was computed by the Geological Survey by the slope-area method, and ranged from about 9,500 acre-feet in 1936, when the hydraulic gradient was 6 feet per mile, to about 12,800 acre-feet in 1944, when the hydraulic gradient was 8 feet per mile. The average over the 16-year period, 1930-45, was 11,200 acre-feet per year. The Bureau, using the same permeabilities and cross-sectional area and the 1954 hydraulic gradient of 4 feet per mile, determined the present outflow to be about 6,500 acre-feet annually.

A substantial outflow is indicated to occur above the confining beds, predominantly as surface drainage of ground water applied for irrigation in the confined area. However, a minor quantity of subsurface outflow occurs, particularly through the sand dune area. In addition, a large nonbeneficial consumptive use is evidenced by the lush growth of water-loving vegetation in places along water courses; other loss is by evaporation from free water surfaces.

Pumpage

Estimates of pumpage for irrigation and other uses were made by the Geological Survey from records of electrical energy consumption, pump lifts, and well efficiencies. Pumpage quantities given in Water Supply

Paper 1000 were revised after publication of that report. Revised pumpage for the years 1929 through 1950 is given in Table 12 and shown graphically on plate 11. This plate also shows average depths to water computed from Table 13.

In recent years annual pumpage for irrigation averaged about 2.60 acre-feet per acre. Current Bureau studies show that in the unconfined part of the area (Zone B) the unconsumed pumpage, or an average of about 40 percent of applied water, returns to ground-water storage; in the confined part of the area (Zone A) no return to pumped aquifers was assumed because of the confining clay zone. About 35 percent of pumpage other than for irrigation, mainly for municipal and industrial purposes, was assumed to return to ground water. Pumped ground water which is not recoverable for pumping is considered as net pumpage. The Geological Survey assumed a 20 percent return flow from irrigation as an average for the entire Santa Maria area during the period 1929-45, and a corresponding net pumpage was used in their determination of perennial yield.

Fluctuation of Ground-Water Levels

The years of above average rainfall following 1900 filled the ground water reservoir to overflowing in 1918. Between 1918 and 1936 the increase in irrigation and the exceptionally dry years in the 1920's and early 1930's served to deplete the ground-water storage by an estimated 500,000 acre-feet.[1] Although the wet years 1937-43 replenished about half the previously depleted storage, the dry years of 1945-50 again caused the ground-water levels to decline. The 1950 water levels under the valley floor averaged about 16 feet below those of 1936.

1/ Worts, G. F., Jr., and Thomasson, H. G., Jr., op. cit.

The location of the principal observation wells in the Santa Maria Valley is shown in Plate 12. The longest available record of observations, 1917 to date, is for well 10/34-14E3, which is near the middle of the Santa Maria Plain. Although the records show that fluctuations in wells near the central part of the Santa Maria Plain have had a wider range in amplitude than wells either near the coast or in the Sisquoc Valley, the fluctuations are probably fairly representative of fluctuations within the valley area as a whole. This record is presented graphically in Plate 13, which includes also the accumulated departure of rainfall from the average at Santa Maria over the 1868-1950 period. The rapid decline of water levels during the irrigation season in recent years is clearly evident in this graph.

Ground-water profiles from the town of Sisquoc through Garey, Fugler Point, Santa Maria, and thence to the coast, located on Plate 12, are presented for 1918, 1935, 1943, and 1950 on Plate 14. The top of the Paso Robles formation is also shown on Plate 13 to indicate the extent of the unwatering of the alluvium since 1943. Six ground-water cross-sections of the upper Santa Maria Valley, located on Plate 12, are presented for 1936, 1950, and 1957 (estimated) on Plate 15. The top of the Paso Robles formation is included on the latter plate.

Annual static water levels in 36 wells throughout the Santa Maria and Sisquoc Valleys are presented in Table 13. Records for the first 18 wells listed, for 1929-49, were furnished by the San Joaquin Power Division of the Pacific Gas and Electric Company. These measurements were made on or about August 1 of each year. The 1950 measurements for these wells were made in December by the Geologic Survey. Records for the remainder of the wells listed, for 1938-50, were furnished by the Santa Maria Valley Water Conservation District, and were measured on or about October 1.

Ground-Water Inventory

The safe or perennial yield of the water-bearing deposits was estimated by the Geological Survey by two independent methods for the period 1929-45, as follows: (1) It is equal to the total estimated recharge of 1,121,500 acre-feet, less the total estimated natural discharge by ground-water outflow of 180,000 acre-feet, divided by the 16 years of inventory, or 58,800 acre-feet a year; and, (2) It is equal to the total net pumpage of 838,200 acre-feet plus the net increase in storage of 60,000 acre-feet divided by the 16 years of inventory; or 56,100 acre-feet a year. The yield for the period was considered to be the average of the two, or about 57,000 acre-feet a year. It was assumed that future rainfall and, hence, recharge will be of about the same magnitude as that for the period 1886-1945. The rainfall for the longer period, 1886-1945, was about 93 percent of that for 1929-45, therefore recharge computed for the shorter period was adjusted accordingly to about 53,000 acre-feet a year. Considering an annual average outflow of 11,000 acre-feet, total recharge averaged about 64,000 acre-feet.

Critical Water Levels

Paso Robles Formation

The critical pumping area, as of 1950, is the valley floor between the city of Santa Maria and Fugler Point. The excessive drawdown during pumping has forced several farmers in this area to pump intermittently. A few wells have been abandoned completely. The ground-water profile and cross-sections (Plates 14 and 15) show that the water levels have reached the

Paso Robles formation in parts of this area.

The water levels and specific capacities of 10 wells in the critical area in 1943 and 1950 are presented in Table 14. These are all the wells in this area for which the information is complete. The specific capacity of a well is defined as the discharge in gallons per minute per foot of drawdown. Among the variables affecting the specific capacity are the pump efficiency (due to calculation of the discharge from energy input), the size of the well, and variations in the permeability of the water-bearing formation. Although the individual wells show an extreme variation in specific capacity, all indicate a major reduction in specific capacity from 1943 to 1950. The average specific capacity dropped from 58.5 in 1943 to 14.2 in 1950, or an average reduction to 24 percent of the original for the 10 wells for which the data are available.

The average position of the pumped water surface in 1943 and 1950 with respect to the Paso Robles formation is shown on Plate 16. This figure illustrates why the reduction in specific capacity begins before the static level reaches the Paso Robles formation. As the pumping depth drops below the Paso Robles surface, both the alluvium and the Paso Robles formation are contributing to the discharge. This factor, plus the effect of local variations in the permeability of both formations, results in a complex drawdown surface. Inspection of all specific capacity test data available indicates that reduction in specific capacity is generally significant when the static level drops to about 5 feet above the top of the Paso Robles formation.

Sea-Water Intrusion

Sea water in coastal aquifers is effectively held off shore by seaward fresh-water gradients within these aquifers, in which water levels in inland wells are significantly higher than in wells along the shore, all water levels being above sea level. A curved interface dipping landward exists in these aquifers between salt and fresh water, the lower part reaching farther inland than the upper. In the case noted above, this interface is held back beneath the ocean with some annual movement back and forth as a result of fluctuating fresh-water head.

In the Santa Maria area the Geological Survey studied the possibilities of sea-water intrusion and made calculations of the position of the salt-water interface. Water Supply Paper 1000 states:

"It has been shown that in 1944 the fresh-water head at the coast, as projected westward, from the gradient determined by water levels in wells, was about 30 feet above sea level. Therefore, it can be calculated that the contact between fresh water and salt water is theoretically about 1,200 feet below sea level at the shore line. Because the deposits at the coast attain a maximum thickness of roughly 1,500 feet along the axis of the Santa Maria syncline the salt water theoretically extends inland about 2 miles in the form of a narrow tongue, and its contact with the overlying fresh water plunges downward inland until it intersects the surface of the consolidated rocks at a depth of about 1,600 feet below sea level.

In 1936, when the head was the minimum of record, or about 20 feet, the salt-water contact may have been about 800 feet below sea level at the coast, and theoretically intersected the surface of the consolidated rocks along the axis of the syncline approximately four miles inland and at a depth of about 1,800 feet."

The fresh-water head has steadily declined since the time of that study and will undoubtedly continue to do so under development trends existing in the area. Accordingly, the salt water has now moved even farther inland than the above figures indicate. Intrusion has not been noticed in wells as yet, because the basin alluvium is of such depth that the lower encroaching part of the salt-water interface can extend a considerable distance inland before the upper part moves past the shoreline. Thus, irrigation wells in the western part of the Santa Maria area have not yet encountered brackish or salt water.

Continued water-level declines will eventually bring about contamination of wells in the coastal area. The length of time involved before such contamination will occur is extremely difficult to estimate. However, Bureau operation studies indicate that within 15 to 20 years, with present irrigation practices and without project development, the average water level in the coastal area will be considerably below sea level, making sea-water intrusion imminent.

Quality of Water

Chemical Analyses

The quality of the ground-water supply in the Santa Maria Valley, as determined by the Geological Survey, was based on chemical analyses of 152 samples of water collected from 116 wells and a study of some 350 analyses made available by other agencies. These analyses mostly of water from wells, but including some from streams and lakes, show a considerable range in the chemical quality of the main water body from one area to another. However, the variation in quality appears to bear little relation to the depth of the wells. This would indicate that the waters throughout the main water body are able to mix freely. The variation in quality of the water is thus primarily attributed to differences in the sources of water and to subsequent alteration during circulation under ground and mingling with water from other sources. The range in quality (parts per million) is shown in the following summary of the analyses of samples from streams and wells in the basin:

	Total Solids	Sodium	Chloride	Sulfate	Hardness
Cuyama River above Alamo Creek	3,200	150	45	1,800	1,792
Alamo Creek	530	42	31	160	338
Huasna River	480	44	36	120	288
Sisquoc River	420-770	26-51	9-23	150-340	264-455
Sisquoc Valley	610-640	49	18-28	241	400-750
Orcutt Upland	200-320	35	46-94	23	90-130
Santa Maria Flood Plain	1000-1600	65-115	30-60	342-566	500-700
Santa Maria River at Guadalupe	1600	120	86	680	932

In the classification of irrigation waters, the chemical constituents which demand primary consideration are sodium chloride, sulfate and boron. The most important factor is the concentration of sodium as compared with the total concentration of the remaining cations. As can be seen from the above tabulation, this ratio is far less than 50 percent in the Santa Maria Valley, a very favorable condition. Another favorable item is that the Cuyama River contributes relatively high quantities of gypsum in solution. This dissolved gypsum causes a loosening of the soil. Where it is absent from the water supply, farmers often purchase it in solid form for spreading on their lands. In these instances the gypsum is much less effective than when dissolved in the irrigation water. The dissolved gypsum, incidentally, accounts for the high concentration of total solids (particularly sulfate) in the Santa Maria Valley water. The boron concentration, not given in the tabulation, is thought to be low. A single analysis for boron in the Santa Maria city water supply yielded only 0.03 parts per million.

In view of the foregoing, the Santa Maria valley water supply seems to be highly suitable for irrigation. This conclusion is borne out by the production of excellent crops thoughout the historical use of this water.

Soil Leaching

The leaching of soluble salts from the root zone is essential in irrigated soils. Adequate drainage, related to the quality of irrigation water, is required to prevent an accumulation of salts in the soil. Continued heavy overdraft will eventually create an inland water-level depression and corresponding landward gradients in the coastal part of the Santa Maria area. Under these conditions, no ground-water outflow will occur and return flow from irrigation will be entirely repumped. It is conceivable that continued reuse of irrigation water, with no outlet drainage, could bring about an undesirable salt accumulation in the soil.

CHAPTER V

WATER REQUIREMENTS

Land Use

The major land use of the valley is for agriculture. Industrial establishments in the valley are largely for the processing and marketing of agricultural products. The major agricultural enterprise in the area is the production of truck crops. These crops consist mainly of lettuce, broccoli, cauliflower, carrots, potatoes, strawberries and flower and vegetable seeds. Beans and grain hay are raised both under irrigation in rotation with other crops and are dry farmed, whereas all other crops are grown only under irrigation. Livestock enterprises consist of a few dairies, poultry establishments and feed yards. All of the water for irrigation, domestic and industrial use in the area is pumped from wells. Although land ownerships and size of farms in the Santa Maria Valley show considerable holdings in excess of 320 acres, Public Law 774 has waived the excess acreage limitations for this project.

Land Classification

The soils of the Santa Maria Valley occupy two main physiographic units: alluvial floodplains and valley terraces. The soils on the floodplains are for the most part Class 1 lands having light and medium textures. Some Class 2 land is located in the lower part of the valley near Oso Flaco Lake and south of the South Maria River near the western sand hills where the soils are heavy and in some places affected by high

Oso Flaco area of Santa Maria valley. View looking west along the south edge of the Nipomo Mesa toward the dune area along the coast.
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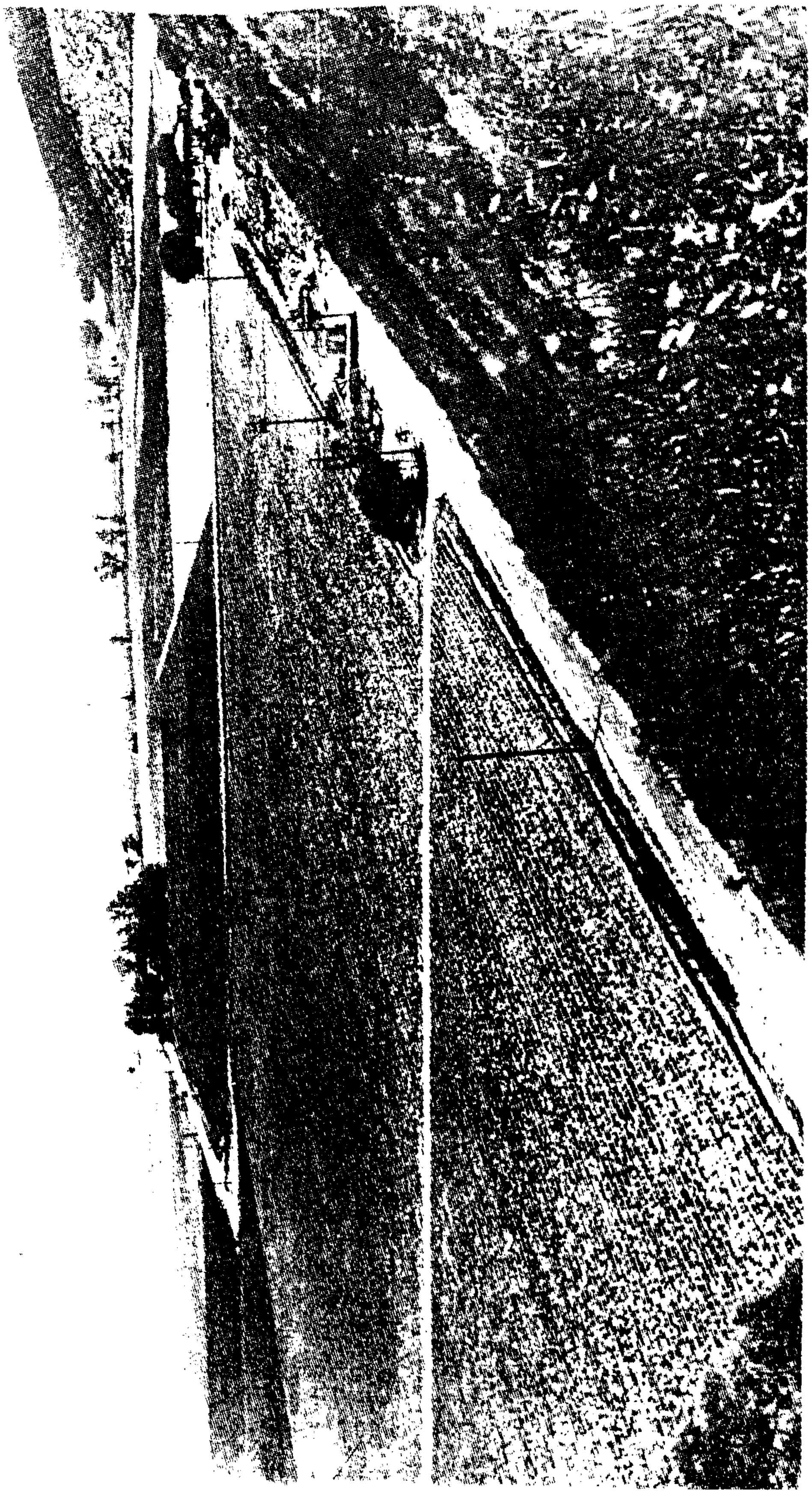

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CHAPTER VI

WATER SUPPLY DEVELOPMENT

Possible Plans of Development

The comparison of the discharge of the Santa Maria River at Fugler Point and Guadalupe indicated that an average of about 60 percent of the flow at Fugler Point percolates into the riverbed before reaching Guadalupe, and that the remaining 40 percent, or about 31,000 acre-feet a year, wastes to the ocean. The underground storage capacity of the Santa Maria Valley was shown to be extremely large, roughly 10 million acre-feet. The advantages of using this underground storage capacity rather than surface storage are (1) the practically unlimited hold-over storage space available, (2) the elimination of the evaporation loss from surface storage, and (3) avoidance of the increasing cost of gravity developments as contrasted with the long-term decreasing cost of pumping due to lower power cost and increasing efficiency of pumps. The development plans at this time are all aimed at increasing the percolation from the river to the ground-water reservoir.

Methods of Increasing Percolation

The two general methods of increasing the percolation from the river are to spread the flows over a greater area or to spread them over a longer period of time. The first method involves the use of spreading basins, and has proven an effective method of increasing the groundwater supplies elsewhere in Southern California. However, construction of spreading works in the present shallow riverbed prior to reduction of flood flows and construction of levees might make the constructing agency liable for flood damages. Full development of water spreading in the riverbed should come after the elimination of the flood danger. The development plans considered involve the construction of one or more storage reservoirs for the retention of flood waters for later release at the percolation rate of the stream channels.

Reservoir Sites

Of 14 reservoir sites investigated, three were chosen as the most favorable for detailed investigation. The Vaquero site is the most favorable on the lower Cuyama River, with a drainage area of 1,135 square miles and an average annual discharge of 39,800 acre-feet. The Round Corral site is the most favorable on the Sisquoc River, with a drainage area of 282 square miles and an average annual discharge of 35,300 acre-feet. The Fugler Point site at the confluence of the Cuyama and Sisquoc Rivers has a drainage area of 1,630 square miles and an average annual discharge of about 75,600 acre-feet.

Percolation Rate

A study was made to determine the maximum flow at Fugler Point which would be absorbed by the riverbed with no waste to the ocean. Average daily flows in second-feet at Fugler Point were plotted against those at Guadalupe. (See Plate 18.) The Fugler Point flows were determined as the sum of the flow of the Cuyama River at the Vaquero Reservoir site and the Sisquoc River at the Garey gaging station, and are tabulated as a part of Table 20. From the mean curve drawn through the plotted prints of Plate 18, it was determined that with a flow of 300 second-feet at Fugler Point, the average flow at Guadalupe was about 10 secon-feet. Flows of less than 10 second-feet at Guadalupe were found to correlate poorly with flows at Fugler Point, indicating that the Guadalupe flows of less than 10 second-feet consisted largely of irrigation waste or local drainage. It was concluded that Fugler Point flows of 300 second-feet or less were absorbed by the riverbed before reaching Guadalupe.

Reservoir Operation and Yield

The annual yield determination for each of these revervoirs is made by estimating the increase, above natural conditions, of water percolated into the underground reservoir beneath Santa Maria Valley as a result of project operation. This increase is assumed to be the difference between the uncontrolled surface-water outflow to the ocean past Guadalupe, near the mouth of the Santa Maria River, and the outflow that would have occurred under reservoir control during the selected period of runoff record less reservoir evaporation. The 1930 to 1948 period was selected for the reservoir yield studies because it was the most nearly average with respect to runoff. Selection of an average period for these yield studies rather than the driest period of record is justified on the basis of the vast storage capacity available in the ground-water reservoir.

Vaquero Reservoir

The operation studies of Vaquero Reservoir were made by coordinating the releases with the flows of the Sisquoc River at Garey to maintain a flow of approximately 300 second-feet at Fugler Point whenever possible. Although this required determination of releases on a daily basis, the complete operation studies were made on a monthly basis. Tables 17, 18, and 19 show the monthly operation for Project Years 1, 50, and 100, respectively. These are for a 239,00 acre-foot capacity multiple-purpose reservoir with a conservation and sediment storage allocation of 150,000 acre-feet. The reservoir operation for the period 1930-48 of Project Years 1 and 100 are presented graphically in Plates 19 and 20.

The operation consists of a monthly process of adding the reservoir inflows to the reservoir contents and subtracting the reservoir releases and evaporation quantities. The reservoir inflow and release quantities are the monthly totals for the corresponding columns in Table 20. It was assumed that rainfall on the reservoir water surface area was equal to the rainfall at Santa Maria and that the gross evaporation rates were the same as for Gibraltar Reservoir. By subtracting inches of rainfall (Table 22) from inches of gross evaporation (Table 23) and converting the values to feet per month, the evaporation rates shown in Table 24 were computed. Adjustments in evaporation were made during months of partial operation. The water surface in acres is for average reservoir contents and is obtained from the area and capacity curves on Plate 22. The evaporation quantities are the product of the evaporation rate and the surface area. From this operation the reservoir contents each month are obtained for use in determining the releases and spills in Table 20, and the evaporation is obtained for use in the yield summary in Table 21.

Table 20 was prepared to show the daily flows at the Vaquero site, Fugler Point, and Guadalupe with and without reservoir control. Vaquero Reservoir inflows are shown as the sum of the flows of the Cuyama River, Alamo Creek, Huasna River, and the ungaged area of 16

Sisquoc River channel in foreground, Cuyama River mouth in background. Channel materials similar at mouths of both rivers. View looking north from highway bridge near mouth of Sisquoc River.
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square miles which is assumed to contribute runoff amounting to 6.6 percent of the Huasna River flows. The flows of the Sisquoc River near Garey prior to the U. S. Geological records since February 1941 were estimated from the relationship with the flows of the Cuyama River 10 miles northeast of Santa Maria (Plate 21). The uncontrolled flows at Fugler Point are the Vaquero Reservoir inflows plus the Sisquoc River flows. The controlled flows at Fugler Point are the reservoir releases or spills plus the Sisquor River flows. The reservoir releases were made to maintain a flow of nearly but not more than 300 second-feet at Fugler Point whenever possible. The controlled releases were determined in multiples of 10 second-feet, but are not necessarily within 10 second-feet of the optimum release since this would be neither critical nor practically attainable under actual operation. The controlled and uncontrolled flows at Guadalupe, which waste to the ocean, were determined from the Fugler Point flows by use of the relationship curve on Plate 18.

Table 21 was prepared to summarize the reservoir operation and yield analysis studies and to show the average annual yield at the 1st, 50th, and 100th years of project operation. The reservoir yield is the difference between the uncontrolled and the controlled flows at Guadalupe less the reservoir evaporation. This table was prepared by tabulating the annual quantities obtained by summation of the uncontrolled and controlled flows at Guadalupe (Table 20) for each year of the 19-year selected period of operation, 1930 through 1948. The totals for each of these columns were converted to 19-year average quantities in acre-feet. The difference between these 19-year average uncontrolled and controlled flows for each of the above years of project operation less the average annual reservoir evaporation from Tables 17, 18, and 19 is the estimated average annual yield for each of the above project years.

Plate 23 was prepared to show the age-yield relationship of Vaquero Reservoir. The curve representing the 150,000 acre-foot storage capacity was drawn through the plotted average annual yield values from Table 21. Yield curves for 125,000 and 175,000 acre-foot storage capacities were located with respect to the curve for 150,000 acre-foot storage capacity by determining the difference in the age ordinate. The difference in capacities, 25,000 acre-feet, divided by the sedimentation rate of 400 acre-feet amounts to 62.5 years of difference in the age ordinate for the same yield values. The 50 and 100-year average annual yields as determined from the yield curves are as follows:

Quantities in acre-feet

Total multiple purpose capacity	Conservation & sediment storage allocation	*Flood control reservation	Average annual yield Over first 50 years	Over first 100 years
214,000	125,000	89,000	20,400	19,600
239,000	150,000	89,000	21,200	20,700
264,000	175,000	89,000	21,500	21,300

*The amount of flood control reservation was determined by the Corps of Engineers

To obtain maximum yields in the reservoir operation studies, full utilization was made of the combined conservation and sediment storage space only. During the period of the reservoir operation study 1930 to 1948, the 150,000 acre-foot capacity was found to be sufficient during the first 50 years of operation to conserve all the flood flows of the Cuyama River and tributaries except in the very high runoff year of 1941. The maximum 1941 storage in Project Year 1 was 148,220 acre-feet, approximately the same as the proposed 150,000 acre-foot initial capacity.

Fugler Point Reservoir

The Fugler Point reservoir site is suitably located to control the flows of both the Cuyama and Sisquoc Rivers. The yield study is based on the release of storage at the rate of 300 cubic feet per second, which is the average stream flow that would percolate into the riverbed without loss to the ocean. Only during seasons when the reservoir becomes filled and the spills exceed 300 second-feet would there be waste to the ocean.

The reservoir yield is the difference between the uncontrolled and the controlled flows at the Guadalupe gaging station less the evaporation during reservoir storage. Tables 25, 26, and 27 were prepared to show the Fugler Point operation for Project Years 1, 50, and 100, respectively. These operations are for a 350,000 acre-foot, multiple-purpose reservoir with a conservation and sedimentation storage allocation of 150,000 acre-feet and a sedimentation rate of 700 acre-feet per year. The operation consists of a monthly process of adding the reservoir inflows to the reservoir contents and subtracting the reservoir releases and evaporation quantities. From this operation the reservoir contents each month are obtained for use in determining the reservoir releases and spills in Table 28, and the reservoir evaporation is estimated for use in the yield summary in Table 29.

The reservoir inflow quantities in general are the monthly totals from the Fugler Point uncontrolled flow column in Table 20. Quantities for the few months not available from Table 20 were obtained by a summation of the recorded flows for the Cuyama and Huasna Rivers and the estimated flows for Alamo Creek and Sisquoc River obtained by use of the relationship curves on Plates 6 and 21. The reservoir release quantities are based on 300 cubic feet per second throughout the storage period except during times of reservoir spills. The evaporation quantities are each the product of the evaporation rate and the surface area for average reservoir contents during the month. The evaporation rates and surface areas respectively are obtained from Table 24 and Plate 24. Plate 24 presents the Fugler Point Reservoir area and capacity curves.

Table 28 was prepared to determine the waste flow to the ocean resulting from Fugler Point Reservoir spills for use in the yield determination in Table 29. The spill quantities are the Fugler Point uncontrolled flows, Table 20, starting when the reservoir becomes full and lasting until the inflows are less than the 300 second-foot release rate. The point at which spill begins was determined by taking the previous month-end reservoir contents from Tables 25, 26, or 27 converted to second-foot days, adding to this the Fugler Point uncontrolled flows from Table 20, subtracting the evaporation quantities and subtracting the daily 300 second-foot releases until the reservoir capacity was obtained. The waste flows were obtained by applying the spill quantities to the relationship curve on Plate 18 and reading the corresponding Guadalupe flow.

Table 29 was prepared to summarize the uncontrolled flows at Guadalupe, Table 20, the Guadalupe flows resulting from reservoir spills from Table 28, the reservoir evaporation from Tables 25, 26, and 27, and the resulting average annual yield for the 1st, 50th, and 100th project years.

Plate 25 is the Fugler Point Reservoir age-yield relationship curve for a combined conservation and sediment storage capacity of 150,000 acre-feet. The curve was prepared from the average annual yield quantities from Table 29.

The average annual yield over the first 50 years of project operation taken as an average of the curve values was estimated to be 24,300 acre-feet compared to 21,200 acre-feet for the Vaquero operation. The 100-year average on the same basis is 22,400 acre-feet compared to 20,700 acre-feet for the Vaquero operation. The slightly greater yield advantage at Fugler Point is more than offset by the fact that Fugler Point Reservoir would inundate some 4,000 acres of irrigable bottomland and the two small towns of Garey and Sisquoc.

Round Corral Reservoir

The most favorable reservoir site on the Sisquoc River is the Round Corral site. According to the stream-runoff records the average runoff at the Sisquoc gaging station, about 2 miles below the Round Corral site, is slightly less than at the Vaquero site or 35,300 acre-feet and 39,800 acre-feet, respectively. The yield of Round Corral Reservoir with 90,000 acre-feet conservation capacity and a sedimentation rate of 180 acre-feet per year would be somewhat less evaporation with only a slight change in spills at either reservoir. These operations show that Round Corral spills would have occurred only in April and May of 1941 for Project Years 50 and 100.

Table 33 was prepared to determine the estimated waste flow to the ocean. Vaquero inflows and releases were obtained from Table 20 while inflows to Round Corral were assumed to be the flows of the Sisquoc River at Sisquoc. The daily flows at Sisquoc were derived by use of the relationship curve on Plate 28 and the daily flows at Garey given in Table 20. The releases from Round Corral were made to result in flows of 300 second-feet at Fugler Point. The spills were combined to obtain the Fugler Point flows from which corresponding Guadalupe flows were obtained by use of Plate 18.

Table 34 was prepared to summarize the controlled and uncontrolled flows at Guadalupe and estimate the average annual yields of the combined operation of Vaquero and Round Corral. The controlled flows are the total quantities from Table 33 converted to acre-feet and the uncontrolled flows are the same as shown in Tables 21 and 29. Table 34 yields were plotted to produce the combined Vaquero-Round Corral age-yield relationship curve shown on Plate 27.

The average annual yields over the first 50 and 100 years of combined operations, taken as an average of the curve values, were estimated to be 29,500 and 29,100 acre-feet respectively. These yields average about 8,300 acre-feet more than the 50 and 100 year average yields of Vaquero reservoir operation alone.

1. Reduce ocean surface outflow from Zone A

2. Improve water utilization practices

To reduce surface outflow from Zone A, studies might be pursued along the following lines:

a. Greater use of sprinkler irrigation to reduce percolation.

b. Use of gravel packed wells to permit water from the upper zone to percolate into the lower or pumping zone where the water table stands higher than the artesian head.

c. Recapture or reduction of as much drainage waste as economically possible and permissible above that required for soil leaching either by shallow well pumping or pumping from drainage ditches or drainage collection ponds.

Water utilization practices might be improved by limiting irrigation applications to that needed, reducing waste to a minimum and destroying phreatophytes where practical.

If it becomes necessary at some future date to increase the yield from the project the Santa Maria riverbed might be advantageously utilized. Under project conditions there would be some 2,000 acres of riverbed area within the leveed channel suitable for a spreading basin. However, development of this spreading basin should be postponed until project operations indicate it will be required.

Chapter VII

SEDIMENTATION

Summary

Current irrigation practice in the Santa Maria Valley is based on pumping from ground-water resources that are replenished by natural recharge with seepage from streams and with infiltration of rain. Sediment flows from the Cuyama and Sisquoc Rivers, which join to become the Santa Maria River, have not been a problem to irrigators. The proposed Vaquero Reservoir on the Cuyama River will accumulate sediment at a rate of 400 acre-feet per year. The reservoir will be operated to increase the natural recharge with no change in current irrigation practice. Therefore, in the future, sediment will be no problem to the irrigators. Since the Vaquero site is the only feasible site on the Cuyama River, space for the accumulation of 100 years of sediment is provided in the reservoir. With 40,000 acre-feet of storage provided for the accumulation of sediment, the average annual yield of Vaquero Reservoir will decline from 21,500 acre-feet per year for project year 1 to 19,900 acre-feet for project year 100. In view of the critical depletion of the ground-water storage and the lack of other sources of supply that can be developed in the immediate future, it is desirable that the maximum feasible yield be developed in order to maintain the present level of water use.

Sediment accumulations at Round Corral and Fugler Point Damsites were computed as 180 and 700 acre-feet per year respectively.

The available data on sediment flows in the Santa Maria Valley is meager. Therefore, it is recommended that a stream flow station be established on the Cuyama River near Carrizo Canyon and that an intermittent-type sediment sampling program also be initiated at the station. This station will replace the present station on the Cuyama River at Santa Maria. The present stream flow and sediment sampling station on the Huasna River near Santa Maria should be re-established above the backwater effect from Vaquero Reservoir. The stream flow and sediment sampling station on Alamo Creek can be discontinued.

General

The studies made for sediment flows at the Vaquero damsite on the Cuyama River, for the Santa Maria River at Fugler Point damsite, and for the Sisquoc River at the Round Corral damsite were required in order to determine the probable rate of sediment deposition in the potential reservoirs, the effect of this deposition on the water supply, and the probable distribution of the sediment in the reservoirs.

It is estimated that the sediment flows computed for the Cuyama River at Vaquero damsite probably are within ± 25 per cent of the correct values. Since an error of this magnitude will not have a significant effect on the yield from Vaquero Reservoir, it is concluded that the sediment studies are adequate. The sediment flows computed for the reservoirs at Fugler Point and Round Corral probably are within ± 25 per cent of the correct values. Since reservoirs at those sites were studied chiefly for comparisons with alternate plans of development, it is also concluded that studies at those sites are adequate.

Vaquero Damsite

Physical features.--The Vaquero damsite is located on the Cuyama River about one mile downstream from its junction with the Huasna River. The Cuyama River with a drainage area of about 1150 square miles, drains essentially all of the northern half and easternmost part of the Santa Maria Basin.

Geology

The Santa Maria Basin, upstream from Fugler Point, is characterized by parallel, northwest-trending ranges and valleys on folded, faulted, and metamorphosed strata. The Cuyama area is made up of sedimentary and alluvial deposits of terrace gravels, clays, shales, and limestones. These deposits, the residual soils and the recent alluvium resulting from their decomposition are easily eroded. The streams that enter the Cuyama River in the valley reaches, flow through steep gorge-like canyons resulting from the prior erosion of the soft sedimentary rocks. Unconsolidated deposits, mostly alluvial, cover the floor of the valley.

Climate

The climate in the Santa Maria Basin is characterized by a short rainy season coincident with the winter months and a long, dry, hot summer. The area above Vaquero damsite is divided into two general zones of precipitation: the lower area drained by the Huasna, Alamo, and Cuyama River below Carrizo Canyon with an average annual precipitation of about 20 inches; and the upper area drained by the Cuyama River above Carrizo Canyon with an average annual precipitation of about 13 inches. This is illustrated on Plate 2.

Topography

The topography of the lower area is characterized by a series of rough mountain ridges that separate the drainage areas. The upper area of the Cuyama River is a relatively flat valley floor flanked on the north by the desert-type Caliente Mountains and on the south by the semi-arid-type Sierra Madre Mountains. The topography of the upper and lower Cuyama Area is illustrated on the following photographs.

Soils

The soils of the lower area are predominantly of medium and coarse texture. Since the area is covered with a fair growth of native grasses, oak woodland, and chaparral, potential erosion from this area is low. While this potential has been somewhat increased by extensive burns in the area, moisture conditions are such that the vegetation quickly recovers in the area. The soils of Cuyama Valley, as illustrated on the following photograph,1/ are predominantly medium and coarse-textured on the valley floor, ranging to coarse, rocky material in the uplands. There is very little vegative cover in the Upper Cuyama Basin. The easily eroded shale which is widespread in the east and north portions of the upper basin, contributes significant quantities of sediment when subjected to high-intensity rainfall.

1/ Soils of Cuyama Valley - 1953, University of California, College of Agriculture, Agricultural Experiment Station.

Cuyama River channel in lowermost end of Cuyama valley near mouth of Cottonwood Creek. View looking upstream from State Highway 166 about 15 miles below town of New Cuyama. Caliente Mountains on the left are barren. 8-2-55

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Cuyama River channel near mouth of Clear Creek, about
15 river miles above head of proposed Vaquero Reservoir.
Clear Creek in lower right corner.
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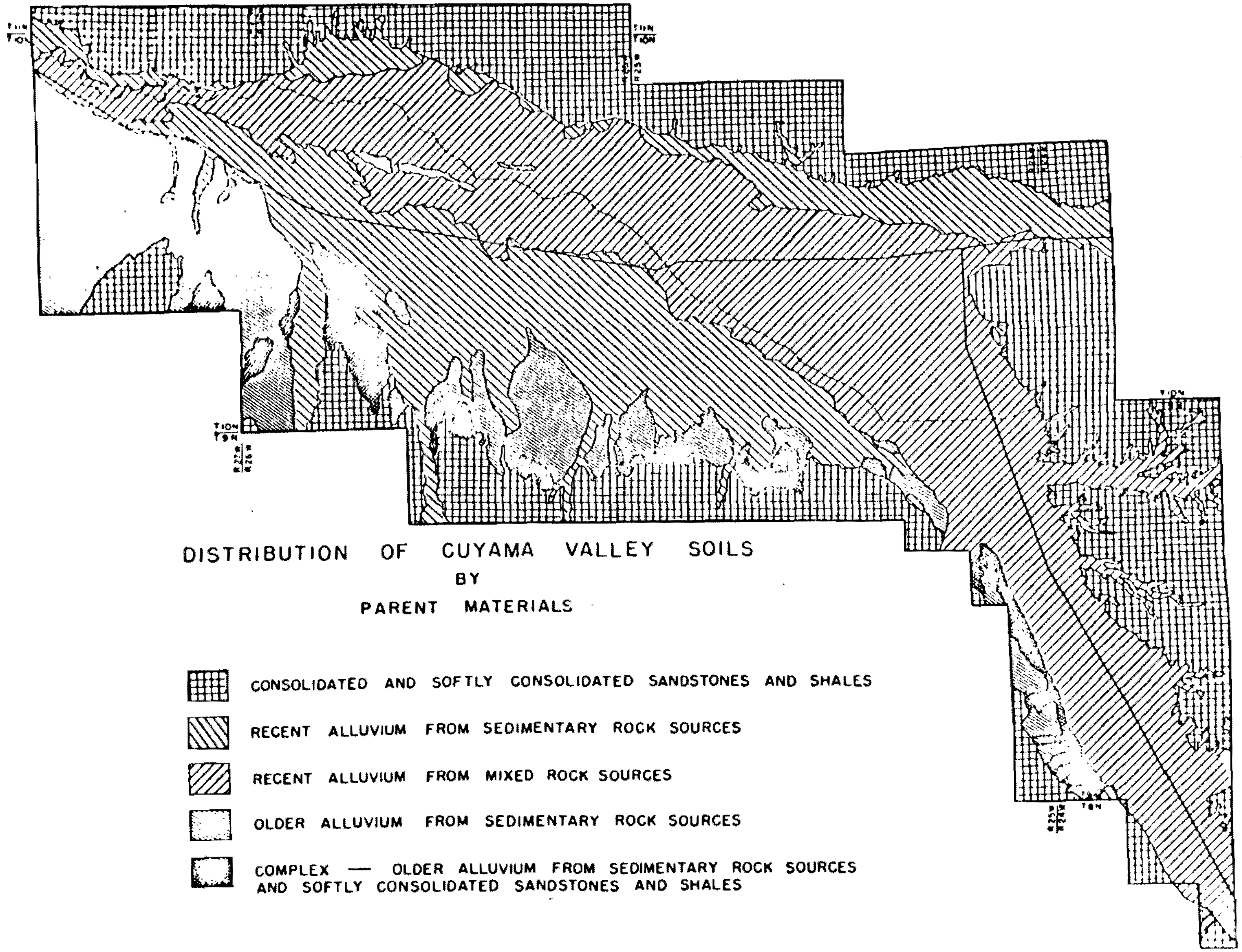

DISTRIBUTION OF CUYAMA VALLEY SOILS
BY
PARENT MATERIALS

CONSOLIDATED AND SOFTLY CONSOLIDATED SANDSTONES AND SHALES

RECENT ALLUVIUM FROM SEDIMENTARY ROCK SOURCES

RECENT ALLUVIUM FROM MIXED ROCK SOURCES

OLDER ALLUVIUM FROM SEDIMENTARY ROCK SOURCES

COMPLEX — OLDER ALLUVIUM FROM SEDIMENTARY ROCK SOURCES AND SOFTLY CONSOLIDATED SANDSTONES AND SHALES

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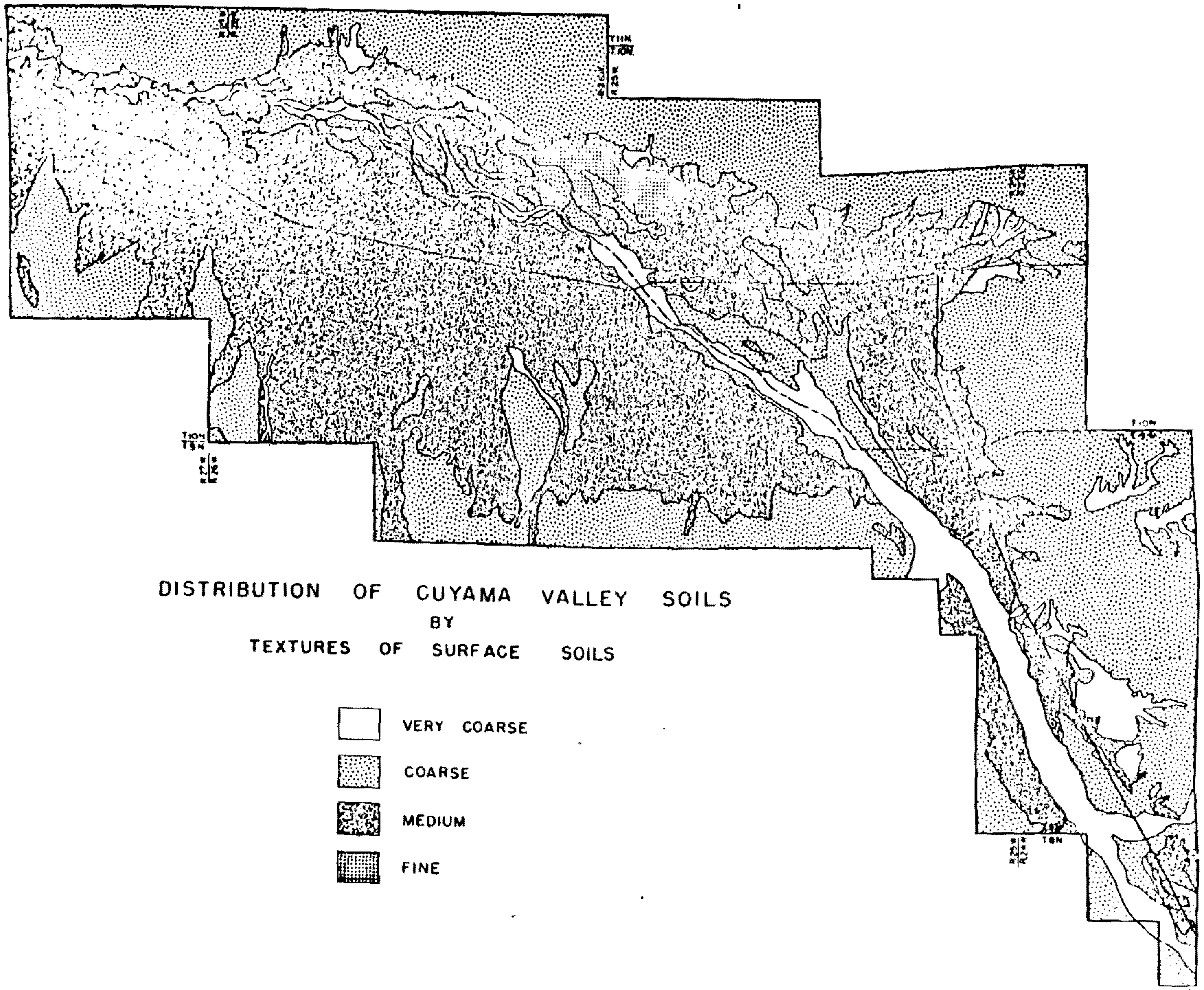

DISTRIBUTION OF CUYAMA VALLEY SOILS
BY
TEXTURES OF SURFACE SOILS

Stream and Valley Characteristics

The drainage area of the Cuyama River is long and narrow. The tributaries are many and of short length, and except in the lower part where Alamo Creek and Huasna River join the main stream from the north, are relatively unimportant. The river enters the Cuyama Valley 20 miles from its source and at the lower end of the valley enters a canyon section through which it flows to its confluence with Sisquoc River. The average slope of the Cuyama River is 180 feet per mile for the upper 10 miles and 35 feet per mile for the lower 100 miles.

The major sediment sources are the semi-barren badlands at the head of the Cuyama Basin and the channel banks in the lower Cuyama Valley. The Huasna River and Alamo Creek are only minor sediment sources under present conditions of water-shed cover. The major portion of the sediment load is of silt-size mostly derived from sandstones, shale and conglomerates.

Round Corral Damsite

Physical Features:--The most favorable damsite on the Sisquoc River is the Round Corral site, located 12 miles upstream from the mouth of the Sisquoc River. The Sisquoc River, with a drainage area of 480 square miles lying mostly in the Los Padres National Forest, is in the south-central Santa Maria Basin. About 290 square miles of drainage area lies above the Round Corral damsite.

Geology and Topography:--The rocks of the Sisquoc River Basin have been faulted and severly folded during periods of crustal movements in the region. The erosion of these formations has produced a rough, unsymmetrical terrain of deep, narrow canyons and sharp crested ridges. The mountain and foothill areas of Sisquoc River Basin consist principally of consolidated deposits of shale, sandstone, and conglomerates. Shallow and residual soil covers most of these mountains and hills. Unconsolidated deposits, mostly alluvial, cover the valley floor and range in depth from 50 feet at the upper end of the valley to 115 feet at Fugler Point. The climate of the Sisquoc River Basin is similar to the rest of the Santa Maria Basin. The average annual precipitation is about 20 inches as illustrated on Plate 2. The soils of Sisquoc River Valley are predominantly of medium and coarse texture. The soils of the area lying above Round Corral damsite range from medium and coarse to coarse and rocky textures respectively from lower to higher elevations. A dense cover of trees is found in the higher elevations; live oak, brush and grasses are common on the lower slopes. Due to fires, erosion in this area can be significant, but moisture conditions are such that vegetation quickly recovers in the area.

Stream and Valley Characteristics

The drainage basin of the Sisquoc River is narrow. The river flows in a well-defined channel through a canyon in the upper reaches. About 8 miles above its mouth, the river emerges into the Sisquoc River Valley through which it flows to its confluence with the Cuyama River. The average slope of the river is 105 feet per mile.

The sediment yield of Sisquoc River is derived from all parts of the area in about equal portions due to uniformity of watershed cover.

The major portion of the sediment load is of silt-size derived from shales, sandstones, and conglomerates.

Fugler Point Damsite

The Fugler Point Damsite is located just below the confluence of the Cuyama and Sisquoc Rivers. It has a drainage area of 1630 square miles, which is a combination of the drainage areas contributing to Round Corral and Vaquero Reservoirs plus the lower Sisquoc drainage area. The reservoir is suitably located to control the flows of both rivers, but would inundate approximately 4000 acres of irrigable land in the Sisquoc Valley and the two small towns of Garey and Sisquoc.

Available Stream Flow Records and Sediment Data.--The records of stream gaging stations essential to this report extend from 1929 through 1952. These records were taken from the USGS Water Supply Papers, Part 11, Water Supply of Pacific Slope Basins. The records were extended over an 85-year period 1868-1952, principally by means of rainfall-runoff correlation graphs.

The available sediment data on sediment loads within the basin consist of analyses of runoff samples[1/] taken in 1941, 1952, 1954, and 1955.

Method of Analysis.--The Analysis of Flow-Duration, Sediment Rating Curve Method was used to compute sediment yield. In general, the

1/ Sediment samples taken in 1941 by U. S. Forest Service and in 1952, 1954 and 1955 by the Soil Conservation Service and the Bureau of Reclamation under a joint program.

procedure used in the analysis of the sampling data consisted of developing a correlation between sediment load and discharge and plotting a sediment-rating curve. The sediment-rating curve was then applied to long-time flow-duration curve and the resulting computation represents a long-term average sediment yield.

Flow Duration curves for Cuyama, Huasna and Sisquoc Rivers, and Alamo Creek (Plates 29, 30, 31 and 32) were based on the 23 years of available record from 1929 through 1952. Extended records on these streams for 85 years indicate that values taken from the curves were low. Adjustments were made on the final sediment load by applying the percentages that these values were low to total sediment load.

Suspended Sediment Rating curves (Plates 33, 34, 35 and 36) were based on the suspended sediment samples. The number of samples were limited but represent fairly well-defined curves. The data on these samples and the suspended load in tons per day are given in Tables 37, 38 and 39. The suspended sediment volumes in acre-feet were computed and are given in Tables 40, 41, 42 and 43. Unit weights of suspended sediment for use in volume computations for 50- and 100-year operations were computed to be 75 pounds per cubic foot for Cuyama and Sisquoc Rivers, 74 pounds per cubic foot for Huasna River and 67 pounds per cubic foot for Alamo Creek. The procedure given in the Hydrology Branch publication, "Determination of the Unit Weight of Sediment for Use in Sediment Volume Computations", was used to determine unit weight. The sieve analyses of suspended sediment samples were plotted and mean grain size curves (Plate 37) were determined.

Cross-sections and streambed slopes were obtained from the field office at Goleta for bed load computations. Typical cross-sections for Cuyama and Huasna Rivers were determined by using the average of the three cross-sections obtained for each stream plotted to the same base line which was taken as the water surface. Hydraulic properties of these typical cross sections were computed, using values of "n" of 0.035 for flows up to 1000 c.f.s. and 0.030 for flows above 1000 c.f.s. in Manning's Formula. The sieve analyses of the bed load samples were plotted and mean grain size curves (Plate 38) were determined. The mean grain diameter as used in the bed load formula was taken as that size at which 50 per cent was passing. Schoklitsch Bed Load Formula was used to compute bed load yield at various flows. Computations are given in Tables 44 and 45. Bed load rating curves (Plate 39) were plotted. The bed load rating curves were applied to flow duration curves to obtain the bed load yield in acre-feet per year given in Tables 46, 47 and 48.

Cross sections on the Sisquoc River were not available so the bed load was estimated from the bed load computations for Vaquero Reservoir. Since Alamo Creek is a small contributor to the total sediment yield and similar to Huasna River, the bedload rating curve for Huasna River and the flow duration curve for Alamo Creek were used to determine the bed load yield for Alamo Creek. Bed load was computed to be about 8 percent of the suspended load.

Revised March 20, 1956

Total Sediment Yield

The total sediment loads for all streams, with adjustments made for differences between the 23 years of available stream flow records and the 85-year extended stream flow records, are summarized in Table 49.

Channel Degradation

The channel below any one of the three damsites would probably degrade somewhat due to the capacity of the clear water outflow to entrain bed material through turbulent energy. However, with the scheduled operational release of only 300 second feet, the available samples of bed material from the Cuyama, Alamo, Huasna, and Sisquoc indicate only very minor degradation should result. It is estimated that the sediment load caused by degrading of the streambed downstream from Vaquero Damsite would amount to 5 acre-feet per year the first year, decreasing thereafter. This estimate is based on the Discharge versus Bedload curve for Huasna River and a discharge of 300 c.f.s. occurring 2 months per annum.

Trap Efficiency

Trap efficiency of Vaquero Reservoir was determined to be 96 per cent by using the capacity over inflow ratio and the Gunnar Brune trap efficiency curves.[1/] This is high for a reservoir that will be empty most of the time, but the major sediment contribution will occur with high flows when the reservoir will be storing. The 4 per cent loss was assumed to be offset by the inflow of sediment from the 16 square miles

1/ Trap Efficiency of Reservoirs, Gunnar M. Brune, "Transactions, American Geophysical Union", Volume 34, No. 3, June,1953.

Revised March 20, 1956

The two men in the center of the photograph are standing on the line of the control section for the tail-water curve study of the Cuyama River approximately one mile downstream of the axis of the proposed Vaquero Dam. The vegetation in the streambed at this location consists of brush willows and sagebrush.
7-28-55.

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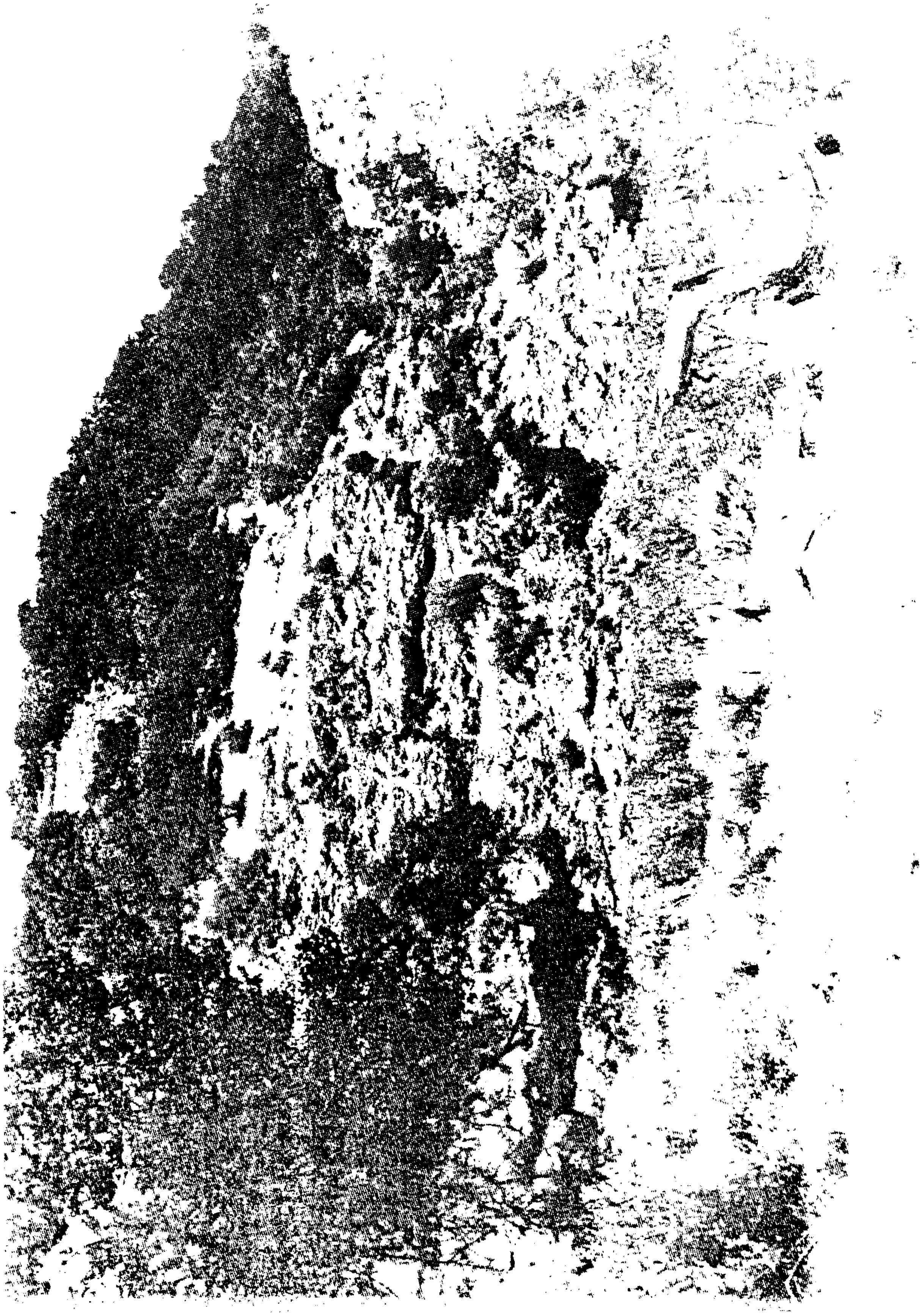

AM 00726

of ungaged area between the damsite and the point at which the total sediment yield was computed; thus 100 per cent of the computed sediment load was used in determining reservoir sedimentation. Trap efficiency for Fugler Point and Round Corral Reservoirs was taken as 100 per cent.

Sediment Disposition

Sediment disposition in the reservoirs was computed by the modified Van't Hul method[1/] and checked by the Area Increment method[1/] for 50 and 100 years of operation. The depth versus capacity curves, (Plates 40, 41 and 42) plotted from the Area and capacity curves for the reservoirs, were used to determine the type of Sediment Distribution-Area Design Curve from which to select Ap values for use in the sediment disposition computations given in Tables 50, 51, 52, 53, 54 and 55.

Reservoir Storage Loss

Vaquero Reservoir

An annual sediment inflow of 400 acre-feet per year for Vaquero Reservoir was computed. This results in a unit yield for the drainage area above the damsite of approximately 0.36 acre-foot per square mile per year. Distribution of sediment by the modified Van't Hul method, with no sediment placed above the conservation pool, indicates sediment deposits at the dam are likely to reach elevations of 493 feet and 504 feet at the end of 50 and 100 years of operation respectively.

1/ Taken from "Interim Report Distribution of Sediment in Reservoirs", Hydrology Branch, Project Investigations Division, Office of the Assistant Commissioner and Chief Engineer.

Round Corral

The annual sediment inflow at Round Corral Damsite of 180 acre-feet per year was based on 60 per cent of the Sisquoc River drainage area lying above the damsite. A total sediment load of 300 acre-feet per year was computed for the Sisquoc River. The unit yield of the drainage area above the damsite is approximately .62 acre-foot per square mile per year. Distribution of sediment indicates sediment deposits at the dam are likely to reach elevations of 723 feet and 738 feet at the end of 50 and 100 years of operation respectively.

Fugler Point

The annual sediment inflow was 300 acre-feet per year from the Sisquoc River and the 400 acre-feet per year computed for Vaquero Reservoir combined to make a total of 700 acre-feet per year. The unit yield of the area above the damsite is approximately .43 acre-feet per square mile per year. Distribution of sediment, with no sediment placed above the conservation pool, indicate sediment deposits at the dam are likely to reach elevations of 363 feet and 382 feet at the end of 50 and 100 years of operation respectively.

Table 6.--Annual Discharge and Rainfall Index for Alamo Creek nr. Santa Maria

*Discharge published by U. S. Geological Survey. 1868-1929 discharges obtained from rainfall-runoff relationship (Plate 5). 1930-43 discharge obtained from relationship with Huasna River (Plate 6).

Year	Index	Acre-feet	Year	Index	Acre-feet
1868	140	15,000	1911	171	23,800
69	88	2,500	12	76	1,400
1870	56	200	13	47	0
71	56	200	14	160	21,000
72	105	5,300	15	138	14,300
73	60	300	16	120	9,200
74	88	2,500	17	107	5,700
75	98	3,900	18	114	7,500
76	133	13,000	19	83	2,000
77	28	0	1920	74	1,300
78	152	18,300	21	88	2,500
79	65	500	22	117	8,500
1880	113	7,300	23	94	3,300
81	85	2,200	24	44	0
82	68	1,000	25	96	3,500
83	67	900	26	87	2,400
84	199	32,000	27	117	8,400
85	74	1,300	28	94	3,300
86	124	10,400	29	74	1,300
87	72	1,200	1930	70	1,100
88	97	3,700	31	62	1,000
89	114	7,500	32	113	9,000
1890	202	32,500	33	88	2,700
91	96	3,500	34	67	1,200
92	79	1,700	35	116	3,700
93	139	14,600	36	92	9,800
94	55	300	37	148	16,300
95	101	4,400	38	157	21,400
96	81	1,800	39	67	1,500
97	101	4,400	1940	110	3,200
98	34	0	41	215	28,200
99	75	1,300	42	112	4,900
1900	71	1,100	43	126	19,200
1	113	7,300	44	101	* 4,400
2	87	2,400	45	87	* 2,900
3	96	3,500	46	81	* 1,300
4	74	1,300	47	63	* 800
5	152	18,000	48	62	* 500
6	134	13,000	49	73	* 200
7	140	15,000	1950	77	* 900
8	96	3,500	1951		* 700
9	189	29,000	1952		*21,000
1910	113	7,300			
			85-Year Average		6,700

Table 7.--Annual discharge and rainfall index for the Sisquoc River near Sisquoc

*Discharge published by U. S. Geological Survey. Other discharges obtained from rainfall-runoff relationship (Plate 7).

Year	Index	Acre-feet	Year	Index	Acre-feet
1868	140	75,000	1911	171	106,000
69	88	21,000	12	76	9,000
1870	56	0	13	47	0
71	56	0	14	160	95,000
72	105	35,000	15	138	73,000
73	60	0	16	120	54,000
74	88	21,000	17	107	41,000
75	98	32,000	18	114	48,000
76	133	67,000	19	83	16,000
77	28	0	1920	74	7,000
78	152	87,000	21	88	21,000
79	65	0	22	117	51,000
1880	113	47,000	23	94	28,000
81	85	18,000	24	44	0
82	68	1,000	25	96	30,000
83	67	0	26	87	20,000
84	199	135,000	27	117	51,000
85	74	7,000	28	94	28,000
86	124	58,000	29	74	7,000
87	72	5,000	1930	70	*3,102
88	97	30,000	31	62	*217
89	114	48,000	32	113	*43,787
1890	202	139,000	33	88	*6,676
91	96	30,000	34	67	0
92	79	12,000	35	116	50,000
93	139	74,000	36	92	25,000
94	55	0	37	148	83,000
95	101	35,000	38	157	92,000
96	81	14,000	39	67	0
97	101	35,000	1940	110	44,000
98	34	0	41	215	152,000
99	75	8,000	42	112	46,000
1900	71	4,000	43	126	60,000
1	113	47,000	44	101	*40,503
2	87	20,000	45	87	*24,077
3	96	30,000	46	81	*17,403
4	74	7,000	47	63	*7,645
5	152	87,000	48	62	*774
6	134	68,000	49	73	*3,679
7	140	75,000	1950	77	*6,880
8	96	30,000	1951		*1,190
9	189	124,000	1952		*76,660
1910	113	47,000			
			85-year average		35,300

Table 9.--Annual Discharge and Rainfall Index for the Sisquoc River near Garey

(a) Discharge obtained from annual discharge relationship between the Cuyama and Sisquoc Rivers. (b) Published records of U. S. Geological Survey. Other discharges obtained from rainfall-runoff relationship (Plate 8).

Year	Index	Acre-feet	Year	Index	Acre-feet
1868	140	82,000	1911	171	122,000
69	88	14,000	12	76	2,500
1870	56	0	13	47	0
71	56	0	14	160	108,000
72	105	57,000	15	138	80,000
73	60	0	16	120	56,000
74	88	14,000	17	107	39,000
75	98	27,000	18	114	48,000
76	133	73,000	19	83	8,000
77	28	0	1920	74	2,500
78	152	97,000	21	88	14,000
79	65	500	22	117	52,000
1880	113	47,000	23	94	22,000
81	85	10,000	24	44	0
82	68	1,000	25	96	24,000
83	67	800	26	87	13,000
84	199	159,000	27	117	52,000
85	74	2,500	28	94	22,000
86	124	61,000	29	74	2,500
87	72	2,000	1930	70	a 2,000
88	97	26,000	31	62	a 2,000
89	114	48,000	32	113	a 61,000
1890	202	163,000	33	88	a 8,500
91	96	25,000	34	67	a 1,000
92	79	5,000	35	116	a 15,000
93	139	80,000	36	92	a 15,000
94	55	0	37	148	a105,000
95	101	31,000	38	157	a136,500
96	81	6,500	39	67	a 15,000
97	101	31,000	1940	110	a 7,000
98	34	0	41	215	b156,200
99	75	3,000	42	112	b 15,600
1900	71	1,800	43	126	b 66,300
01	113	47,000	44	101	b 37,800
02	87	13,000	45	87	b 16,980
03	96	25,000	46	81	b 8,520
04	74	2,500	47	63	b 2,230
05	152	97,000	48	62	b 0
06	134	75,000	49	73	b 89
07	140	82,000	1950	77	b 1,200
08	96	25,000	1951		b 0
09	189	146,000	1952		b 73,720
1910	113	47,000			
			85-Year Average		35,800

Table 10.--Annual Discharge of Santa Maria River Headwaters
Drainage area in square miles. Discharge in thousands acre-feet.
Season ending September 30.

	Cuyama	Huasna	Alamo	Ungaged	Vaquero	Sisquoc River Near Garey	Fugler Point
Area	912	119	88	16	1135	442	1630
Year	Discharge	Discharge	Discharge	Discharge	Discharge	Discharge	Discharge
1930	3.2	0.4	1.1	0	4.7	2.0	6.7
1931	3.9	0.3	1.0	0	5.2	2.0	7.2
1932	26.8	21.6	9.0	1.4	58.8	61.0	119.8
1933	7.7	4.7	2.7	0.3	15.4	8.5	23.9
1934	3.0	0.6	1.2	0	4.8	1.0	5.8
1935	9.2	7.1	3.7	0.5	20.5	15.0	35.5
1936	9.2	18.4	9.8	1.2	38.6	15.0	53.6
1937	43.8	38.7	16.3	2.6	101.4	105.0	206.4
1938	56.1	49.4	21.4	3.3	130.2	136.5	266.7
1939	9.2	1.3	1.5	0.1	12.1	15.0	27.1
1940	6.1	5.9	3.2	0.4	15.6	7.0	22.6
1941	63.7	68.3	28.2	4.5	164.7	156.2	320.9
1942	9.3	11.6	4.9	0.8	26.6	15.6	42.2
1943	27.7	46.1	19.2	3.0	96.0	66.3	162.3
1944	18.9	7.8	4.4	0.5	31.6	37.8	69.4
1945	9.9	6.9	2.9	0.5	20.2	17.0	37.2
1946	6.9	2.9	1.3	0.2	11.3	8.5	19.8
1947	5.8	0.9	0.8	0.1	7.6	2.2	9.8
1948	1.8	0.5	0.5	0	2.8	0	2.8
Average Discharge 1930-1948	17.0	15.4	7.0	1.0	40.4	35.3	75.7
Average Discharge 1868-1952	17.3	14.8	6.7	1.0	39.8	35.8	75.6

Table 11.--Annual discharge of the Santa Maria River at Guadalupe

Water Year	Discharge* in ac.ft.	Water year	Discharge in ac.ft.
1930	0	1941	183,300
1931	0	1942	1,090
1932	50,150	1943	71,900
1933	4,770	1944	13,560
1934	500	1945	4,990
1935	7,200	1946	4,880
1936	21,080	1947	2,530
1937	93,600	1948	0
1938	127,650		
1939	0		
1940	460	Average 1930-1948	30,900

*Discharge quantities prior to 1941 are estimated on the basis of daily discharge relationship curve Plate 18. Subsequent discharges measured by U. S. Geological Survey.

Table 12 - Annual Pumpage from the Main Water Body, 1929-50

Power Year April 1 - March 31	Irrigation 1/	Other Uses 1/2/	Total
	Quantities in Acre-feet		
1929	50,000	5,000	55,000
1930	52,000	5,100	57,100
1931	54,000	5,200	59,200
1932	48,000	5,200	53,200
1933	43,000	5,100	48,100
1934	45,000	5,200	50,200
1935	46,000	5,200	51,200
1936	54,000	5,300	59,300
1937	55,000	5,600	60,600
1938	60,000	5,800	65,800
1939	66,000	6,100	72,100
1940	72,000	6,400	78,400
1941	63,000	6,600	69,600
1942	67,000	7,200	74,200
1943	76,000	8,000	84,000
1944	78,000	8,200	86,200
1945	95,000	8,000	103,000
1946	102,000	7,700	109,700
1947	113,000	7,500	120,500
1948	97,000	7,200	104,200
1949	103,000	7,000	110,000
1950	105,000	6,600	111,600

1/ Estimated by U. S. Geological Survey on the basis of electrical energy consumption furnished by the San Joaquin Power Division, Pacific Gas and Electric Company.

2/ Includes public-supply, industrial, domestic, and stock uses, and also includes the discharge by flow from wells.

Table 13 - Annual Static Water Levels in Santa Maria Valley

Records of 18 wells, 1929 to 1949, furnished by Pacific Gas and Electric Co. (PGE). Records of 18 wells, 1938 to date, furnished by Santa Maria Valley Water Conservation District (SMD). Records tabulated by U. S. Geological Survey (USGS). Year 1918 estimated from groundwater profile.

Depths in feet below approximate ground surface

Well numbers PGE	SMD	USGS	Elevation	Year 1918	1929	1930	1931	1932	1933	1934	1935
1	4	10/33-28A1	325	31	80.09	92.25	99.50	56.66	62.58	82.41	71.33
2		10/33-21F1	312	41	93.75	100.41	118.50	78.66	84.66	94.50	90.00
3		10/33-20H1	300	45	94.66	102.66	112.50	87.33	88.25	96.75	101.00
4	3	10/33-19B1	275	57	101.57	103.10	116.00	108.33	108.00	111.66	115.33
5		10/33-18M1	264	61	110.75	118.66	123.00	118.75	118.16	124.50	120.00
6		10/33-18C1	267	63	107.05	119.90	110.25	104.08	107.60	112.00	125.45
7		10/34-13A1	257	66	114.41	121.16	128.50	122.75	124.16		123.75
8		10/34-13C1	249	69	113.75	122.85	132.00	129.75	132.66	136.50	141.50
9		10/34-13G1	253	66	107.58	112.83	120.25	110.33	107.60	115.00	116.50
11		10/34- 3P1	203	45	88.33	93.00	99.83	100.50	105.00	108.16	114.08
12		10/34-16R1	204	42	90.00	96.00	101.11	104.00	107.66	109.50	112.94
13		10/34- 9Q1	192	38	82.25	87.50	95.25	96.00	100.25	103.16	105.75
14		10/34-17F2	176	36	71.58	78.00	79.50	81.43	83.50	87.16	90.17
16		10/34- 7G1	164	32	63.00	62.50	70.25	72.08	75.00	86.16	90.17
17		10/35-11C2	124	12	49.58	47.50	50.16	52.66	52.58	58.41	61.59
18		10/35-15C1	106	7	27.50	25.00	29.75	29.25	31.00	45.33	38.84
19	18	10/35- 7F1	48	0	1.83	1.75	5.00	7.92	7.67	13.66	14.75
20		10/34-14E3	225	58	103.00	110.00	116.33	118.50	120.25	124.91	128.16
	8	10/33-18G1	273	63	107.58	112.83	120.25	105.67		115.00	116.50

Table 13 – (Continued)

Well numbers: PGE	Well numbers: SMD	Well numbers: USGS	Elevation	Depths in feet below approximate ground surface — Year 1936	1937	1938	1939	1940	1941	1942	1943
1	4	10/33-28A1	325	60.00	41.00	35.58	*56.75	*63.80	**38.96	*41.00	41.40
2		10/33-21F1	312	80.08	52.58	44.16	*68.41	*79.50	*49.00	*57.50	*48.50
3		10/33-20H1	300	87.75	64.00	56.88	*76.00	87.50		58.80	52.50
4	3	10/33-19B1	275	90.50	89.50	81.16	*88.83	*103.50	**77.22	*79.80	*74.80
5		10/33-18M1	264	133.14	104.00	94.83	101.83	*112.50	**89.12	91.00	84.50
6		10/33-18C1	267	129.50	105.33	95.50	*111.33	*89.00	*89.00	*93.30	*87.30
7		10/34-13A1	257	132.22	103.41	91.16	106.00	*121.00	*90.00	*92.00	*83.20
8		10/34-13C1	249	139.66	116.58	105.50	116.58	122.80	**97.93	*102.80	*97.00
9		10/34-13G1	253	109.16	83.41	78.00	92.50	104.00	*106.40	*104.00	*94.00
11		10/34- 3P1	203	113.00	100.75	89.00	*93.75	*108.00	*84.00	84.00	*76.50
12		10/34-16R1	204	115.00	106.90	106.20	104.35	101.80	104.00	96.50	91.00
13		10/34- 9Q1	192	107.83	104.50	94.41	*93.83	*100.00	89.70	86.00	83.30
14		10/34-17F2	176	92.83	92.00	84.33	81.41	86.00	78.50	73.40	70.80
16		10/34- 7G1	164	92.75	91.83	88.00	86.25	*91.03	**63.41	80.00	*83.00
17		10/35-11C2	124	60.00	57.33	59.16	*60.00	60.00	55.30	54.00	*59.50
18		10/35-15C1	106	37.33	42.16	47.66	*49.20	41.00	38.00	35.00	34.00
19	18	10/35- 7F1	48	12.08	17.50	15.75	*22.75	20.80	12.00	15.70	10.00
20		10/34-14E3	225	131.91	125.00	114.00	112.33	118.80	111.80	104.00	98.50
	8	10/33-18G1	273	109.16	83.41	75.50	95.67	106.67	78.25	83.75	71.17

*Pumped shortly before measurement
**USGS measurement

Table 13 - (Continued)

Well numbers			Eleva-	Depths in feet below approximate ground surface						
PGE	SMD	USGS	tion	Year 1944	1945	1946	1947	1948	1949	**1950
1	4	10/33-28A1	325	*49.50	50.00	*71.50	*87.50	97.00	105.42	107.45
2		10/33-21F1	312	53.50	*63.30	*76.40	*92.20	*105.20	*122.10	113.00
3		10/33-20H1	300	61.70	*73.20	*86.80	97.10	111.20	*118.90	129.17
4	3	10/33-19B1	275	*78.50	84.20	*97.00	109.10	114.10	123.30	148.20
5		10/33-18M1	264	90.10	*96.00	*109.90	115.80	*132.20	*161.90	126.80
6		10/33-18C1	267	*82.60	90.30	*105.90	*112.00	*120.20	*141.70	117.25
7		10/34-13A1	257	*88.00	*101.10	*101.10	106.70	*120.50	*147.90	133.65
8		10/34-13C1	249	100.00	*98.50	*112.00	119.80	*129.20	*144.90	148.50
9		10/34-13G1	253	*103.10	*112.40	*122.40	121.40	*136.30	*146.70	146.32
11		10/34- 3P1	203	*78.80	86.30	*91.50	*100.80	*107.50	***114.80	124.38
12		10/34-16R1	204	*91.20	91.50	*96.80	102.80	*109.50	*115.90	
13		10/34- 9Q1	192	*86.50	85.70	*97.80	*97.90	102.50	*110.30	114.31
14		10/34-17F2	176	74.50	70.30	75.90	*85.10	91.00	*97.20	
16		10/34- 7G1	164	79.10	64.00	71.00	74.30	*86.00	*93.10	89.92
17		10/35-11C2	124	*58.10	*56.30	*64.70	*72.20	61.80	*69.30	
18		10/35-15C1	106	***37.00	40.40	*62.20	***56.00	*46.80	*56.50	
19	18	10/35- 7F1	48	9.50	5.20	*10.20	17.60	13.50	14.00	23.20
20		10/34-14E3	225	97.50	102.70	107.70	115.90	122.90	129.90	139.09
	8	10/33-18G1	273	80.60	90.90	104.10	111.80	121.60	128.00	131.90

*Pumped shortly before measurement
**USGS measurements, December
***Estimated

Table 13 - (Continued)

Depths in feet below approximate ground surface

Well numbers SED	Well numbers USGS	Elevation	Year 1938	1939	1940	1941	1942	1943
1	10/34-22R1	217	113.25	110.04	*114.93	*109.70	*102.50	98.93
2	10/34-23H1	242	123.50	123.40	128.50	121.00	113.75	108.25
5	9/33- 2A1	380	34.00	39.50	43.50	29.92	32.92	30.00
6	9/32- 7N1	422	43.67	51.10	*64.50	47.80	*52.48	*44.33
7	10/33-27G1	338	33.25	*54.73	*59.33	32.25	39.50	*41.00
9	10/34- 2R1	230	87.83	102.00	*126.33	81.00	89.12	85.70
10	10/35-12M1	138	53.30	54.42	*62.00	*52.17	*49.42	45.75
11	10/34- 6N1	152	63.75	*67.92	71.00	58.17	57.63	53.41
12	11/34-30Q1	148	54.20	60.60	*67.10	46.17	*53.00	*48.83
13	11/35-35A1	123	46.67	49.58	*53.83	40.96	41.75	*38.25
14	11/35-33G1	91	32.40	32.40	40.10	28.50	26.88	27.41
15	11/35-20E1	49	7.83	11.60	*43.75	*38.00	8.25	5.08
16	11/35-28M1	77	*30.30	25.80	39.25	28.17	*28.90	21.75
17	10/35- 9F1	88	25.25	27.67	35.10	26.00	24.17	24.08
19	10/35- 9N1	87	26.00	26.83	34.75	25.60	*30.80	*31.17
20	10/35-21B1	94	*27.00	28.60	36.00	22.83	18.10	18.25
21	10/35-24B1	144	61.00	60.12	66.75	57.70	52.28	50.10

*Pumped shortly before measurement

Table 13 - (Continued)

Well numbers		Eleva-	Depths in feet below approximate ground surface						
			Year						
SWD	USGS	tion	1944	1945	1946	1947	1948	1949	1950
1	10/34-22R1	217	*96.40	99.10	104.40	109.50	116.75	*123.70	130.00
2	10/34-23H1	242	107.20	*112.90	*118.20	123.25	133.10	*142.70	148.33
5	9/33- 2A1	380	30.20	32.00	38.75	46.60	*60.00	70.82	78.75
6	9/32- 7N1	422	*44.33	45.60	*56.50	66.45	81.20	97.84	109.80
7	10/33-27G1	338	*44.90	48.40	60.00	*77.00	*95.40	*109.42	116.83
9	10/34- 2R1	230	82.00	91.55	100.00	113.33	115.00	121.00	125.90
10	10/35-12M1	138	47.10	46.75	*54.67	57.80	64.80	68.40	*72.75
11	10/34- 6N1	152	*54.90	56.10	61.40	67.30	73.60	79.60	*86.00
12	11/34-30Q1	148	47.00	*52.10	56.17	*62.67	*71.33	*75.00	79.17
13	11/35-35A1	123	*39.10	40.50	45.75	49.75	53.90	60.00	64.25
14	11/35-33G1	91	27.00	27.00	29.58	31.90	*40.50	*44.88	44.27
15	11/35-20E1	49	8.20	*33.00	19.00	*41.00	*47.00	*42.70	13.83
16	11/35-28M1	77	28.50	20.20	28.25	25.33	30.55	*36.10	36.25
17	10/35- 9F1	88	25.25	25.80	28.50	32.33	37.67	40.50	42.25
19	10/35- 9N1	87	25.25	25.25	31.58	31.17	*47.50	*46.75	42.75
20	10/35-21B1	94	20.30	*24.45	31.00	*30.00	33.65	38.60	*40.48
21	10/35-24B1	144	51.42	49.25	54.67	58.25	63.20	73.10	75.35

*Pumped shortly before measurement

Table 14 - Water Levels and Specific Capacities of 10 Wells in the Critical Area in 1943 and 1950

Data furnished by U. S. Geological Survey

Well	Depth of alluvium	Depth to static water level		Depth to pumped water level		Specific capacity gal./min./ft.draw - down	
		1943	1950	1943	1950	1943	1950
1	146	85.0	144.7	94.1	180.0	69.6	1.4
2	157	97.6	151.5	103.2	185.0	192.8	18.7
3	148	100.0	141.8	110.9	175.8	51.5	6.1
4	143	95.0	145.0	115.5	178.0	68.0	26.4
5	140	93.3	150.1	134.3	176.5	12.3	8.0
6	140	79.6	132.9	128.1	163.5	9.9	5.8
7	141	97.5	141.7	136.9	180.4	12.8	4.9
8	142	75.0	121.1	87.5	133.1	90.5	49.3
9	146	91.0	153.9	152.2	224.8	4.7	0.8
10	132	79.8	114.5	93.0	137.5	73.0	20.1
Average	144	89.4	139.7	115.6	173.5	58.5	14.2

Table 15 - Acreages of arable lands by land classes
on the valley floors and mesa areas
Santa Maria Valley Area

	Class 1	Class 2	Total	Acres IN SLO Co.
Valley Lands				
Santa Maria Water Cons. District	24,700	11,800	36,500	7,780
Oso Flaco Areas outside S.M.W.C.D.	100	200	300	300
Sisquoc Valley	500	500	1,000	
Total Valley Lands	25,300	12,500	37,800	
Mesa Lands				
Sisquoc Mesa	300	2,200	2,500	
West Mesa	300	6,300	6,600	
Oncutt West Mesa	500	3,500	4,000	
Total Mesa Lands	1,100	12,000	13,100	
Grand Total	26,400	24,500	50,900	

6a in Santa Barbara Co. [illegible] 42,200

Less about [illegible] for future [illegible]

Table 16 - Summary of Crop Acreages and Water Requirements for Valley Lands and Mesa Lands Santa Maria Valley Area

	Valley Lands	Mesa Lands	Total
Presently Cropped (1954)	33,500	3,000	36,500
Ultimate Crop Acreage			
Productive Land	35,000	12,100	47,100
Irrigated Land	35,000	9,000	44,000
Nonirrigated (Dry Farmed)	0	3,100	3,100
Double Cropped	17,500	1,800	19,300
Ultimate Water Requirements (Ac-Ft)			
Farm Delivery Requirement	72,000	18,100	90,100
Consumptive Use	74,600	16,900	91,500
Utilizable Rainfall	26,250	5,400	31,650
Crop Irrigation Requirement	48,350	11,500	59,850
Municipal and Industrial Needs			10,000

Table 17 - Vaquero Reservoir Operation for Project Year No. 1

Multiple-purpose capacity 239,000 acre-feet, conservation and sediment storage allocation 150,000 acre-feet. Sedimentation rate 400 acre-feet per year. Inflow quantities from Table 20. Evaporation rates from Table 24. Excess of precipitation over evaporation indicated by (-).

Quantities in acre-feet--Sediment accumulation, None

Seasonal Year and Month	Reservoir Inflow	Reservoir release	Evaporation in feet	Water surface acreage	Evaporation	Water Storage
1932						
Dec	11,010	0	- .11	360	-40	11,050
Jan	6,980	10,295	- .26	520	-135	7,870
Feb	33,450	1,270	- .05	810	-40	40,090
Mar	3,505	11,325	.32	980	315	31,955
Apr	1,310	16,065	.41	810	330	16,870
May	825	17,480	.45	480	215	0
	57,080	56,435			645	
1933						
Jan	7,455	695	- .17	280	- 50	6,810
Feb	1,860	8,640	.11	260	30	0
	9,315	9,335			- 20	
1935						
Apr	9,890	8,730	.02	240	5	1,155
May	130	1,280	.04	100	5	0
	10,020	10,010			10	
1936						
Feb	26,585	1,945	-.21	600	-125	24,765
Mar	3,030	15,850	.19	740	140	11,805
Apr	2,980	14,670	.30	380	115	0
	32,595	32,465			130	
1937						
Dec	800	200			0	600
Jan	3,920	1,600	-.07	100	- 5	2,925
Feb	56,905	1,470	-.28	900	-250	58,610
Mar	25,500	3,330	-.17	1,480	-250	81,030
Apr	7,795	5,215	.39	1,700	665	82,945
May	2,055	15,850	.44	1,570	690	68,460
June	750	17,400	.57	1,320	750	51,060
July	350	18,000	.67	1,090	730	32,680
Aug	240	18,000	.65	880	570	14,350
Sept	200	14,385	.39	420	165	0
	98,515	95,450			3,065	
1938-39						
Feb	48,620	1,430	-.54	820	-445	47,635
Mar	63,995	0	-.16	1,660	-265	111,895
Apr	6,615	6,445	.16	2,120	340	111,725
May	3,000	14,000	.43	2,080	895	99,830
June	1,330	16,700	.46	1,870	860	83,600
July	720	18,000	.64	1,560	1,000	65,320
Aug.	420	18,000	.59	1,270	750	46,990
Sept.	360	17,400	.45	1,040	470	29,480
Oct	500	[illegible]	.28	750	210	11,770
Nov	660	[illegible]	.12	380	45	0
	126,220	[illegible]			3,860	

Table 17 - (Continued)

Quantities in acre-feet - Sediment Accumulation, None

Seasonal Year and Month	Reservoir Inflow	Reservoir Release	Evaporation in feet	Water surface acreage	Evaporation	Water Storage
1941-42						
Feb	46,295	595	-.41	800	-330	46,030
Mar	60,070	495	-.55	1,600	-880	106,485
Apr	39,840	0	-.06	2,280	-135	146,460
May	6,195	8,015	.41	2,540	1,040	143,600
June	1,680	15,000	.50	2,420	1,210	129,070
July	850	18,000	.57	2,200	1,255	110,665
Aug	540	18,000	.51	2,010	1,025	92,180
Sept	330	17,400	.44	1,730	760	74,350
Oct	320	18,000	.21	1,410	295	56,375
Nov	655	17,400	.16	1,170	185	39,445
Dec	4,590	16,195	- .57	930	- 530	28,370
Jan	4,450	14,440	- .07	800	- 55	18,435
Feb	3,605	14,560	.03	620	20	7,460
Mar	3,140	10,585	.06	260	15	0
	172,560	168,685			3,875	
1943						
Jan	30,030	0	-.16	700	-110	30,140
Feb	7,535	8,310	.03	890	25	29,340
Mar	44,825	2,520	-.05	1,210	- 60	71,705
Apr	6,105	11,050	.19	1,480	280	66,480
May	2,120	16,500	.47	1,320	620	51,480
June	1,060	17,400	.50	1,100	550	34,590
July	610	18,000	.59	830	490	16,710
Aug	300	16,750	.55	470	260	0
	92,585	90,530			2,055	
1944						
Feb	8,305	375	-.08	400	- 30	7,960
Mar	13,275	4,005	-.15	600	90	17,140
Apr	2,310	13,000	.11	580	65	6,385
May	600	6,945	.15	260	40	0
	24,490	24,325			165	
1945						
Feb	5,130	5,135	-.05	100	- 5	0
Mar	4,365	3,490	-.04	100	- 5	880
Apr	535	1,410	.05	100	5	0
	10,030	10,035			- 5	

Total evaporation 13,780

19-Year average evaporation 730 Ac-Ft per yr.

AM 00744

Table 18 - Vaquero Reservoir Operation for Project Year No. 50

Multiple-purpose capacity 239,000 acre-feet, conservation and sediment storage allocation 150,000 acre-feet. Sediment rate 400 acre-feet per year. Inflow quantities from Table 20. Evaporation rates from Table 24. Excess of precipitation over evaporation indicated by (-).

Quantities in Acre-feet - Sediment accumulation, 20,000 acre-feet.

Seasonal Year and Month	Reservoir Inflow	Reservoir Release	Evaporation in feet	Water Surface Acreage	Evaporation	Water Storage
1932						
Dec.	11,010	0	-.11	340	-35	11,045
Jan.	6,980	10,295	-.26	490	-130	7,860
Feb.	33,450	1,270	-.05	800	-40	40,080
Mar.	3,505	11,325	.32	1,020	325	31,940
Apr.	1,310	16,065	.41	810	330	16,850
May	825	17,470	.45	460	205	0
	57,080	56,425			655	
1933						
Jan.	7,455	695	-.17	240	-40	6,800
Feb.	1,860	8,635	0.11	240	25	0
	9,315	9,330			-15	
1935						
Apr.	9,890	8,730	.02	280	5	1,155
May	130	1,280	.04	80	5	0
	10,020	10,010			10	
1936						
Feb.	26,585	1,945	-.21	600	-125	24,765
Mar.	3,030	15,850	.19	730	140	11,805
Apr.	2,980	14,675	.30	370	110	0
	32,595	32,470			125	
1937						
Dec.	800	200			0	600
Jan.	3,920	1,600	-.07	130	-10	2,930
Feb.	56,905	1,470	-.28	910	-245	58,610
Mar.	25,500	3,330	-.17	1,600	-270	81,050
Apr.	7,795	5,215	.39	1,810	705	82,925
May	2,055	15,850	.44	1,710	750	68,380
June	750	17,400	.57	1,410	805	50,925
July	350	18,000	.67	1,090	730	32,545
Aug.	240	18,000	.65	760	495	14,290
Sept.	200	14,335	.39	400	155	0
	98,515	95,400			3,115	
1938-39						
Feb.	48,620	1,430	-.54	800	-430	47,620
Mar.	63,995	0	-.16	1,780	-285	111,905
Apr.	6,615	6,445	.16	2,230	355	111,715
May	3,000	14,000	.43	2,130	915	99,800
June	1,330	16,700	.46	1,930	890	83,540
July	720	18,000	.64	1,680	1,075	65,185
Aug.	420	18,000	.59	1,340	790	46,815
Sept.	360	17,400	.45	1,050	475	29,300
Oct.	500	18,000	.28	760	210	11,590
Nov.	660	12,210	.12	340	40	0
	126,220	122,185			4,035	

Table 18 - (Continued)

Quantities in acre-feet - Sediment accumulation 20,000 acre-feet

Seasonal Year and Month	Reservoir Inflow	Reservoir Release	Evaporation in feet	Water Surface Acreage	Evaporation	Water Storage
1941-42						
Feb	46,295	595	-.41	760	-310	46,010
Mar	60,070	495	-.55	1,730	-950	106,535
Apr	39,840	*16,515	-.06	2,330	-140	130,000
May	6,195	* 9,800	.41	2,520	1,025	125,370
June	1,680	15,000	.50	2,330	1,165	110,885
July	850	18,000	.57	2,070	1,180	92,555
Aug	540	18,000	.51	1,820	930	74,165
Sept	330	17,400	.44	1,520	670	56,425
Oct	320	18,000	.21	1,200	250	38,495
Nov	655	17,400	.16	890	140	21,610
Dec	4,590	16,195	-.57	640	-365	10,370
Jan	4,450	14,440	-.07	380	- 25	405
Feb	260	665			0	0
	166,075	162,505			3,570	
1943						
Jan	30,030	0	-.16	630	-100	30,130
Feb	7,535	8,310	.03	880	25	29,330
Mar	44,825	2,520	-.05	1,260	- 65	71,700
Apr	6,105	11,050	.19	1,590	300	66,455
May	2,120	16,500	.47	1,400	660	51,415
June	1,060	17,400	.50	1,120	560	34,515
July	610	18,000	.59	800	470	16,655
Aug	300	16,705	.55	450	250	0
	92,585	90,485			2,100	
1944						
Feb	8,305	375	-.08	390	- 30	7,960
Mar	13,275	4,005	.15	570	85	17,145
Apr	2,310	13,000	.11	540	60	6,395
May	600	6,955	.15	260	40	0
	24,490	24,335			155	
1945						
Feb	5,130	5,135	-.05	100	- 5	0
Mar	4,365	3,490	-.04	100	- 5	880
Apr	535	1,410	.05	100	5	0
	10,030	10,035			- 5	
Total Evaporation					13,745	
19-year average evaporation					720 Acre-feet per year	

(*) Denotes reservoir spills are included.

AM 00746

Table 19 - Vaquero Reservoir Operation for Project Year No. 100

Multiple-purpose capacity 239,000 acre-feet, conservation and sediment storage allocation 150,000 acre-feet. Sediment rate 400 acre-feet per year. Inflow quantities from Table 20. Evaporation rates from Table 24. Excess of precipitation over evaporation indicated by (-). (*) Denotes reservoir spills are included.

Quantities in acre-feet - Sediment accumulation, 40,000 acre-feet

Seasonal Year and Month	Reservoir Inflow	Reservoir Release	Evaporation in feet	Water Surface Acreage	Evaporation	Water Storage
1932						
Dec	11,010	0	-.11	360	- 40	11,050
Jan	6,980	10,295	-.26	460	-120	7,855
Feb	33,450	1,270	-.05	800	- 40	40,075
Mar	3,505	11,325	.32	1,070	340	31,915
Apr	1,310	16,065	.41	800	330	16,830
May	825	17,465	.45	420	190	0
	57,080	56,420			660	
1933						
Jan	7,455	695	-.17	250	- 35	6,785
Feb	1,860	8,685	.11	250	- 30	0
	9,315	9,380			- 65	
1935						
Apr	9,890	8,730	.02	280	5	1,155
May	130	1,280	.04	80	5	0
	10,020	10,010			10	
1936						
Feb	26,585	1,945	-.21	510	-110	24,750
Mar	3,030	15,850	.19	660	125	11,805
Apr	2,980	14,630	.30	510	155	0
	32,595	32,425			170	
1937						
Dec	800	200			0	600
Jan	3,920	1,600	-.07	140	- 10	2,930
Feb	56,905	1,470	-.28	940	-265	58,630
Mar	25,500	3,330	-.17	1,780	-305	81,105
Apr	7,795	5,215	.39	2,010	785	82,900
May	2,055	15,850	.44	1,900	835	68,270
June	750	17,400	.57	1,570	895	50,725
July	350	18,000	.67	1,160	780	32,295
Aug	240	18,000	.65	770	500	14,035
Sept	200	14,080	.39	400	155	0
	98,515	95,145			3,370	
1938-39						
Feb	48,620	1,430	-.54	820	-445	47,635
Mar	63,995	1,945 *	-.16	1,970	-315	110,000
Apr	6,615	7,505 *	.16	2,580	415	108,695
May	3,000	14,000	.43	2,330	1,000	96,695
June	1,330	16,700	.46	2,100	965	80,360
July	720	18,000	.64	1,810	1,160	61,920
Aug	420	18,000	.59	1,410	830	43,510
Sept	360	17,400	.45	1,040	470	26,000
Oct	500	18,000	.28	640	180	8,320
Nov	660	8,945	.12	280	35	0
	126,220	121,925			4,295	

Table 19 - (Continued)

Quantities in acre-feet - Sediment accumulation, 40,000 acre-feet

Seasonal Year and Month	Reservoir Inflow	Reservoir Release	Evaporation in feet	Water Surface Acreage	Evaporation	Water Storage
1941-42						
Feb	46,295	595	-.41	800	- 330	46,030
Mar	60,070	495	-.55	1,920	-1,055	106,660
Apr	39,840	36,650 *	-.06	2,520	- 150	110,000
May	6,195	9,800 *	.41	2,500	1,025	105,370
June	1,680	15,000	.50	2,280	1,140	90,910
July	850	18,000	.57	2,010	1,105	72,655
Aug	540	18,000	.51	1,640	835	54,360
Sept	330	17,400	.44	1,260	555	36,735
Oct	320	18,000	.21	870	185	18,870
Nov	655	17,400	.16	450	70	2,055
Dec 1-4	155	2,220	-.08	100	- 10	0
	156,930	153,560			3,370	
1942						
Dec 28-31	3,350	395	-.08	100	- 10	2,965
Jan	3,035	6,005	-.02	170	- 5	0
	6,385	6,400			- 15	
1943						
Jan	30,030	0	-.16	580	- 95	30,125
Feb	7,535	8,310	.03	940	30	29,320
Mar	44,825	2,520	-.05	1,360	- 70	71,695
Apr	6,105	11,050	.19	1,770	335	66,415
May	2,120	16,500	.47	1,560	735	51,300
June	1,060	17,400	.50	1,210	605	34,355
July	610	18,000	.59	830	490	16,475
Aug	300	16,545	.55	420	230	0
	92,585	90,325			2,260	
1944						
Feb	8,305	375	-.08	370	- 30	7,960
Mar	13,275	4,005	.15	520	80	17,150
Apr	2,310	13,000	.11	500	55	6,405
May	600	6,970	.15	240	35	0
	24,490	24,350			140	
1945						
Feb	5,130	5,135	-.05	100	- 5	0
Mar	4,365	3,490	-.04	100	- 5	880
Apr	535	1,410	.05	80	5	0
	10,030	10,035			- 5	
Total Evaporation					14,190	
19-Year average evaporation					750	

Table 20 - (Continued)

Project Years 1, 50, and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal year	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	*Sisquoc River flow	Fugler Point total flow *Con-trolled	Fugler Point total flow *Uncon-trolled	Guadalupe flow *Con-trolled	Guadalupe flow *Uncon-trolled
1934												
Jan 1	72	6	16	1	95			300	300	395	11	27
2	195	3	4		202			590	590	792	95	210
3	72	3	3		78			250	250	328		15
4	36	2	2		40	100		115	215	155		
5	26	2	2		30	180		76	256	106		
6	19	2	2		23	188	0	50	246	73		
Total					468	468		1,381	1,857	1,849	106	252
1935												
Jan 6	105	3	3		112			330	330	442	15	40
7	35	3	3		41	153		95	248	136		
11	88	3	4		95	10		280	290	375		22
12	50	3	3		56	141		150	291	206		
16	120	5	10	1	135			370	370	505	22	60
17	48	4	7	1	60	100		145	245	205		
18	56	4	8	1	69	120		175	295	244		
19	98	5	12		116			310	310	426	12	35
20	35	3	4		42	100		95	195	137		
21	23	3	5		31	133	0	50	183	81		
Total					757	757		2,000	2,757	2,747	49	157

Table 20 - (Continued)

Project Years 1, 50, and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1935	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	*Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Apr 8	390	630	1,490	98	2,608			980	980	3,588	350	2,700
9	197	120	318	20	655			580	580	1,235	90	580
10	126	53	149	9	337			390	390	727	25	170
11	58	35	100	7	200	100		180	280	380		23
12	34	25	73	5	137	200		90	290	227		
13	31	18	55	3	107	210		80	290	187		
14	29	15	44	3	91	220		72	292	163		
15	51	14	41	3	109	120		155	275	264		
16	43	13	38	3	97	160		125	285	222		
17	40	11	30	2	83	170		115	285	198		
18	36	10	26	2	74	190		100	290	174		
19	32	9		2	67	200		84	284	151		
20	28	8	22	2	60	220		70	290	130		
21	27	8	20	1	56	220		66	286	122		
22	24	7	18	1	50	230		64	294	114		
23	21	7	16	1	45	240		42	282	87		
24	18	6	14		38	250		31	281	69		
25	15	6	14		35	270		21	291	56		
26	12	6	12		30	280		11	291	41		
27	11	6	12		29	280		8	288	37		
28	11	5	10		26	280		8	288	34		
29	10	5	11		26	280		5	285	31		
30	10	5	10		25	280	1,155	5	285	30		
Total					4,985	4,400		3,282	7,682	8,267	465	3,473
May 1	10	5	9		24	280		5	285	29		
2	10	4	8		22	280		5	285	27		
3	10	4	7		21	85	0	5	90	26		
Total					67	645		15	660	82	0	0

Table 20 - (Continued)

Project Years 1, 50, and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1936		Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	*Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Feb	12	24	62	150	10	246	200		54	254	300		11
	13	130	335	826	54	1,345			400	400	1,745	27	1,080
	14	220	132	349	23	732			650	650	1,382	125	710
	15	208	320	784	52	1,364			600	600	1,964	98	1,270
	16	329	345	835	55	1,564			830	830	2,394	240	1,700
	17	141	100	272	18	531			435	435	966	36	390
	18	90	115	302	20	527			285	285	812		225
	19	55	90	244	16	405	100		170	270	575		85
	20	40	72	200	13	325	130		115	245	440		38
	21	35	55	164	11	265	180		95	275	360		20
	22	178	190	490	32	890			530	530	1,420	66	740
	23	340	670	1,560	103	2,673			880	880	3,553	280	2650
	24	295	220	553	36	1,104			790	790	1,894	210	1,200
	25	128	93	256	16	493			398	398	891	27	280
	26	80	61	173	11	325			255	255	580		88
	27	62	47	137	9	255	100		194	294	449		40
	28	50	37	107	7	201	120		150	270	351		18
	29	40	29	84	6	159	150	24,765	115	265	274		
Total						13,404	980		6,946	7926	20,350	1,109	10,545

Table 20 - (Continued)

Project Years 1, 50, and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1937	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	*Storage Year 1	*Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Mar 1	54	17	48	3	122	120		165	285	287		
2	47	14	40	3	104	140		140	280	244		
3	46	13	38	2	99	150		135	285	234		
4	47	12	34	2	95	150		140	290	235		
5	47	12	33	2	94	150		140	290	234		
6	47	11	32	2	92	150		140	290	232		
7	48	11	30	2	91	150		145	295	236		
8	48	11	30	2	91	150		145	295	236		
9	49	10	28	2	89	150		148	298	237		
10	50	10	28	2	90	140		150	290	240		
11	52	10	28	2	92	140		158	298	250		
12	65	13	39	3	120	90		200	290	320		13
13	88	23	67	4	182			280	280	462		44
14	72	18	52	3	145			230	230	375		22
15	95	18	52	3	168			300	300	468	11	46
16	98	55	156	10	329			310	310	639	12	115
17	163	36	103	7	309			500	500	809	58	225
18	128	35	100	7	270			400	400	670	28	135
19	116	30	89	6	241			360	360	601	20	98
20	108	28	81	6	223			340	340	563	16	80
21	407	28	81	6	522			1,000	1,000	1,522	380	840
22	765	273	682	45	1,767			1,650	1,650	3,417	1,000	2,550
23	606	195	498	33	1,332			1,320	1,320	2,652	680	1,900
24	617	180	461	31	1,289			1,350	1,350	2,639	700	1,890
25	631	194	488	32	1,345			1,360	1,360	2,705	705	1,960
26	391	135	355	23	904			980	980	1,884	350	1,200
27	313	104	273	18	708			820	820	1,528	230	840
28	290	82	229	15	616			780	780	1,396	210	730
29	265	68	190	13	536			715	715	1,251	160	600
30	209	57	161	11	438			610	610	1,048	110	420
31	158	48	137	9	352		81,030	480	480	832	50	235
Total					12,855	1,680		15,591	17,271	28,446	4,720	13,943

Table 20 - (Continued)

Project Years 1, 50, and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1938	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	*Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Feb 1	73	114	304	20	511			230	230	741		175
2	48	50	143	9	250	100		145	245	395		27
3	326	240	597	40	1,203			850	850	2,053	180	1,350
4	157	168	427	28	780			480	480	1,260	50	600
5	134	90	243	16	483			405	405	888	29	280
6	115	55	163	11	344			360	360	704	19	155
7	100	45	127	8	280			315	315	595	12	90
8	94	37	105	7	243			300	300	543	11	72
9	200	70	193	13	476			585	585	1,061	90	420
10	428	130	340	23	921			1,050	1,050	1,971	410	1,270
11	2,920	2,200	4,630	305	10,055			3,500	3,500	13,555	2,600	11,500
12	992	410	986	34	2,422			1,850	1,850	4,272	1,170	3,300
13	326	195	493	33	1,047			850	850	1,897	250	1,200
14	246	220	552	36	1,054			690	690	1,744	150	1,050
15	144	150	395	40	729			440	440	1,169	38	520
16	104	115	306	20	545			320	320	865	13	260
17	87	86	240	16	429			275	275	704		150
18	76	78	218	14	386	50		240	290	626		110
19	87	92	252	17	448			275	275	723		165
20	78	62	173	11	324	40		250	290	574		85
21	74	52	147	9	282	50		235	285	517		61
22	71	44	123	8	246	60		225	285	471		47
23	68	35	101	7	211	80		215	295	426		35
24	68	30	87	6	191	80		215	295	406		30
25	66	26	74	5	171	80		205	285	376		23
26	64	22	64	4	154	90		200	290	354		18
27	64	20	59	3	146	90		200	290	346		17
28	72	27	78	5	182		47,635	230	230	412		31
Total					24,513	720		15,135	15,855	39,648	5,022	23,041

Table 20 - (Continued)

Project Years 1 and 50

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1938	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	*Release	*Storage Year 1	*Sisquoc River flow	Fugler Point total flow *Controlled	*Uncontrolled	Guadalupe flow *Controlled	*Uncontrolled
Mar 1	114	100	271	18	503			360	360	863	20	260
2	325	220	546	34	1,125			850	850	1,975	250	1,270
3	5,350	370	910	60	6,690			5,000	5,000	11,690	3,900	10,000
4	2,120	245	615	40	3,020			2,900	2,900	5,920	2,100	4,700
5	800	167	427	28	1,422			1,600	1,600	3,022	940	2,230
6	400	127	334	22	883			1,000	1,000	1,883	380	1,200
7	290	144	377	24	835			780	780	1,615	205	940
8	375	190	490	32	1,087			950	950	2,037	330	1,330
9	290	130	334	22	776			780	780	1,556	205	870
10	220	99	264	17	600			630	630	1,230	115	580
11	220	97	261	17	595			630	630	1,225	115	570
12	962	380	929	63	2,334			1,800	1,800	4,134	1,130	3,150
13	1,240	480	1,156	76	2,952			2,150	2,150	5,102	1,470	4,000
14	690	260	640	42	1,632			1,450	1,450	3,082	780	2,280
15	515	183	467	30	1,195			1,210	1,210	2,405	560	1,700
16	400	140	363	24	927			1,000	1,000	1,927	380	1,250
17	332	110	295	19	756			860	860	1,616	190	950
18	290	90	243	16	639			780	780	1,419	210	740
19	255	78	212	14	559			710	710	1,269	160	600
20	332	68	190	12	602			860	860	1,462	260	790
21	204	60	169	11	444			590	590	1,034	94	400
22	183	58	157	10	408			540	540	948	70	330
23	159	48	139	9	355			480	480	835	50	240
24	146	47	135	9	337			450	450	787	44	200
25	129	42	121	8	300			400	400	700	28	150
26	119	39	111	8	277			370	370	647	21	120
27	104	34	97	6	241			320	320	561	13	80
28	96	30	89	6	221			300	300	521	11	63
29	90	28	83	6	207			285	285	492	0	54
30	78	24	72	5	179			250	250	429	0	35
31	72	22	64	4	162		111,895	225	225	387	0	25
Total					32,263			30,510	30,510	62,773	14,031	41,107

Table 20 - (Continued)

Project Year 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1938	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	*Release	*Storage Year 100	*Sisquoc River flow	Fugler Point total flow *Controlled	*Uncontrolled	Guadalupe flow *Controlled	*Uncontrolled
Mar 1					503			360	360	863	20	260
2					1,125			850	850	1,975	250	1,270
3					6,690			5,000	5,000	11,690	3,900	10,000
4					3,020			2,900	2,900	5,920	2,100	4,700
5					1,422			1,600	1,600	3,022	940	2,230
6					883			1,000	1,000	1,883	380	1,200
7					835			780	780	1,615	205	940
8					1,087			950	950	2,037	330	1,330
9					776			780	780	1,556	205	870
10					600			630	630	1,230	115	580
11					595			630	630	1,225	115	570
12					2,334			1,800	1,800	4,134	1,130	3,150
13					2,952			2,150	2,150	5,102	1,470	4,000
14					1,632			1,450	1,450	3,082	780	2,280
15	Same as for Year 1				1,195			1,210	1,210	2,405	560	1,700
16					927			1,000	1,000	1,927	380	1,250
17					756			860	860	1,616	190	950
18					639			780	780	1,419	210	740
19					559			710	710	1,269	160	600
20					602			860	860	1,462	260	790
21					444			590	590	1,034	94	400
22					408			540	540	948	70	330
23					355			480	480	835	50	240
24					337			450	450	787	44	200
25					300			400	400	700	28	150
26					277			370	370	647	21	120
27					241	188	110,000	320	508	561	60	80
28					221	227	Spill	300	527	521	66	63
29					207	213		285	498	492	54	54
30					179	185		250	435	429	36	35
31					162	168	110,000	225	393	387	25	25
Total					32,263	981		30,510	31,491	62,773	14,248	41,107

Table 20 - (Continued)

Project Years 1 and 50

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	*Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
1938												
Apr 1	71	20	59	4	154	60		225	285	379		23
2	74	19	55	4	152	60		235	295	387		25
3	72	18	52	3	145	60		228	288	373		22
4	69	17	48	3	137	60		218	278	355		18
5	76	18	51	3	148	60		240	300	388		25
6	68	16	47	3	134	80		212	292	346		17
7	64	15	44	3	126	90		200	290	326		14
8	60	15	43	3	121	100		185	285	306		11
9	59	15	42	3	109	100		183	283	292		
10	56	15	42	3	116	100		172	272	288		
11	56	14	40	3	113	100		172	272	285		
12	58	13	39	3	113	100		178	278	291		
13	62	13	39	3	117	100		194	294	311		12
14	62	12	36	3	113	100		194	294	307		11
15	58	12	36	3	109	100		178	278	287		
16	55	12	35	2	104	100		170	270	274		
17	51	12	33	2	98	120		155	275	253		
18	49	12	32	2	95	140		148	288	243		
19	47	12	30	2	91	150		140	290	231		
20	44	12	30	2	88	160		130	290	218		
21	43	10	28	2	83	160		125	285	208		
22	39	10	26	2	77	180		110	290	187		
23	38	10	25	2	75	180		107	287	182		
24	51	10	28	2	90	140		155	295	245		
25	69	10	40	3	122	70		215	285	337		16
26	64	10	35	2	111	90		200	290	311		12
27	51	10	30	2	93	140		155	295	248		
28	46	10	30	2	88	150		137	287	225		
29	58	12	35	2	107	100		180	280	287		
30	57	12	35	2	106	100	111,725	175	275	281		
Total					3,335	3,250		5,316	8,566	8,651	0	206

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Table 20 - (Continued)

Project Year 100

Quantities shown in second-feet days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1938	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 100	*Sisquoc River flow	Fugler Point total flow *Con-trolled	Fugler Point total flow *Uncon-trolled	Guadalupe flow *Con-trolled	Guadalupe flow *Uncon-trolled
Apr 1					154	147		225	372	379	22	23
2					152	145		235	380	387	23	25
3					145	138		228	366	373	20	22
4					137	130		218	348	355	18	18
5					148	141		240	381	388	24	25
6					134	127	Spill	212	339	346	16	17
7					126	119		200	319	326	13	14
8					121	114		185	299	306	11	11
9					109	102		183	285	292		
10					116	109		172	281	288		
11					113	106		172	278	285		
12					113	106		178	284	291		
13					117	110		194	304	311	11	12
14					113	106		194	300	307	11	11
15	---Same as for Year 1 -----				109	102	110,000	178	280	287		
16					104	100		170	270	274		
17					98	120		155	275	253		
18					95	140		148	288	243		
19					91	150		140	290	231		
20					88	160		130	290	218		
21					83	160		125	285	208		
22					77	180		110	290	187		
23					75	180		107	287	182		
24					90	140		155	295	245		
25					122	70		215	285	337		16
26					111	90		200	290	311		12
27					93	140		155	295	248		
28					88	150		137	287	225		
29					107	100		180	280	287		
30					106	100	108,695	175	275	281		
Total					3,335	3,782		5,316	9,098	8,651	169	206

Table 20 - (Continued)

Project Years 1, 50 and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal year	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	*Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
1940												
Jan 11	71	69	192	13	345	70		225	295	570		82
12	49	38	110	8	205	120		147	267	352		18
13	47	9	26	2	84	150		140	290	224		
14	29	6	12	1	48	190		73	263	121		
15	24	2	8		34	186	0	54	240	88		
Total					716	716		639	1,355	1,355		100
Feb 2	70	3	5		78	60		222	282	300		11
3	59	3	5		67	85		182	267	249		
4	52	24	63	4	143	132		158	290	301		11
5	56	15	45	3	109	120		173	293	282		
26	54	25	72	5	156	120		165	285	321		14
27	82	27	78	6	193			260	260	453		40
28	28	24	68	5	115	150		69	219	184		
29	36	80	227	14	357	190	715	100	290	457		41
Total					1,218	857		1,329	2,179	2,547		117
Mar 1	30	58	164	11	263	200		77	277	340		16
2	25	38	109	7	179	240		58	298	237		
3	21	28	81	5	135	250		42	292	177		
4	19	21	60	4	104	260		35	295	139		
5	18	16	48	3	85	177	0	30	207	115		
Total					766	1,127		242	1,369	1,008	0	16

Table 20 - (continued)

Project Years 1, 50 and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1941	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	*Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Dec. 18	104	3	5		112			320	320	432	13	36
19	35	3	5		43	100		95	195	138		
20	19	3	3		25	80		35	115	59		
23	239	8	20	1	268			670	670	938	135	320
24	616	5	11	1	633			1,330	1,330	1,963	680	1,280
25	60	12	34	2	107	100		185	285	292		
26	45	5	8	0	58	140		135	275	193		
27	33	4	5	0	42	200		88	288	130		
28	28	3	4	0	35	200		69	269	104		
29	28	3	3	0	34	200		69	269	103		
30	27	3	3	0	33	200		65	265	98		
31	26	2	3	0	31	201	0	61	262	92		
Total					1,421	1,421		3,122	4,543	4,543	828	1,636
Jan. 8	153	3	4		160			460	460	620	44	110
9	89	4	5	0	98			280	280	378		23
10	36	3	5		44	110		98	208	142		
11	25	3	3	0	31	223		58	281	89		
24	36	50	140	9	235	150		100	250	335		15
25	66	27	77	5	175	80		205	285	380		23
26	41	37	108	7	193	150		120	270	313		12
27	32	30	85	6	153	200		80	280	233		
28	31	20	59	4	114	200		80	280	194		
29	25	15	43	3	86	176	0	58	234	144		
Total					1,289	1,289		1,539	2,828	2,828	44	183

Table 20 - (Continued)

Project Years 1, 50 and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1941	Cuyama River	*Alamo Creek	*Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Feb 6	49	50	144	9	252	100		148	248	400		28
7	96	36	101	7	240	200		77	277	317		13
8	100	510	1,210	81	1,901			221	221	2,122		1,430
9	118	350	852	57	1,377			356	356	1,733	18	1,050
10	153	270	664	44	1.131			525	525	1,656	64	980
11	591	390	953	63	1.997			2,000	2,000	3,997	1,350	3,000
12	836	340	828	55	2,059			1,380	1,380	3,439	720	2,600
13	214	150	386	26	776			469	469	1,245	46	590
14	100	116	311	21	548			285	285	833		240
15	165	470	1,120	74	1,829			506	506	2,335	60	1,650
16	243	280	690	46	1,259			422	422	1,681	33	1,000
17	563	560	1,330	88	2,541			661	661	3,202	130	2,400
18	312	275	684	45	1,316			575	575	1,891	85	1,200
19	155	150	390	26	721			408	408	1,129	32	470
20	145	120	326	22	613			359	359	972	19	350
21	260	118	322	21	721			664	664	1,385	130	710
22	419	108	284	17	828			646	646	1,474	125	800
23	278	76	211	14	579			485	485	1,064	52	420
24	191	118	316	19	644			490	490	1,134	54	490
25	182	80	226	15	503			440	440	943	38	330
26	122	72	202	13	409			346	346	755	18	185
27	78	63	173	11	325			293	293	618		110
28	268	130	349	23	770		46,030	810	810	1,580	225	910
Total					23,339	300		12,566	12,866	35,905	3,199	20,956

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AM 00760

Table 20 - (Continued)

Project Years 1, 50 and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1941	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Mar 1	1,570	350	853	56	2,829			1,800	1,800	4,629	1,150	3,550
2	770	270	673	44	1,757			1,350	1,350	3,107	690	2,280
3	690	330	816	54	1,890			1,360	1,360	3,250	700	2,400
4	3,000	1,000	2,290	151	6,441			3,500	3,500	9,941	2,650	8,100
5	2,760	660	1,530	101	5,051			4,100	4,100	9,151	3,150	7,450
6	*580	250	619	41	1,490			1,860	1,860	3,350	1,180	2,500
7	*320	170	436	29	955			1,240	1,240	2,195	580	1,500
8	267	130	343	23	773			1,010	1,010	1,783	370	1,100
9	208	110	299	20	637			914	914	1,551	300	890
10	170	95	263	17	545			746	746	1,291	180	640
11	128	79	220	14	441			650	650	1,091	125	460
12	139	93	259	17	508			962	962	1,470	340	800
13	347	95	266	18	726			1,450	1,450	2,176	780	1,500
14	202	98	270	18	588			1,180	1,180	1,768	530	1,080
15	202	90	249	16	557			1,120	1,120	1,677	480	1,000
16	122	69	193	13	397			914	914	1,311	300	660
17	111	58	162	11	342			734	734	1,076	175	430
18	94	49	140	9	292			617	617	909	110	310
19	79	41	117	8	245			442	442	687	39	145
20	71	35	101	7	214			390	390	604	26	100
21	65	32	91	6	191			345	345	536	17	68
22	58	31	88	6	183			311	311	494	12	60
23	53	29	84	6	172			311	311	483	12	50
24	51	27	79	5	162			274	274	436		36
25	49	25	74	5	153	60		228	288	381		25
26	46	24	71	5	146	90		203	293	349		18
27	45	23	68	5	141	100		184	284	325		15
28	89	49	140	9	287			366	366	653	20	135
29	322	105	284	19	730			957	957	1,687	330	1,000
30	184	49	140	9	382			522	522	904	64	310
31	421	170	440	29	1,060		106,485	1,020	1,020	2,080	390	1,400
Total					30,285	250		31,060	31,310	61,345	14,700	40,012

Table 20 - (Continued)

Project Year 1

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1941	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Apr 1	601	239	600	40	1,480			1,150	1,150	2,630	500	1,900
2	467	190	480	33	1,170			1,100	1,100	2,270	460	1,600
3	267	110	296	20	693			783	783	1,476	210	830
4	660	290	719	24	1,693			963	963	2,656	340	1,930
5	1,160	270	*668	44	2,142			1,620	1,620	3,762	960	2,850
6	244	120	322	22	708			1,270	1,270	1,978	620	1,300
7	175	100	274	18	567			998	998	1,565	370	900
8	153	88	246	16	503			874	874	1,377	275	710
9	139	75	220	14	448			746	746	1,194	185	540
10	235	125	330	22	712			722	722	1,434	170	780
11	693	320	790	53	1,856			1,530	1,530	3,386	870	2,550
12	396	170	436	29	1,031			1,180	1,180	2,211	540	1,550
13	396	133	350	23	902			998	998	1,900	370	1,230
14	297	110	290	19	716			900	900	1,616	300	950
15	274	90	250	17	631			822	822	1,453	240	800
16	252	78	220	14	564			746	746	1,310	180	650
17	208	69	193	13	483			662	662	1,145	130	510
18	208	57	160	11	431			606	606	1,037	100	410
19	190	50	143	9	392			551	551	943	76	335
20	166	46	129	8	349			504	504	853	58	250
21	144	42	120	8	314			450	450	764	40	190
22	125	40	113	8	286			408	408	694	29	155
23	111	37	105	7	260			382	382	642	24	120
24	111	34	97	6	248			365	365	613	20	105
25	114	32	93	6	245			420	420	665	32	130
26	219	31	90	6	346			390	390	736	26	180
27	111	30	88	6	235			318	318	553	13	80
28	99	29	84	6	218			305	305	523	12	65
29	99	28	82	5	214			286	286	500	0	58
30	125	30	88	6	249		146,460	358	358	607	19	108
Total					20,086	0		22,407	22,407	42,493	7,169	23,766

Table 20 - (Continued)

Project Year 50

Quantities shown in second-foot days - Storage in acre-feet. (*) Denotes estimated

Seasonal Year 1941	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 50	Sisquoc River Flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Apr. 1					1,480			1,150	1,150	2,630	500	1,900
2					1,170			1,100	1,100	2,270	460	1,600
3					693			783	783	1,476	210	830
4					1,693			963	963	2,656	340	1,930
5					2,142			1,620	1,620	3,762	960	2,850
6					708			1,270	1,270	1,978	620	1,300
7					567			998	998	1,565	370	900
8					503			874	874	1,377	275	710
9					448			746	746	1,194	185	540
10					712			722	722	1,434	170	780
11					1,856	162	130,000	1,530	1,692	3,386	1,010	2,550
12					1,031	1,034		1,180	2,214	2,211	1,550	1,550
13					902	904		998	1,902	1,900	1,230	1,230
14					716	719		900	1,619	1,616	950	950
15	--- Same as for Year 1 --------				631	633		822	1,455	1,453	800	800
16					564	567		746	1,313	1,310	650	650
17					483	486		662	1,148	1,145	510	510
18					431	433	Spill	606	1,039	1,037	410	410
19					392	395		551	946	943	335	335
20					349	351		504	855	853	250	250
21					314	317		450	767	764	190	190
22					286	289		408	697	694	155	155
23					260	262		382	644	642	120	120
24					248	251		365	616	613	105	105
25					245	248		420	668	665	130	130
26					346	348		390	738	736	180	180
27					235	238		318	556	553	80	80
28					218	210		305	525	523	65	65
29					214	217		286	503	500	58	58
30					249	252	130,000	358	610	607	108	108
Total					20,086	8,326		22,407	30,733	42,493	12,976	23,766

Table 20 - (Continued)

Project Year 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1941	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 100	Sisquoc River Flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe Flow *Controlled	Guadalupe Flow *Uncontrolled
Apr. 1					1,480			1,150	1,150	2,630	500	1,900
2					1,170	970	110,000	1,100	2,070	2,270	1,390	1,600
3					693	695		783	1,478	1,476	830	830
4					1,693	1,695		963	2,658	2,656	1,930	1,930
5					2,142	2,144		1,620	3,764	3,762	2,850	2,850
6					708	710		1,270	1,980	1,978	1,300	1,300
7					567	569		998	1,567	1,565	900	900
8					503	505		874	1,379	1,377	710	710
9					448	450		746	1,196	1,194	540	540
10					712	714		722	1,436	1,434	780	780
11					1,856	1,858		1,530	3,388	3,386	2,550	2,550
12					1,031	1,033	----Spill----	1,180	2,213	2,211	1,550	1,550
13					902	904		998	1,902	1,900	1,230	1,230
14					716	718		800	1,618	1,616	950	950
15	----Same as for Year 1 -------				631	633		822	1,455	1,453	800	800
16					564	567		746	1,313	1,310	650	650
17					483	486		662	1,148	1,145	510	510
18					431	434		606	1,040	1,037	410	410
19					392	395		551	946	943	335	335
20					349	352		504	856	853	250	250
21					314	317		450	767	764	190	190
22					286	289		408	697	694	155	155
23					260	263		382	645	642	120	120
24					248	251		365	616	613	105	105
25					245	248		420	668	665	130	130
26					346	349		390	739	736	180	180
27					235	238		318	556	553	80	80
28					218	221		305	526	523	65	65
29					214	217		286	503	500	58	58
30					249	252	110,000	358	610	607	108	108
Total					20,086	18,477		22,407	40,884	42,493	22,156	23,766

Table 20 - (Continued)

Project Year 1

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1941	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
May 1	305	28	82	6	421	0		*320	320	741	14	180
2	86	25	72	5	188	20		*270	290	458		44
3	75	23	66	4	168	40	Maximum	*250	290	418		33
4	71	20	59	4	154	50		*240	290	394		28
5	65	18	52	3	138	60		*230	290	368		23
6	63	17	49	3	132	70		*220	290	352		18
7	57	16	46	3	122	80		208	288	330		15
8	57	15	44	3	119	80		203	283	322		14
9	55	14	42	3	114	100	148,220	188	288	302		
10	52	14	40	3	109	110		180	290	289		
11	48	13	38	3	102	110	Storage	168	278	270		
12	45	13	37	2	97	120		168	288	265		
13	45	12	35	2	94	120		168	288	262		
14	44	12	33	2	91	130		*160	290	251		
15	42	11	31	2	86	140		*152	292	238		
16	40	10	29	2	81	140		*146	286	227		
17	38	10	28	2	78	140		*140	280	218		
18	*36	10	27	2	75	150		*135	285	210		
19	*35	9	26	2	72	160		130	290	202		
20	*33	9	25	2	69	170		120	290	189		
21	*32	9	25	2	67	170		113	283	180		
22	31	9	24	2	66	180		108	288	174		
23	30	8	22	2	62	180		*102	282	164		
24	29	8	21	1	59	190		* 98	288	157		
25	29	8	20	1	58	190		* 94	284	152		
26	29	7	18	1	55	190		* 91	281	146		
27	28	7	16	1	52	190		* 88	278	140		
28	28	7	16	1	52	190		* 85	275	137		
29	28	6	15	1	50	190		* 82	272	132		
30	26	6	14	1	47	190		* 78	268	125		
31	25	6	14	1	46	190	143,600	* 74	264	120		
Total					3,124	4,040		4,809	8,849	7,933	14	355

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AM 00765

Table 20 - (Continued)

Project Years 50 and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal year 1941	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 50	Sisquoc River flow	Fugler total *Controlled	Point flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
May 1					421	404	Spill	*320	724	741	176	180
2					188	170		*270	440	458	39	44
3					168	151		*250	401	418	30	33
4					154	137		*240	377	394	25	28
5					138	120		*230	350	368	18	23
6					132	115		*220	335	352	15	18
7					122	105		208	313	330	12	15
8					119	102		203	305	322	11	14
9					114	96	130,000	188	285	302		
10					109	110		180	290	289		
11					102	110		168	278	270		
12					97	120		168	288	265		
13					94	120		168	288	262		
14					91	130		*160	290	251		
15	---Same as for Year 1---				86	140		*152	292	238		
16					81	140		*146	286	227		
17					78	140		*140	280	218		
18					75	150		*135	285	210		
19					72	160		130	290	202		
20					69	170		120	290	189		
21					67	170		113	283	180		
22					66	180		108	288	174		
23					62	180		102	282	164		
24					59	190		98	288	157		
25					58	190		94	284	152		
26					55	190		91	281	146		
27					52	190		88	278	140		
28					52	190		85	275	137		
29					50	190		82	272	132		
30					47	190		78	268	125		
31					46	190	125,370	74	264	120		
					3,124	4,940		4,809	9,750	7,933	324	355

Table 20 - (Continued)

Project Years 1 and 50

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1942	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	Sisquoc River Flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Dec. 1	11	3	2	0	16	295	---- Release of 1941 storage continued, see Table 17 ----		295	16		
2	9	3	2	0	14	295			295	14		
3	16	3	4	0	23	295			295	23		
4	19	3	4	0	26	295			295	26		
5	13	3	2	0	18	295			295	18		
6	9	3	2	0	14	295			295	14		
7	8	2	3	0	13	295			295	13		
8	8	3	3	0	14	295			295	14		
9	9	3	2	0	14	295			295	14		
10	15	3	3	0	21	295			295	21		
11	57	2	3	0	62	295			295	62		
12	39	3	3	0	45	295			295	45		
13	20	3	3	0	26	295			295	26		
14	17	3	4	0	24	295			295	24		
15	19	3	6	0	28	295			295	28		
16	17	3	7	0	27	295			295	27		
17	16	3	5	0	24	295			295	24		
18	14	3	4	0	21	295			295	21		
19	14	3	4	0	21	295			295	21		
20	14	3	4	0	21	295			295	21		
21	14	3	4	0	21	295			295	22		
22	16	3	3	0	22	295			295	22		
23	15	3	3	0	21	295			295	21		
24	15	3	3	0	21	295			295	21		
25	15	3	4	0	22	295			295	22		
26	15	3	4	0	22	295			295	22		
27	15	3	5	0	23	295			295	23		
28	81	128	336	22	567	50		*230	280	797		220
29	96	82	229	15	422	0		*417	417	839	31	250
30	84	85	237	15	421	50		216	266	637		115
31	59	55	156	10	280	100	28,370	172	272	452		40
Total					2,314	8,165		1,035		3,350	31	625

Table 20 - (Continued)

Project Year 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1942	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 100	*Sisquoc River Flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Dec. 1					16	295	End of 1941 Storage 0 Release		295	16		
2					14	295			295	14		
3	-----Same as for Year 1 ------				23	295			295	23		
4					26	268			268	26		
Total					79	1,153			1,153	79	0	0
Dec. 28					567	50		230	280	797		220
29					422	0		417	417	839	31	250
30	---- Same as for Year 1 ------				421	50		216	266	637		115
31					280	100	2,965	172	272	452		40
Total					1,690	200		1,035	1,235	2,725	31	625
Jan. 1					209	120		167	287	376		23
2					151	170		117	287	268		
3					115	200		85	285	200		
4					88	220		66	286	154		
5					74	240		51	291	125		
6	---- Same as for Year 1 ------				66	250		42	292	108		
7	(following page)				58	260		33	293	91		
8					53	260		27	287	80		
9					51	260		24	284	75		
10					47	270		21	291	68		
11					43	200	0	19	219	62		
Total					955	2,450		652	3,102	1,607	0	23
Jan. 25					205	190		103	293	308		12
26	----Same as for Year 1 ------				159	100		172	272	331		13
27					113	150		112	262	225		
28					99	136	0	104	240	203		
Total					576	576		491	1,067	1,067	0	25

AM 00768

Table 20 - (continued)

Project Years 1 and 50

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1942	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	*Sisquoc River Flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Jan. 1	59	37	106	7	209	120	---Releases of 1941 storage continued, see Table 17 ---	167	287	376		23
2	49	25	72	5	151	170		117	287	268		
3	37	19	55	4	115	200		85	285	200		
4	27	15	*43	3	88	220		66	286	154		
5	*25	12	*35	2	74	240		51	291	125		
6	*24	10	*30	2	66	250		42	292	109		
7	23	9	*25	2	58	260		33	293	91		
8	22	8	*22	1	53	260		27	287	80		
9	22	8	*20	1	51	260		24	284	75		
10	*21	7	*18	1	47	270		21	291	68		
11	*20	6	*16	1	43	270		19	289	62		
12	*19	6	15	1	41	270		17	287	58		
13	*18	6	14	1	39	270		16	286	55		
14	18	6	13	0	37	270		14	284	51		
15	17	6	13	0	36	280		13	293	49		
16	16	5	12	1	34	280		14	294	48		
17	16	5	12	1	34	280		14	294	48		
18	16	5	11	1	33	280		13	293	46		
19	16	5	11	1	33	280		12	292	45		
20	15	5	11	1	32	280		12	292	44		
21	15	5	11	1	32	280		12	292	44		
22	22	5	12	1	40	260		32	292	72		
23	34	5	12	1	52	190		101	291	153		
24	21	5	12	1	39	220		68	288	107		
25	84	30	86	5	205	190		103	293	308		12
26	45	28	81	5	159	120		172	292	331		13
27	27	21	61	4	113	180		112	292	225		
28	32	16	48	3	99	180		104	284	203		
29	26	14	40	3	83	200		85	285	168		
30	25	12	36	2	75	220		71	291	146		
31	23	12	35	2	72	230	18,435	59	289	131		
Total					2,243	7,280		1,696	8,976	3,939	0	48

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Table 20 - (Continued)

Project Year 1

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1942	Cuyama River	* Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	*Storage Year 1	Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Mar 1	16	6	15	1	38	270		16	286	54		
2	16	6	15	1	38	280		14	294	52		
3	16	6	15	1	38	280		14	294	52		
4	16	6	14	1	37	280		13	293	50		
5	16	6	14	1	37	280		12	292	49		
6	16	6	14	1	37	280	End of 1941 releases	11	291	48		
7	16	6	13	1	36	280		11	291	47		
8	16	5	12	1	34	280		10	290	44		
9	16	6	13	1	36	280		10	290	46		
10	16	6	13	1	36	280		10	290	46		
11	21	8	21	1	51	270		16	286	67		
12	20	9	26	2	57	270		18	288	75		
13	16	9	24	2	51	270		17	287	68		
14	42	14	40	3	99	250		36	286	135		
15	146	45	128	8	327	140		1143	283	470		46
16	55	25	73	5	158	170		121	291	279		
17	27	19	56	4	106	190		97	287	203		
18	24	17	49	3	93	200		85	285	178		
19	21	15	43	3	82	210		79	289	161		
20	19	13	36	2	70	210		73	283	143		
21	17	12	33	2	64	220		64	284	128		
22	17	10	29	2	58	96	0	57	153	115		
23												
24												
25												
26												
27												
28												
29												
30												
31												
Total					1,583	5,286		927	6,213	2,510	-0-	46

Table 20 - (Continued)

Project Years 1, 50 and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	*Release	*Storage Year 1	Sisquoc River flow	Fugler total *Controlled	Point flow *Uncontrolled	Guadalupe flow *Controlled	*Uncontrolled
1942												
Apr 22	168	18	51	3	240			512	512	752	62	180
23	128	15	44	3	190			260	260	450		40
24	38	13	37	2	90	140		148	288	238		
25	31	12	35	2	78	180		108	288	186		
26	27	11	31	2	71	200		88	288	159		
27	26	11	30	2	109	200		79	279	188		
28	24	10	29	2	65	123	0	71	194	136		
Total					843	843		1,266	2,109	2,109	62	220
1943												
Jan 22	548	660	1,520	100	2,828			1,370	1,370	4,198	700	3,350
23	2,290	1,260	2,800	186	6,536			5,900	5,900	12,436	4,700	10,500
24	513	310	761	51	1,135			1,050	1,050	2,185	420	1,500
25	180	114	302	20	616			337	337	953	13	330
26	199	185	* 469	31	884			309	309	1,193	12	540
27	176	135	354	24	689			456	456	1,145	42	500
28	168	98	270	18	554			306	306	860	11	260
29	80	80	226	15	401			256	256	657		126
30	117	200	512	34	863			326	326	1,189	12	540
31	134	130	348	23	635		30,140	490	490	1,125	54	480
Total					15,141	0		10,800	10,800	25,941	5,964	18,126

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Table 20 - (Continued)

Project Years 1, 50 and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1943	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	Sisquoc River flow	Fugler Point total flow *Con-trolled	Fugler Point total flow *Uncon-trolled	Guadalupe flow *Con-trolled	Guadalupe flow *Uncon-trolled
Feb 1	124	88	*244	16	472			333	333	805	13	220
2	97	66	*187	12	362	50		*221	271	583		88
3	69	48	*135	9	261	120		*156	276	417		32
4	63	35	*100	7	205	150		*112	262	317		13
5	*52	30	*87	6	175	150		142	292	317		13
6	46	28	80	6	160	150		142	292	302		11
7	42	26	74	5	147	150		142	292	289		10
8	48	24	71	5	148	140		156	296	304		11
9	42	21	62	4	129	140		138	278	267		
10	36	18	52	3	109	160		101	261	210		
11	34	15	44	3	96	200		86	286	182		
12	32	13	38	3	86	220		62	282	148		
13	32	11	32	2	77	240		*42	282	119		
14	32	11	30	2	75	260		37	297	112		
15	30	10	28	2	70	260		35	295	105		
16	29	9	26	2	66	260		33	293	99		
17	28	9	25	2	64	260		33	293	97		
18	27	9	25	2	63	260		33	293	96		
19	28	9	24	2	63	260		33	293	96		
20	28	9	24	2	63	260		33	293	96		
21	28	9	24	2	63	240		47	287	110		
22	35	13	38	3	89			389	389	478	25	
23	75	15	44	3	137			364	364	501	20	58
24	85	20	59	4	168			432	432	600	35	98
25	98	17	49	3	167			275	275	442		40
26	56	14	39	3	112	60		220	280	332		15
27	45	11	32	2	90	80		209	289	299		10
28	37	11	31	2	81	120	29,340	170	290	251		
Total					3,798	4,190		4,176	8,366	7,974	93	619

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Table 20 - (Continued)

Project Years 1, 50 and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1943	Cuyama River	Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Mar 1	33	11	30	2	76	150		125	275	201		
2	31	10	28	2	71	170		116	236	187		
3	30	11	32	2	75	170		129	299	204		
4	*206	48	137	9	400			1,110	1,110	1,510	460	860
5	705	92	257	17	1,071			1,270	1,270	2,341	620	1,400
6	325	85	237	16	663			748	748	1,411	185	760
7	275	60	171	11	517			580	580	1,097	88	460
8	300	*375	908	60	1,643			594	594	2,237	96	1,550
9	468	*1,180	2,620	174	4,442			952	952	5,394	325	4,220
10	524	*850	1,930	128	3,432			1,100	1,100	4,532	460	3,500
11	350	*340	825	54	1,569			840	840	2,409	250	1,710
12	220	*220	*555	36	1,031			688	688	1,719	150	1,050
13	160	*145	377	25	707			615	615	1,322	108	660
14	125	*106	285	18	534			559	559	1,093	80	460
15	100	*86	238	16	440			524	524	964	64	340
16	80	*71	198	13	362			471	471	833	46	240
17	*116	*120	316	21	573			471	471	1,044	46	420
18	267	*280	697	46	1,290			626	626	1,916	110	1,250
19	175	*110	296	20	601			432	432	1,033	35	400
20	130	*80	217	14	441			376	376	817	22	230
21	110	*67	184	12	373			327	327	700	14	155
22	95	*54	154	10	313			292	292	605		100
23	86	*49	140	9	284	40		252	292	536		68
24	83	*48	135	9	275	60		220	280	495		56
25	80	*44	124	8	256	80		209	289	465		44
26	75	*38	108	7	228	90		199	289	427		34
27	70	*35	100	7	212	90		199	289	411		30
28	66	*34	93	6	199	100		189	289	387		25
29	63	*30	87	6	186	100		164	284	370		21
30	60	*29	84	6	179	100		189	289	368		21
31	55	*24	71	5	155	120	71,705	170	290	325		14
Total					22,598	1,270		14,756	16,027	37,354	3,159	20,078

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Table 20 - (Continued)

Project Years 1, 50, and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1943	Cuyama River	*Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Apr 1	50	23	66	4	143	130		151	281	294		
2	45	22	63	4	134	150		129	279	263		
3	42	20	58	4	124	170		108	278	232		
4	40	18	53	3	114	190		97	287	211		
5	*81	23	68	5	177	100		160	260	337		16
6	*104	28	80	5	217			269	269	486		52
7	75	23	66	4	168	100		160	260	328		14
8	55	21	62	4	142	140		138	278	280		
9	50	21	60	4	135	160		134	294	269		
10	47	19	54	3	123	170		116	286	239		
11	45	18	51	3	117	190		101	291	218		
12	43	17	48	3	111	200		82	282	193		
13	41	16	46	3	106	210		72	282	178		
14	39	15	43	3	100	[illegible]		62	292	162		
15	*41	14	41	3	100	150		120	270	220		
16	54	14	39	3	110	160		101	281	211		
17	42	13	37	3	95	200		86	286	181		
18	35	12	35	2	84	210		79	289	163		
19	32	12	33	2	79	210		78	288	157		
20	30	11	31	2	74	210		78	288	152		
21	29	10	29	2	70	210		74	284	144		
22	28	10	27	2	67	220		68	288	135		
23	28	9	26	2	65	230		64	294	129		
24	28	9	25	2	64	230		63	293	127		
25	27	9	25	2	63	230		60	290	123		
26	27	9	24	2	62	230		58	288	120		
27	27	9	23	2	61	230		56	286	117		
28	26	8	23	2	59	230		54	284	113		
29	26	8	22	1	57	230		53	283	110		
30	26	8	22	1	57	230	66,480	50	280	107		
Total					3,078	5,570		2,921	8,491	5,999		82

Table 20 - (Continued)

Project Years 1, 50, and 100

Quantities shown in second-foot days - storage in acre-feet. (*) Denotes estimated.

Seasonal Year 1944	Cuyama River	Alamo Creek	Huasna River	*Ungaged	Vaquero Reservoir *Inflow	Vaquero Reservoir *Release	Vaquero Reservoir *Storage Year 1	Sisquoc River flow	Fugler Point total flow *Controlled	Fugler Point total flow *Uncontrolled	Guadalupe flow *Controlled	Guadalupe flow *Uncontrolled
Feb 1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21	280	4	31	2	317			265	265	582		90
22	1,520	*240	330	22	2,112			3,350	3,350	5,462	2,500	4,150
23	*570	84	135	9	798			1,250	1,250	2,048	600	1,370
24	*185	*25	60	4	274			540	540	814	70	225
25	*115	*7	40	3	165			370	370	535	21	68
26	*95	6	35	2	138			320	320	458	12	46
27	*75	5	30	2	112			269	269	381		23
28	*65	5	25	2	97	90		198	288	295		10
29	*120	6	45	3	174	100	7,960	187	287	361		20
Total					4,187	190		6,749	6,939	10,936	3,203	6,002

Table 25 - (Continued)

Quantities in acre-feet - Sediment accumulation, none

Seasonal year & Month	Reservoir Inflow	Reservoir Release	Reservoir Spill	Evap. Rate (ft.)	Water Surface Area (acres)	Evap.	Storage
1938							0
Feb.	78,640	16,660		-0.54	1550	-840	62,820
Mar.	124,510	8,930	28,940	-0.16	3350	-540	150,000
Apr.	17,160	13,690	4,910	0.16	4080	650	147,910
May	7,000	18,440	0	0.43	3970	1710	134,760
June	2,000	17,850		0.46	3730	1720	117,190
July	720	18,440		0.64	3370	2160	97,310
Aug.	420	18,440		0.59	2860	1690	77,600
Sept.	360	17,850		0.45	2550	1150	58,960
Oct.	500	18,440		0.28	2250	630	40,390
Nov.	660	17,850		0.17	1550	260	22,940
Dec.	4,000	18,440		-0.04	1070	- 40	8,540
Jan.	4,000	12,640		-0.21	490	-100	0
	239,970	197,570	33,850			8,450	
1940							0
Jan.	2,690	2,690				0	0
Feb.	5,050	5,050				0	0
Mar.	2,000	2,000				0	0
1941							0
Dec.	9,010	7,140		-0.13	220	- 30	1,900
Jan.	5,600	7,530		-0.14	220	- 30	0
Feb.	71,220	13,690		-0.38	1470	-560	58,090
Mar.	121,680	10,120	21,460	-0.55	3290	-1,810	150,000
Apr.	84,280	0	84,530	-0.06	4100	-250	150,000
May	15,740	14,280	5,720	0.41	4050	1660	144,080
June	3,920	17,850		0.50	3880	1940	128,210
July	1,100	18,440		0.57	3610	2060	108,810
Aug.	540	18,440		0.51	3160	1610	89,300
Sept.	330	17,850		0.44	2740	1210	70,570
Oct.	320	18,440		0.21	2430	510	51,940
Nov.	660	17,850		0.16	2070	330	34,420
Dec.	-6,460	18,440		-0.57	1460	-830	23,270
1942							
Jan.	7,670	18,440		-0.07	1130	- 80	12,580
Feb.	5,000	17,260		0.03	690	20	300
Mar.	6,350	6,650				0	0
	339,000	222,420	111,710			5,750	

Table 26 - Fugler Point Reservoir Operation for Project Year No. 50

Multi-purpose capacity 350,000 acre-feet, conservation and sediment storage allocation 150,000 acre-feet. Sediment rate 700 acre-feet per year. Inflow quantities were determined from Fugler Point uncontrolled flow quantities in Table 20. Release quantities are based on a 300 second-foot rate. Evaporation rates from Table 24.

Quantities in acre-feet--Sediment accumulation, 35,000 acre-feet

Seasonal Year & Month	Reservoir Inflow	Reservoir Release	Reservoir Spill	Evap. Rate (Ft.)	Water Surface Area (Acres)	Evap.	Storage
1932							0
Dec.	20,940	4,170		-0.11	750	-80	16,850
Jan.	14,100	18,440		-0.26	1,060	-280	12,790
Feb.	67,750	17,260		-0.05	1,990	-100	63,280
Mar.	9,650	18,440		0.32	2,380	760	53,730
Apr.	2,410	17,850		0.41	2,140	880	37,410
May	1,000	18,440		0.45	1,710	770	19,200
June	500	17,850		0.58	860	500	1,350
July	60	1,410				0	0
	116,410	113,860				2,450	
1933							
Jan.	16,200	7,740		-0.17	490	-80	8,540
Feb.	4,260	12,750		0.11	490	50	0
	20,460	20,490				-30	
1934							0
Jan.	3,670	3,670				0	0
1935							0
Jan.	5,400	5,400				0	0
Apr.	16,400	16,400				0	0
1936							0
Feb.	40,360	10,710		-0.19	1,060	-200	29,850
Mar.	4,660	18,440		0.19	1,450	280	15,790
Apr.	5,030	17,850		0.30	790	240	2,730
May	1,000	3,710		0.10	150	20	0
	51,050	50,710				340	
1937							0
Dec.	2,870	2,380				0	490
Jan.	8,710	5,950		-0.08	240	-20	3,270
Feb.	95,740	16,660		-0.28	2,100	-590	82,940
Mar.	56,420	16,060	8,940	-0.17	3,750	-640	115,000
Apr.	20,410	10,120	12,540	0.39	3,970	1,550	111,200
May	4,120	18,440		0.44	3,870	1,700	95,180
June	750	17,850		0.57	3,330	1,900	76,180
July	350	18,440		0.67	2,580	1,730	56,360
Aug.	250	18,440		0.65	2,160	1,400	36,770
Sept.	200	17,850		0.49	1,660	810	18,310
Oct.	100	13,140		0.35	770	270	0
	189,920	160,330	21,480			8,110	

Table 28 - (Continued)

Project Year No. 50

Sediment accumulation, 35,000 acre-feet

Year Month & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (SFD)	Guadalupe Flow (c.f.s.)
1937						
Mar.					41,815	
1	287	300	-10	0		
2	244	300	-10			
3	234	300	-10			
4	235	300	-10			
5	234	300	-10			
6	232	300	-10			
7	236	300	-10			
8	236	300	-10			
9	237	300	-10			
10	240	300	-10			
11	250	300	-10			
12	320	300	-10			
13	462	300	-10			
14	375	300	-10			
15	468	300	-10			
16	639	300	-10			
17	809	300	-10			
18	670	300	-10			
19	601	300	-11			
20	563	300	-11			
21	1,522	300	-11			
22	3,417	300	-11			
23	2,652	300	-11			
24	2,639	300	-11			
25	2,705	300	-11			
26	1,884	300	-11			
27	1,528	300	-11	0		
28	1,396	0	-11	1,342	57,978	700
29	1,251		-11	1,262		610
30	1,048		-11	1,059		430
31	832		-11	843	57,978	255
Total - SFD	28,446	8,100	-323	4,506		1,995
Total - A.F.	56,420	16,060	-640	8,940		3,960

Table 28 - (Continued)

Project Year No. 100

Sediment accumulation, 70,000 acre-feet

Year, Month, & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (s.f.d.)	Guadalupe Flow (c.f.s.)
1937						
Mar.					40,333	
1	Same as Project Year No. 50	300	-11			
2		300	-11			
3		300	-11			
4		300	-11			
5		300	-11			
6		300	-11			
7		300	-11			
8		300	-11			
9		300	-11			
10		300	-11			
11		300	-11		39,819	
12		300	-11			
13		300	-11			
14		300	-11			
15		300	-11			
16		0	-11	605	40,333	100
17			-11	820		235
18			-11	681		145
19			-11	612		105
20			-11	574		86
21			-12	1,534		860
22			-12	3,429		2,620
23			-12	2,664		1,970
24			-12	2,651		1,960
25			-12	2,717		2,010
26			-12	1,896		1,210
27			-12	1,540		880
28			-11	1,407		760
29			-11	1,262		610
30			-11	1,059		430
31			-11	843	40,333	255
Total--s.f.d.	28,446	4,500	-348	24,294		14,236
Total--a.f.	56,420	8,920	-690	48,190		28,240

Table 28 - (Continued)

Project Year No. 50 and 100

Sediment accumulation, 35,000 Acre-feet

Year, Month and Day	Reservoir Inflow (c.f.s.)	Release (c.f.s)	Evap. (c.f.s.)	Spill (c.f.s.)	Storage (s.f.d.)	Guadalupe Flow (c.f.s.)
1937						
April					57,978	
1	777	0	26	751		190
2	734		26	708		160
3	687		26	661		130
4	612		26	586		85
5	568		26	542		73
6	518		26	492		53
7	469		26	443		40
8	430		26	404		29
9	414		26	388		25
10	392		26	366		21
11	370		26	354		19
12	345		26	319		13
13	335		26	309	57,978	10
14	312	300	26			
15	283	300	26			
16	270	300	26			
17	253	300	26			
18	245	300	26			
19	230	300	26			
20	217	300	26			
21	216	300	26			
22	197	300	26			
23	195	300	26			
24	188	300	26			
25	184	300	26			
26	176	300	26			
27	176	300	26			
28	171	300	26			
29	170	300	26			
30	156	300	26		56,063	
Total SFD	10,290	5,100	780	6,325		848
Total AF	20,410	10,120	1,550	12,540		1,680

Table 28 - (Continued)

Project Year No. 1

No sediment accumulation

Year Month, & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (s.f.d.)	Guadalupe Flow (c.f.s.)
1938						
Mar.					31,671	
1	863	300	-9	0		
2	1,975	300	-9			
3	11,690	300	-9			
4	5,920	300	-9			
5	3,022	300	-9			
6	1,883	300	-9			
7	1,615	300	-9			
8	2,037	300	-9			
9	1,556	300	-9			
10	1,230	300	-9			
11	1,225	300	-9			
12	4,134	300	-9			
13	5,102	300	-9			
14	3,082	300	-9			
15	2,405	300	-9			
16	1,927	0	-9	1,357	75,624	700
17	1,616		-9	1,625		970
18	1,419		-9	1,428		770
19	1,269		-9	1,278		620
20	1,462		-9	1,471		810
21	1,034		-9	1,043		420
22	948		-9	957		345
23	835		-9	844		260
24	787		-9	796		220
25	700		-8	708		160
26	647		-8	655		125
27	561		-8	569		85
28	521		-8	529		68
29	492		-8	500		57
30	429		-8	437		36
31	387	0	-8	395	75,624	25
Total S.F.D.	62,773	4,500	-272	14,592		5,671
Total A.F.	124,510	8,930	-540	28,940		11,250

Table 27 - (Continued)

Quantities in acre-feet - sediment accumulation, 70,000 acre-feet

Seasonal year & month	Reservoir Inflow	Reservoir Release	Reservoir Spill	Evap. Rate (Ft.)	Water Surface Area (Acres)	Evap.	Storage
1944							0
Feb.	21,690	5,630		-0.08	970	- 80	16,140
Mar.	31,370	18,440		0.15	1,520	230	28,840
Apr.	6,790	17,850		0.11	1,520	170	17,610
May	3,010	18,440		0.39	1,060	410	1,770
June	400	2,160		0.06	150	10	0
	63,260	62,520				740	
1945							0
Feb.	12,720	12,730		-0.09	100	- 10	0
Mar.	9,440	8,930				0	510
Apr.	730	1,240				0	0
	22,890	22,900				- 10	

Total Evap. ~ 22,720 A.F.
19 yr. Avg. Evap. ~ 1,200 A.F.

AM 00782

Table 28 - (Continued)

Project Year No. 50

Sediment accumulation, 35,000 acre-feet

Year, Month, & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (s.f.d.)	Guadalupe Flow (c.f.s.)
1938						
Mar.					31,742	
1	Same as Project Year No. 1	300	-9	0		
2		300	-9			
3		300	-9			
4		300	-9			
5		300	-9			
6		300	-9			
7		300	-9			
8		0	-9	741	57,978	180
9			-9	1,565		900
10			-9	1,239		590
11			-9	1,234		590
12			-9	4,143		3,200
13			-9	5,111		4,000
14			-9	3,091		2,340
15			-9	2,414		1,750
16			-9	1,936		1,280
17			-9	1,625		970
18			-9	1,428		700
19			-9	1,278		620
20			-9	1,471		810
21			-9	1,043		420
22			-9	957		340
23			-9	844		255
24			-9	796		220
25			-9	709		160
26			-9	656		130
27			-9	570		85
28			-9	530		68
29			-9	501		57
30			-9	438		36
31			-9	396	57,978	26
Total s.f.d.	62,773	2,100	-279	34,716		19,727
Total a.f.	124,510	4,160	-550	68,860		39,130

AM 00783

Table 28 - (Continued)

Project Year No. 100

Sediment accumulation, 70,000 acre-feet

Year Month & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (SFD)	Guadulupe Flow (c.f.s.)
1938						
Mar.					31,717	
1		300	-11			
2	Same as Project Year No. 1	300	-11			
3		0	-11	5,345	40,333	4,190
4			-11	5,931		4,720
5			-11	3,033		2,290
6			-11	1,894		1,220
7			-11	1,626		960
8			-11	2,048		1,370
9			-10	1,566		900
10			-10	1,240		590
11			-10	1,235		590
12			-10	4,144		3,200
13			-10	5,112		4,000
14			-10	3,092		2,340
15			-10	2,415		1,750
16			-10	1,937		1,280
17			-10	1,626		970
18			-10	1,429		700
19			-10	1,279		620
20			-10	1,472		810
21			-10	1,044		420
22			-10	958		340
23			-10	845		255
24			-10	797		220
25			-10	710		160
26			-10	657		130
27			-10	571		85
28			-10	531		68
29			-10	502		57
30			-10	439		36
31			-10	397	40,333	26
Total - SFD	62,773	600	-318	53,875		34,297
Total - A.F.	124,510	1,190	-630	106,860		68,030

Table 28 - (continued)

Project Year No. 1, 50, and 100

No sediment accumulation

Year, Month, & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (s.f.d.)	Guadalupe Flow (c.f.s.)
1938						
April					75,624	
1	379	0	11	368		21
2	387		11	376		22
3	373		11	362		20
4	355		11	344		17
5	388		11	377		22
6	346		11	335		16
7	326		11	315	75,624	13
8	306	300	11	0		0
9	292	300	11			
10	288	300	11			
11	285	300	11			
12	291	300	11			
13	311	300	11			
14	307	300	11			
15	287	300	11			
16	274	300	11			
17	253	300	11			
18	243	300	11			
19	231	300	11			
20	218	300	11			
21	208	300	11			
22	187	300	11			
23	182	300	11			
24	245	300	11			
25	337	300	11			
26	311	300	11			
27	248	300	11			
28	225	300	11			
29	287	300	11			
30	281	300	11		74,568	
Total S.F.D.	8,651	6,900	330	2,477		131
Total A.F.	17,160	13,690	650	4,910		260

Table 28 - (Continued)

Project Year No. 1

No sediment accumulation

Year, Month, & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (s.f.d.)	Guadalupe Flow (c.f.s.)
1941						
Mar.					29,287	
1	4,629	300	-30			
2	3,107	300	-30			
3	3,250	300	-30			
4	9,941	300	-30			
5	9,151	300	-30			
6	3,350	300	-30			
7	2,195	300	-30			
8	1,783	300	-30			
9	1,551	300	-30			
10	1,291	300	-30			
11	1,091	300	-30			
12	1,470	300	-30			
13	2,176	300	-30			
14	1,768	300	-30			
15	1,677	300	-29			
16	1,311	300	-29			
17	1,076	300	-29			
18	909	0	-29	825	75,624	245
19	687		-29	716		165
20	604		-29	633		115
21	536		-29	565		83
22	494		-29	523		66
23	483		-29	512		61
24	436		-29	465		46
25	381		-29	410		30
26	349		-29	378		22
27	325		-29	354		19
28	653		-29	682		145
29	1,687		-29	1,716		1,050
30	904		-29	933		320
31	2,080	0	-29	2,109	75,624	1,450
Total s.f.d.	61,345	5,100	-913	10,821		3,817
Total a.f.	121,680	10,120	-1810	21,460		7,570

AM 00786

Table 28 - (continued)

Project Year No. 50

Sediment accumulation, 35,000 acre-feet

Year, Month, & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (s.f.d.)	Guadalupe Flow (c.f.s.)
1941						
Mar.	Same as Project Year No. 1				29,337	
1		300	-30			
2		300	-30			
3		300	-30			
4		300	-30			
5		0	-30	387	57,978	24
6			-30	3,380		2,550
7			-30	2,225		1,550
8			-30	1,813		1,150
9			-30	1,581		910
10			-30	1,321		680
11			-30	1,121		480
12			-30	1,500		840
13			-30	2,206		1,510
14			-30	1,798		1,120
15			-30	1,707		1,020
16			-30	1,341		700
17			-30	1,106		480
18			-30	939		350
19			-30	717		165
20			-30	634		115
21			-30	566		83
22			-30	524		66
23			-30	513		61
24			-30	466		46
25			-30	411		30
26			-30	379		22
27			-30	355		19
28			-30	683		145
29			-30	1,717		1,050
30			-30	934		320
31		0	-30	2,110	57,978	1,450
Total S.F.D.	61,345	1,200	-930	32,434		16,936
Total A.F.	121,680	2,380	-1840	64,330		33,590

AM 00787

Table 28 - (Continued)

Project Year No. 100

Sediment accumulation, 70,000 acre-feet

Year Month & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (SFD)	Guadulupe Flow (c.f.s.)
1941						
Mar.					29,317	
1	Same as Project Year No. 1	300	-34			
2		300	-34			
3		300	-34			
4		0	-34	9,147	40,333	7,550
5			-34	9,185		7,580
6			-34	3,384		2,570
7			-34	2,229		1,590
8			-34	1,817		1,150
9			-34	1,585		920
10			-34	1,325		680
11			-34	1,125		490
12			-34	1,504		850
13			-34	2,210		1,510
14			-34	1,802		1,130
15			-34	1,711		1,060
16			-34	1,345		700
17			-34	1,110		480
18			-34	943		330
19			-34	721		170
20			-34	638		115
21			-34	570		86
22			-34	528		68
23			-34	517		62
24			-34	470		47
25			-34	415		31
26			-34	383		24
27			-34	359		19
28			-34	687		150
29			-34	1,721		1,060
30			-34	938		325
31			-34	2,114	40,333	1,450
Total - SFD	61,345	900	-1,054	50,483		32,197
Total - A.F.	121,680	1,790	-2,090	100,130		63,860

Table 28 - (continued)

Project Year No. 1, 50, and 100

No sediment accumulation

Year, Month, & Day	Reservoir Inflow (c.f.s.)	Reservoir Release (c.f.s.)	Reservoir Evap. (c.f.s.)	Reservoir Spill (c.f.s.)	Storage (s.f.d.)	Guadalupe Flow (c.f.s.)
1941						
April					75,624	
1	2,630	0	-5	2,635		1,950
2	2,270		-5	2,275		1,680
3	1,476		-5	1,481		820
4	2,656		-5	2,661		1,960
5	3,762		-5	3,767		2,890
6	1,978		-5	1,983		1,300
7	1,565		-4	1,569		900
8	1,377		-4	1,381		720
9	1,194		-4	1,198		550
10	1,434		-4	1,438		790
11	3,386		-4	3,390		2,580
12	2,211		-4	2,215		1,540
13	1,900		-4	1,904		1,230
14	1,616		-4	1,620		960
15	1,453		-4	1,457		800
16	1,310		-4	1,314		670
17	1,145		-4	1,149		510
18	1,037		-4	1,041		420
19	943		-4	947		335
20	853		-4	857		260
21	764		-4	768		205
22	694		-4	698		150
23	642		-4	646		125
24	613		-4	617		105
25	665		-4	669		135
26	736		-4	740		180
27	553		-4	557		79
28	523		-4	527		66
29	500		-4	504		58
30	607	0	-4	611	75,624	105
Total S.F.D.	42,493		-126	42,619		24,073
Total A.F.	84,280		-250	84,530		47,750

AM 00789

Table 28 - (Continued)

Project Year No. 1, 50, and 100

No sediment accumulation

Year Month & Day	Reservoir Inflow (c.f.s.)	Release (c.f.s.)	Evap. (c.f.s.)	Spill (c.f.s.)	Storage (SFD)	Guadalupe Flow (c.f.s.)
1941						
May					75,624	
1	741	0	27	714		165
2	458		27	431		36
3	418		27	401		28
4	394		27	367		20
5	368		27	341		17
6	352		27	325		14
7	330		27	303	75,624	11
8	322	300	27			
9	302	300	27			
10	289	300	27			
11	270	300	27			
12	265	300	27			
13	262	300	27			
14	251	300	27			
15	238	300	27			
16	227	300	27			
17	218	300	27			
18	210	300	27			
19	202	300	27			
20	189	300	27			
21	180	300	27			
22	174	300	27			
23	164	300	27			
24	157	300	27			
25	152	300	27			
26	146	300	27			
27	140	300	27			
28	137	300	27			
29	132	300	27			
30	125	300	27			
31	120	300	27		72,638	
Total - SFD	7,933	7,200	837	2,882		291
Total - A.F.	15,740	14,280	1,660	5,720		580

Table 28 - (continued)

Project Year No. 100

Sediment accumulation, 70,000 acre-feet

Year, Month & Day	Inflow	Reservoir Release	Evap.	Spill	Storage	Guadalupe Flow
	(c.f.s.)	(c.f.s.)	(c.f.s.)	(c.f.s.)	(s.f.d.)	(c.f.s.)
1943 March					22,496	
1	201	300	-3			
2	187	300	-3			
3	204	300	-3			
4	1,510	300	-3			
5	2,341	300	-3			
6	1,411	300	-3			
7	1,097	300	-3			
8	2,237	300	-3			
9	5,394	300	-3			
10	4,532	300	-3			
11	2,409	0	-3	720	40,333	160
12	1,719		-3	1,722		1,060
13	1,322		-3	1,325		680
14	1,093		-3	1,096		460
15	964		-3	967		355
16	833		-3	836		250
17	1,044		-3	1,047		430
18	1,916		-3	1,919		1,250
19	1,033		-3	1,036		420
20	817		-3	820		235
21	700		-3	703		155
22	605		-3	608		105
23	536		-3	539		70
24	495		-3	498		56
25	465		-3	468		47
26	427		-3	430		35
27	411		-3	414		31
28	387		-3	390		25
29	370		-3	373		22
30	368		-3	371		21
31	325	0	-3	328	40,333	14
Total SFD	37,354	3,000	-93	16,610		5,881
Total AF	74,090	5,950	-180	32,940		11,660

Table 29 - Fugler Point Reservoir Yield Summary

150,000 acre-foot conservation-sediment storage capacity

Uncontrolled flow quantities are a summation of Guadalupe uncontrolled flows, Table 20. Controlled flow quantities are an annual summation of Guadalupe flows from Table 28, evaporation from Tables 25, 26 and 27.

Quantities in acre-feet

Year	Uncontrolled Flow	Controlled flow for Project Years 1	50	100
1930	0	0	0	0
1931	0	0	0	0
1932	50,150	0	0	0
1933	4,770	0	0	0
1934	500	0	0	0
1935	7,200	0	0	0
1936	21,080	0	0	0
1937	93,600	0	5,640	30,840
1938	127,650	11,510	39,390	68,290
1939	0	0	0	0
1940	460	0	0	0
1941	172,380	55,900	81,920	112,190
1942	1,860	0	0	0
1943	77,170	0	0	11,660
1944	20,750	0	0	0
1945	7,620	0	0	0
1946	4,550	0	0	0
1947	60	0	0	0
1948	0	0	0	0
19-Year Total	589,800	67,410	126,950	222,980
19-Year Average	31,040	3,550	6,680	11,740
*Yield		27,490	24,360	19,300
Evaporation		1,650	1,550	1,200
Net Yield		25,840	22,810	18,100

*Yield = Uncontrolled minus controlled flow at Guadalupe.

Table 30 - Round Corral Reservoir Operation for Project Year No. 1

Conservation and sediment storage allocation 90,000 acre-feet. Sedimentation rate 180 acre-feet per year. Inflow quantities were assumed to be Sisquoc River near Sisquoc flows. Release quantities are based on a rate of 300 second-feet minus Vaquero releases minus Sisquoc flow originating between Sisquoc and Garey. Evaporation rates from Table 23.

Quantities in acre-feet - sediment accumulation, none

Seasonal year & month	Reservoir Inflow	Reservoir Release	Evap. in feet	Water surface acreage	Evaporation	Water storage
1932						
Feb.	30,485	12,165	.13	230	30	18,290
Mar.	6,145	7,120	.35	355	125	17,190
Apr.	1,095	1,785	.43	345	150	16,350
May	175	605	.48	335	160	15,760
June	0	15,630	.59	220	130	0
	37,900	37,305			595	
1933						
Jan.	8,750	3,205	.10	125	15	5,530
Feb.	3,390	8,020	.19	135	25	875
Mar.	1,795	2,670	.04	40	0	0
	13,935	13,895			40	
1935						
Apr.	6,510	4,955	.18	60	10	1,545
May	210	1,750	.04	65	5	0
	6,720	6,705			15	
1936						
Feb.	12,855	7,840	.06	125	10	5,005
Mar.	1,750	2,595	.30	165	50	4,110
Apr.	2,050	3,180	.39	140	55	2,925
May	0	2,915	.09	90	10	0
	16,655	16,530			125	
1937						
Jan.	1,980	970	0		0	1,010
Feb.	34,435	10,800	.12	275	35	24,610
Mar.	28,285	10,490	.22	525	115	42,290
Apr.	12,615	12,635	.41	610	250	42,020
May	2,065	2,595	.44	605	265	41,225
June	125	450	.57	600	340	40,560
July	0	450	.68	595	405	39,705
Aug.	0	450	.65	585	380	38,875
Sept.	0	3,465	.50	560	280	35,130
Oct.	0	18,230	.37	450	165	16,735
Nov.	0	16,700	.17	215	35	0
	79,505	77,235			2,270	

Table 30 - (Continued)

Quantities in acre-feet - sediment accumulation, none

Seasonal year & month	Reservoir Inflow	Reservoir Release	Evap. in feet	Water surface acreage	Evapo-ration	Water storage
1938-39						
Feb.	27,780	12,990	.08	205	15	14,775
Mar.	54,100	12,030	.19	550	105	56,740
Apr.	10,890	11,405	.32	720	230	55,995
May	4,790	4,445	.44	720	315	56,025
June	1,035	1,150	.47	720	340	55,570
July	175	450	.64	715	460	54,835
Aug.	0	450	.59	710	420	53,965
Sept.	0	450	.50	705	350	53,165
Oct.	0	450	.30	700	210	52,505
Nov.	175	5,475	.19	675	130	47,075
Dec.	4,625	16,890	.09	595	55	34,755
Jan.	4,530	16,890	.06	480	30	22,365
Feb.	4,350	14,675	.13	355	45	11,995
Mar.	4,370	16,325	.22	190	40	0
	116,820	114,075			2,745	
1941-42						
Feb.	22,970	11,105	.06	190	10	11,855
Mar.	54,870	11,195	.18	535	95	55,435
Apr.	39,700	13,105	.26	810	210	81,820
May	9,970	10,410	.42	890	375	81,005
June	3,215	2,850	.51	890	455	80,915
July	255	450	.58	885	515	80,205
Aug.	0	450	.51	880	450	79,305
Sept.	0	450	.44	875	385	78,470
Oct	0	450	.30	870	260	77,760
Nov.	0	450	.19	865	165	77,145
Dec.	2,050	2,300	.05	860	45	76,850
Jan.	3,365	4,000	.08	860	70	76,145
Feb.	1,475	2,100	.14	855	120	75,400
Mar.	2,405	7,960	.26	830	215	69,630
Apr.	4,850	12,590	.24	790	190	61,700
May	1,430	16,460	.43	700	300	46,370
June	35	17,040	.53	575	305	29,060
July	0	18,050	.63	390	245	10,765
Aug.	0	10,665	.58	170	100	0
	146,590	142,075			4,515	

AM 00794

Table 30 - (Continued)

Quantities in acre-feet - sediment accumulation, none

Seasonal year & month	Reservoir Inflow	Reservoir Release	Evap. in feet	Water surface acreage	Evapo-ration	Water storage
1943						
Jan.	18,645	3,175	.03	205	5	15,465
Feb.	8,285	8,350	.14	325	45	15,355
Mar.	27,055	13,710	.21	415	85	28,615
Apr.	5,795	6,800	.28	480	135	27,475
May	1,455	1,350	.47	470	220	27,360
June	0	450	.50	465	230	26,680
July	0	450	.59	460	270	25,960
Aug.	0	1,695	.58	445	260	24,005
Sept.	0	18,185	.53	320	170	5,650
Oct.	0	5,635	.13	130	15	0
	61,235	59,800			1,435	
1944						
Feb.	11,780	3,375	.04	150	5	8,400
Mar.	18,155	14,440	.26	245	65	12,050
Apr.	4,485	4,850	.32	275	90	11,595
May	1,530	11,500	.40	200	80	1,545
June	140	1,685	.04	60	0	0
	36,090	35,850			240	
1945						
Feb.	7,590	7,575	.12	150	15	0

Total Evaporation 11,995

19-year average evaporation 630 acre-feet per year

AM 00795

Table 31 - Round Corral Reservoir Operation for Project Year No. 50

Conservation and sediment storage allocation 90,000 acre-feet. Sedimentation rate 180 acre-feet per year. Inflow quantities were assumed to be Sisquoc River near Sisquoc flows. Release quantities are based on a rate of 300 second-feet minus Vaquero releases. Minus Sisquoc flow originating between Sisquoc and Garey. Evaporation rates from Table 23.

Quantities in acre-feet - Sediment accumulation 9,000 acre-feet

Seasonal Year & Month	Reservoir Inflow	Reservoir Release	Evap. in Feet	Water Surface Acreage	Evap.	Water Storage
1932						
Feb.	30,485	12,165	.13	245	30	18,290
Mar.	6,145	7,120	.35	370	130	17,185
Apr.	1,095	1,785	.43	360	155	16,340
May	175	605	.48	350	170	15,740
June	0	15,605	.59	225	135	0
	37,900	37,280			620	
1933						
Jan.	8,750	3,205	.10	125	15	5,530
Feb.	3,390	8,020	.19	135	25	875
Mar.	1,795	2,670	.04	40	0	0
	13,935	13,895			40	
1935						
Apr.	6,510	4,955	.18	60	10	1,545
May	210	1,750	.04	65	5	0
	6,720	6,705			15	
1936						
Feb.	12,855	7,840	.06	125	10	5,005
Mar.	1,750	2,595	.30	165	50	4,110
Apr.	2,050	3,180	.39	140	55	2,925
May	0	2,915	.09	90	10	0
	16,655	16,530			125	
1937						
Jan.	1,980	970	0		0	1,010
Feb.	34,435	10,800	.12	305	35	24,610
Mar.	28,285	10,490	.22	550	120	42,285
Apr.	12,615	12,635	.41	625	255	42,010
May	2,065	2,595	.44	620	275	41,205
June	125	450	.57	615	350	40,530
July	0	450	.68	610	415	39,665
Aug.	0	450	.65	605	395	38,820
Sept.	0	3,465	.50	585	290	35,065
Oct.	0	18,230	.37	470	175	16,660
Nov.	0	16,620	.17	230	40	0
	79,505	77,155			2,350	

AM 00796

* Denotes reservoir spills are included.

Quantities in acre-feet - sediment accumulation, 9,000 acre-feet

Seasonal Year & Month	Reservoir Inflow	Reservoir Release	Evap. in Feet	Water Surface Acreage	Evap.	Water Storage
1938-39						
Feb.	27,780	12,990	.08	215	15	14,775
Mar.	54,100	12,030	.19	575	110	56,735
Apr.	10,890	11,405	.32	745	240	55,980
May	4,790	4,445	.44	745	330	55,995
June	1,035	1,150	.47	745	350	55,530
July	175	450	.64	740	475	54,780
Aug.	0	450	.59	730	430	53,900
Sept.	0	450	.50	725	360	53,090
Oct.	0	450	.30	720	215	52,425
Nov.	175	5,475	.19	690	130	46,995
Dec.	4,625	16,890	.09	600	55	34,675
Jan.	4,530	16,890	.06	500	30	22,285
Feb.	4,350	14,675	.13	370	50	11,910
Mar.	4,370	16,240	.22	190	40	0
	116,820	113,990			2,830	
1941-42						
Feb.	22,970	11,105	.06	190	10	11,855
Mar.	54,870	11,195	.18	550	100	55,430
Apr.	39,700	*13,895	.26		235	81,000
May	9,970	*10,215	.42		390	80,365
June	3,215	2,850	.51	940	480	80,250
July	255	450	.58	930	540	79,515
Aug.	0	450	.51	925	470	78,595
Sept.	0	450	.44	920	405	77,740
Oct.	0	450	.30	915	275	77,015
Nov.	0	450	.19	905	170	76,395
Dec.	2,050	2,300	.05	905	45	76,100
Jan.	3,365	4,000	.08	900	70	75,395
Feb.	1,475	13,055	.14	865	120	63,695
Mar.	2,405	14,520	.26	750	195	51,385
Apr.	4,850	12,590	.24	670	160	43,485
May	1,430	16,460	.43	560	240	28,215
June	35	17,035	.53	405	215	11,000
July	0	10,920	.41	190	80	0
	146,590	142,435			4,200	

Table 31 - (Continued)

Quantities in acre-feet - sediment accumulation, 9,000 acre-feet

Seasonal Year & Month	Reservoir Inflow	Reservoir Release	Evap. in Feet	Water Surface Acreage	Evap.	Water Storage
1943						
Jan.	18,645	3,175	.03	210	5	15,465
Feb.	8,285	8,350	.14	340	50	15,350
Mar.	27,055	13,710	.21	430	90	28,605
Apr.	5,795	6,800	.28	490	140	27,460
May	1,455	1,350	.47	485	230	27,335
June	0	450	.50	480	240	26,645
July	0	450	.59	475	280	25,915
Aug.	0	1,295	.58	460	265	24,355
Sept.	0	18,185	.53	340	180	5,990
Oct.	0	5,975	.13	100	15	0
	61,235	59,740			1,495	
1944						
Feb.	11,780	3,375	.04	155	5	8,400
Mar.	18,155	14,440	.26	260	70	12,045
Apr.	4,485	4,850	.32	290	95	11,585
May	1,530	11,500	.40	205	80	1,535
June	140	1,675	.04		10	0
	36,090	35,840			250	
1945						
June	7,590	7,575	.12	150	15	0

Total evaporation -- 11,940

19 year average evaporation -- 630 acre-feet

AM 00798

Table 32 - Round Corral Reservoir Operation for Project Year No. 100

Conservation and sediment storage allocation 90,000 acre-feet. Sedimentation rate 180 acre-feet per year. Inflow quantities were assumed to be Sisquoc River near Sisquoc flows. Release quantities are based on a rate of 300 second-feet minus Vaquero releases minus Sisquoc flow originating between Sisquoc and Garey. Evaporation rates from Table 23.

Quantities in acre-feet - sediment accumulation, 18,000 acre-feet

Seasonal year & month	Reservoir Inflow	Reservoir Release	Evap. Rate (Ft.)	Water Surface Acreage	Evap.	Storage
1932						
Feb.	30,485	12,165	.13	260	35	18,285
Mar.	6,145	7,120	.35	395	140	17,170
Apr.	1,095	1,785	.43	380	165	16,315
May	175	605	.48	370	180	15,705
June	0	15,570	.59	230	135	0
	37,900	37,245			655	
1933						
Jan.	8,750	3,205	.10	125	15	5,530
Feb.	3,390	8,020	.19	135	25	875
Mar.	1,795	2,670	.04		0	0
	13,935	13,895			40	
1935						
Apr.	6,510	4,955	.18	60	10	1,545
May	210	1,750	.04	65	5	0
	6,720	6,705			15	
1936						
Feb.	12,855	7,840	.06	125	10	5,005
Mar.	1,750	2,595	.30	165	50	4,110
Apr.	2,050	3,180	.39	140	55	2,925
May	0	2,915	.09	90	10	0
	16,655	16,530			125	
1937						
Jan.	1,980	970	0		0	1,010
Feb.	34,435	10,800	.12	325	40	24,605
Mar.	28,285	10,490	.22	570	125	42,275
Apr.	12,615	12,635	.41	650	265	41,990
May	2,065	2,595	.44	645	285	41,175
June	125	450	.57	640	365	40,485
July	0	450	.68	635	430	39,605
Aug.	0	450	.65	630	410	38,745
Sept.	0	3,465	.50	600	300	34,980
Oct.	0	18,230	.37	490	180	16,570
Nov.	0	16,530	.17	240	40	0
	79,505	77,065			2,440	

Table 33 - (continued)

Project Year No. 50 (2 sheets)

Quantities in second-foot days - Storage in acre-feet

Seasonal Year & Month	Vaquero Inflow	Vaquero Releases	Round Corral Inflow	Round Corral Releases	Storage Year 50 Acre-feet	Sisquoc at Garey	Fugler Point	Guadalupe Flow
1941								
May 1	421	404	310	303	81,000	303	707	175
2	188	170	267	260	---Spill---	260	430	35
3	168	151	250	243		243	394	28
4	154	137	240	233		233	370	23
5	138	120	231	224		224	344	18
6	132	115	222	216		216	331	15
7	122	105	212	206		206	311	10
8	119	102	208	202	81,000	202	304	
9	114	96	192	204		204	300	
10	109	110	187	190		190	300	
11	102	110	175	190		190	300	
12	97	120	175	180		180	300	
13	94	120	175	180		180	300	
14	91	130	168	170		170	300	
15	86	140	161	160		160	300	
16	81	140	152	160		160	300	
17	78	140	150	160		160	300	
18	75	150	145	150		150	300	
19	72	160	139	140		140	300	
20	69	170	129	130		130	300	
21	67	170	122	130		130	300	
22	66	180	118	120		120	300	
23	62	180	110	120		120	300	
24	59	190	108	110		110	300	
25	58	190	104	110		110	300	
26	55	190	102	110		110	300	
27	52	190	100	110		110	300	
28	52	190	98	110		110	300	
29	50	190	95	110		110	300	
30	47	190	92	110		110	300	
31	46	190	89	110	80,365	110	300	
	3,124	4,940	5,026	5,151		5,151	10,091	304

Table 34 - Vaquero-Round Corral Yield Summary

Conservation-sediment storage capacities: Vaquero Reservoir 150,000 acre-feet, Round Corral 90,000 acre-feet. Uncontrolled flows as shown in Table 20. Controlled flows from Table 33.

Quantities in acre-feet

Year	Uncontrolled Flow	Controlled flow for Project Years 1	50	100
1930	0	0	0	0
31	0	0	0	0
32	50,150	0	0	0
33	4,770	0	0	0
34	500	0	0	0
35	7,200	0	0	0
36	21,080	0	0	0
37	93,600	0	0	0
38	127,650	0	0	0
39	0	0	0	0
1940	460	0	0	0
41	172,380	0	8,480	30,440
42	1,860	0	0	0
43	77,170	0	0	0
44	20,750	0	0	0
45	7,620	0	0	0
46	4,550	0	0	0
47	60	0	0	0
48	0	0	0	0
19-Year Total	589,800	0	8,480	30,440
19-Year Average	31,040	0	450	1,600
*Yield		31,040	30,590	29,440
Evaporation		1,360	1,350	1,390
Net Yield		29,680	29,240	28,050

*Yield = Uncontrolled - controlled flow at Guadalupe gaging station.

TABLE 41--HUASNA RIVER SUSPENDED SEDIMENT LOAD

% Limits	%Interval	%Mid. Ord.	Qw	Qs	2x4 Qw. Disch.	2x5 Qs. Disch.
0.00-0.02	0.02	0.01	4,500	163,000	0.9	32.6
0.02-0.1	0.08	0.06	2,200	39,000	1.8	31.2
0.1 -0.5	0.4	0.3	1,000	8,200	4.0	32.8
0.5 -1.5	1.0	1.0	450	1,650	4.5	16.5
1.5 -5.0	3.5	3.25	130	140	4.5	4.9
5-15	10	10	21	4	2.1	0.4
15-25	10	20	7	1	0.7	0.1
25-35	10	30	4		0.4	
35-45	10	40	3		0.3	
45-55	10	50	2		0.2	
55-65	10	60	1		0.1	
65-75	10	70	1		0.1	
				Total	19.6	118.5

Qw. A.D. = 19.6 x365x1.9835 = 14,190 (AF)/yr.

Qs. A.D. = 118.5 x365 = 43,253 Tons/yr.

Sediment

A.D. $= \frac{43,253}{74 \times 21.78} \frac{\text{Tons/yr.}}{\text{Tons/(AF)}} = \frac{43,253}{1611.7} = 26.8$ (AF)/yr.

Yield $= \frac{43,253}{1611.7 \times 119} \frac{\text{Tons/yr.}}{\text{Tons/(AF)} \times \text{D.A.}} = \frac{43,253}{191,792} = 0.226$ (AF)/sq.mi.

Concentration $= \frac{43,253 \times 100}{14190 \times 1361} \frac{\text{Qs A.D.x100}}{\text{Qw A.D.x1361}} = \frac{4,325,300}{19,312,590} = 0.22$ Percent

Runoff

Rate $= \frac{14190}{119} \frac{\text{Qw A.D.}}{\text{D.A.}} = 119.2$ (AF)/sq.mi.

A.D. = Annual Discharge
D.A. = Drainage Area

AM 00802

TABLE 42--ALAMO CREEK SUSPENDED SEDIMENT LOAD

% Limits	% Interval	% Mid. Ord.	Qw	Qs	2x4 Qw. Disch.	2x5 Qs. Disch.
0.00-0.02	0.02	0.01	2,150	64,000	0.4	12.8
0.02-0.1	0.08	0.06	1,100	15,500	0.9	12.4
0.1 -0.5	0.4	0.3	420	2,050	1.7	8.2
0.5 -1.5	1.0	1.0	170	300	1.7	3.0
1.5 -5.0	3.5	3.25	43	16	1.5	0.6
5-15	10	10	10	1	1.0	0.1
15-25	10	20	5		0.5	
25-35	10	30	3		0.3	
35-45	10	40	3		0.3	
45-55	10	50	2		0.2	
55-65	10	60	1		0.1	
65-75	10	70	1		0.1	
				Total	8.7	37.1

Qw. A.D. = 8.7 x365x1.9835 = 6,300 (AF)/yr.

Qs. A.D. = 37.1 x365 = 13,542 Tons/yr.

Sediment

A.D. $= \frac{13,542}{67 \times 21.78}$ $\frac{\text{Tons/yr.}}{\text{Tons/(AF)}}$ $\frac{13,542}{1459.3}$ = 9.3 (AF)/yr.

Yield $= \frac{13,542}{1459.3 \times 88}$ $\frac{\text{Tons/yr.}}{\text{Tons/(AF)xD.A.}}$ $\frac{13,542}{128,418}$ = 0.105 (AF)/sq.mi.

Concentration $= \frac{13542 \times 100}{6300 \times 1361}$ $\frac{\text{Qs A.D.x100}}{\text{Qw A.D.x1361}}$ $\frac{1,354,200}{8,574,300}$ = 0.16 Percent

Runoff

Rate $= \frac{6300}{88}$ $\frac{\text{Qw A.D.}}{\text{D.A.}}$ = 71.6 (AF)/sq.mi.

A.D. = Annual Discharge
D.A. = Drainage Area

TABLE 43--SISQUOC RIVER (NEAR CAREY) SUSPENDED SEDIMENT LOAD

% Limits	%Interval	% Mid. Ord.	Qw	Qs	2x4 Qw. Disch.	2x5 Qs. Disch.
0.00-0.02	0.02	0.01	5,700	750,000	1.14	150.0
0.02-0.1	0.08	0.06	3,550	375,000	2.84	300.0
0.1 -0.5	0.4	0.3	1,750	98,000	7.00	392.0
0.5 -1.5	1.0	1.0	840	18,000	8.40	180.0
1.5 -5.0	3.5	3.25	350	2,900	12.25	101.5
5-15	10	10	95	190	9.50	19.0
15-25	10	20	19	7	1.90	0.7
25-35	10	30	1		0.10	
				Total	43.13	1143.2

Qw. A.D. = 43.13 x365x1.9835 = 31,230 (AF)/yr.

Qs. A.D. = 1143.2 x365 = 417,268 Tons/yr.

Sediment

A.D. $= \frac{417,268}{75 \times 21.78}$ $\frac{\text{Tons/yr.}}{\text{Tons/(AF)}}$ $\frac{417,268}{1633.5}$ = 255.4 (AF)/yr.

Yield $= \frac{417,268}{1633.5 \times 442}$ $\frac{\text{Tons/yr.}}{\text{Tons/(AF)xD.A.}}$ $\frac{417,268}{722,007}$ = 0.58 (AF)/sq.mi.

Concentration $= \frac{417,268 \times 100}{31230 \times 1361}$ $\frac{\text{Qs A.D.x100}}{\text{Qw A.D.x1361}}$ $\frac{41,726,800}{42,504,030}$ = 0.98 Percent

Runoff

Rate $= \frac{31,230}{442}$ $\frac{\text{Qw A.D.}}{\text{D.A.}}$ = 70.7 (AF)/sq.mi.

A.D. = Annual Discharge
D.A. = Drainage Area

TABLE 46--CUYAMA RIVER BED LOAD YIELD

% Limits	% Interval	% Mid. Ord.	Qw c.f.s.	Qs a.f./yr.	2x5 Qs. Disch. a.f./yr.
0.00-0.02	0.02	0.01	5,000	5,840	1.17
0.02-0.1	0.08	0.06	2,650	3,050	2.44
0.1 -0.5	0.4	0.3	920	1,040	4.16
0.5 -1.5	1.0	1.0	350	385	3.85
1.5 -5.0	3.5	3.25	112	120	4.20
5-15	10	10	32	33	3.30
15-25	10	20	16	16.2	1.62
25-35	10	30	10	10.0	1.00
35-45	10	40	5	5.0	.50
45-55	10	50	3	3.0	.30
55-65	10	60	1	1.0	.10
65-75	10	70	1	1.0	.10
				Total	22.74

Annual Sediment Discharge = 22.74 (AF)/yr.

Yield = $\frac{22.74 \text{ A.F.}}{912 \text{ sq.mi.}}$ = 025 (AF)/sq.mi.

AM 00805

TABLE 47--HUASNA RIVER BED LOAD YIELD

% Limits	% Interval	% Mid. Ord.	Qw c.f.s.	Qs a.f./yr.	2x5 Qs. Disch a.f./yr.
0.00-0.02	0.02	0.01	4,500	1,130	0.23
0.02-0.1	0.08	0.06	2,200	515	0.41
0.1 -0.5	0.4	0.3	1,000	200	0.80
0.5 -1.5	1.0	1.0	450	61	0.61
1.5 -5.0	3.5	3.25	130	0	
5-15	10	10	21	0	
15-25	10	20	7	0	
25-35	10	30	4	0	
35-45	..10	40	3	0	
45-55	10	50	2	0	
55-65	10	60	1	0	
65-75	10	70	1	0	
			Total		2.05

Annual Sediment Discharge = 2.05 (AF)/yr.

TABLE 48--ALAMO CREEK BED LOAD YIELD

% Limits	% Interval	% Mid. Ord.	Qw c.f.s.	Qs a.f./yr.	2x5 Qs. Disch. a.f./yr.
0.00-0.02	0.02	0.01	2,150	500	.10
0.02-0.1	0.08	0.06	1,100	225	.18
0.1 -0.5	0.4	0.3	420	54	.27
0.5 -1.5	1.0	1.0	170	7	.07
1.5 -5.0	3.5	3.25	43		
5-15	10	10	10		
15-25	10	20	5		
25-35	10	30	3		
35-45	10	40	3		
45-55	10	50	2		
55-65	10	60	1		
65-75	10	70	1		
			Total		.62

Annual Sediment Discharge = .62 (AF)/yr.

AM 00807

TABLE 49--SUMMARY OF SEDIMENT VOLUME COMPUTATIONS AND ADJUSTMENTS
(Quantities in acre-feet)

Based on 1930 - 1952 Runoff Data and
1941, 1952, 1954 and 1955 Sediment Concentration Data

	Suspended Sediment	Bed Load	Total Sediment	Bed % of Suspended
Cuyama	278.4	22.7	301.1	8.15
Huasna	26.8	2.1	28.9	7.84
Alamo	9.3	0.6	9.9	6.45
Total	314.5	25.4	339.9	
Sisquoc	255.4	20.5[a]	275.9	8.03
Total	569.9	45.9	615.8	

Adjusting Runoff Data (1930-52) to 85-year Average Runoff (1868-1952)

	85-year Average Runoff	1930-52 Flow Duration Curve	% of Long-time	Long-time Sediment Concentration Suspended Sediment	Bed Load	Total Sediment	(say)
Cuyama	17340	15200	87.7	317.4	25.9	343.3	
Huasna	14820	14190	95.7	28.0	2.2	30.2	
Alamo	6710	6300	93.9	9.9	0.6	10.5	
Total	38870	35690		355.3	28.7	384.0	400
Sisquoc	35790	31230	87.3	292.6	23.5	316.1	300
Total	74660	66920		647.9	52.2	700.1	700

Sisquoc Bed Load % of suspended computed as $\frac{25.4}{314.5}$ x 100 = 8.08%

0.0808 x 255.4 = 20.6 which was adjusted to nearest 1/2 acre-foot or 20.5.

TABLE 50--VAQUERO RESERVOIR SEDIMENT DISPOSITION AFTER 50 YEARS

Total Sediment = 20,000 Acre-Feet

	Original		Relative	A. P.	Sediment		Accum. Sediment	Revised	
Elev.	Area	Capacity	Depth	Type II	Area	Volume	Volume	Area	Capacity
623	2580	150,000	1.00	0	0		20,166	2580	129,834
						101			
620	2460	142,700	.98	.46	67		20,065	2393	122,635
						945			
610	2170	119,500	.91	.84	122		19,120	2048	100,380
						1350			
600	1960	98,700	.84	1.02	148		17,770	1812	80,930
						1560			
590	1660	80,600	.77	1.13	164		16,210	1496	64,390
						1690			
580	1420	65,200	.70	1.20	174		14,520	1246	50,680
						1765			
570	1220	52,000	.63	1.235	179		12,755	1041	39,245
						1795			
560	1070	41,000	.56	1.245	180		10,960	890	30,040
						1800			
550	900	31,000	.49	1.24	180		9,160	720	21,840
						1775			
540	800	22,500	.42	1.21	175		7,385	625	15,115
						1705			
530	680	16,000	.35	1.15	166		5,680	514	10,320
						1610			
520	540	10,500	.28	1.08	156		4,070	384	6,430
						1480			
510	380	5,200	.21	.97	140		2,590	240	2,610
						1295			
500	200	2,000	.14	.82	119		1,295	81	705
(493	97	660	.091	.67)		945			
490	70	350	.07	.60	70		350	0	0
						350			
						20166			
480	0	0	0	0	0			0	0

New Zero Elevation at 493'

$K = \frac{97}{.67} = 144.77$

AM 00809

TABLE 51--VAQUERO RESERVOIR SEDIMENT DISPOSITION AFTER 100 YEARS

Total Sediment = 40,000 Acre-Feet

	Original		Relative	A. P.	Sediment		Accum. Sediment	Revised	
Elev.	Area	Capacity	Depth	Type II	Area	Volume	Volume	Area	Capacity
623	2580	150,000	100	0	0		40,284	2580	109,716
						204			
620	2460	142,700	.98	.46	136		40,080	2324	102,620
						1920			
610	2170	119,500	.91	.84	248		38,160	1922	81,340
						2745			
600	1960	98,700	.84	1.02	301		35,415	1659	63,285
						3175			
590	1660	80,600	.77	1.13	334		32,240	1326	48,360
						3445			
580	1420	65,200	.70	1.20	355		28,795	1065	36,405
						3600			
570	1220	52,000	.63	1.235	365		25,195	855	26,805
						3665			
560	1070	41,000	.56	1.245	368		21,530	702	19,470
						3670			
550	900	31,000	.49	1.24	366		17,860	534	13,140
						3615			
540	800	22,500	.42	1.21	357		14,245	443	8,255
						3485			
530	680	16,000	.35	1.15	340		10,760	340	5,240
						3295			
520	540	10,500	.28	1.08	319		7,465	221	3,035
						3030			
510	380	5,200	.21	.97	287		4,435	93	765
(504	260	3,100	.168	.88)		2435			
500	200	2,000	.14	.82	200		2,000	0	0
						1650			
490	70	350	.07	.60	80		350	0	0
						350			
						40,284			
480	0		0	0	0		0	0	0

New Zero Elevation at 504'

$K = \frac{260}{.88} = 295.45$

TABLE 52--FUGLER POINT RESERVOIR SEDIMENT DISPOSITION AFTER 50 YEARS

Total Sediment = 35,000 Acre-Feet

	Original		Relative	A.P.	Sediment		Accum.	Revised	
Elev.	Area	Capacity	Depth	Type II	Area	Volume	Sediment	Area	Capacity
430	4075	150,000	1.00	0	0		35,070	4075	114,930
						2100			
420	3475	112,000	.882	.92	420		32,970	3055	79,030
						4680			
410	2725	79,000	.765	1.13	516		28,290	2209	51,710
						5385			
400	2325	53,000	.647	1.23	561		22,905	1764	30,095
						5645			
390	1650	33,000	.529	1.245	568		17,260	1082	15,740
						5590			
380	1175	18,500	.412	1.205	550		11,670	625	6,830
						5235			
370	750	8,800	.294	1.09	497		6,435	253	2,365
(363	445	3,500	.211	.97)		4135			
360	330	2,300	.176	.90	330		2,300	0	0
						1500			
355	160	800	.118	.75	160		800	0	0
						650			
350	50	150	.059	.55	50		150	0	0
						150			
						35,070			
345	0	0	0	0	0		0	0	0

New Zero Elevation at 363'

$$K = \frac{445}{.97} = 456.41$$

TABLE 53--FUGLER POINT RESERVOIR SEDIMENT DISPOSITION AFTER 100 YEARS

Total Sediment = 70,000 Acre-Feet

	Original		Relative	A.F.	Sediment		Accum.	Revised	
Elev.	Area	Capacity	Depth	Type II	Area	Volume	Sediment	Area	Capacity
430	4075	150,000	1.00	0	0		69,815	4075	80,185
						4620			
420	3475	112,000	.882	.92	924		65,195	2551	46,805
						10295			
410	2725	79,000	.765	1.13	1135		54,900	1590	24,100
						11850			
400	2325	53,000	.647	1.23	1235		43,050	1090	9,950
						12425			
390	1650	33,000	.529	1.245	1250		30,625	400	2,375
(382	1225	20,500	.435	1.22)		12125			
380	1175	18,500	.412	1.205	1175		18,500	0	0
						9700			
370	750	8,800	.294	1.09	750		8,800	0	0
						6500			
360	330	2,300	.176	.90	330		2,300	0	0
						1500			
355	160	800	.118	.75	160		800	0	0
						650			
350	50	150	.059	.55	50		150	0	0
						150			
						69815			
345	0	0	0	0	0		0	0	0

New Zero Elevation at 382'

$K = \frac{1225}{1.22} = 1004.1$

TABLE 54--ROUND CORRAL RESERVOIR SEDIMENT DISPOSITION AFTER 50 YEARS

Total Sediment = 9,000 Acre-Feet

	Original		Relative	A. P.	Sediment		Accum. Sediment	Revised	
Elev.	Area	Capacity	Depth	Type II	Area	Volume	Volume	Area	Capacity
934	955	90,000	1.000	0			9089	955	80,911
						189			
920	875	79,000	.947	.69	27		8900	848	70,100
						640			
900	770	63,000	.868	.96	37		8260	733	54,740
						800			
880	660	48,500	.789	1.105	43		7460	617	41,040
						890			
860	555	36,500	.710	1.19	46		6570	509	29,930
						940			
840	460	26,250	.631	1.235	48		5630	412	20,620
						960			
820	360	18,000	.552	1.245	48		4670	312	13,330
						960			
800	275	12,000	.473	1.235	48		3710	227	8,290
						940			
780	205	7,250	.394	1.195	46		2770	159	4,480
						900			
760	145	3,600	.315	1.12	44		1870	101	1,730
						830			
740	85	1,500	.236	1.01	39		1040	46	460
(723	34	475	.168	.88)		640			
720	25	400	.157	.85	25		400	0	0
						350			
700	5	50	.078	.63	5		50	0	0
						50			
						9089			
680	0	0	0	0			0	0	0

New Zero Elevation at 723'

$K = \frac{34}{.88} = 38.6$

AM 00813

TABLE 55--ROUND CORRAL RESERVOIR SEDIMENT DISPOSITION AFTER 100 YEARS

Total Sediment = 18,000 Acre-Feet

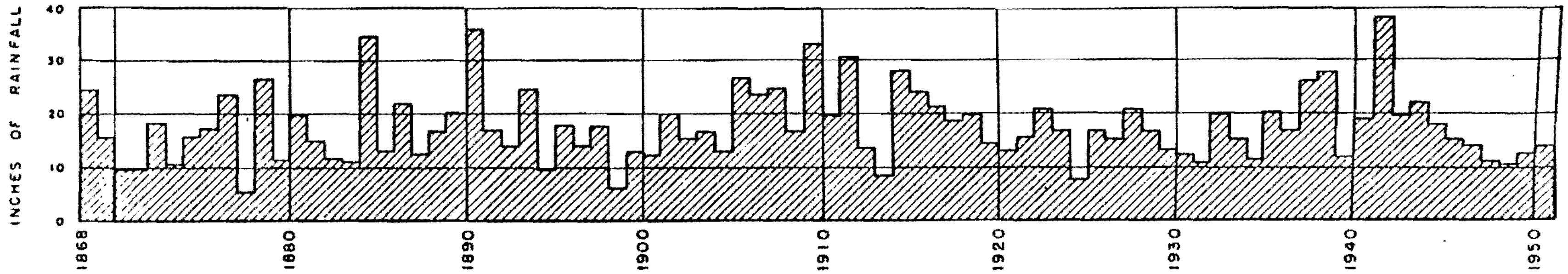
	Original		Relative	A.P.	Sediment		Accum. Sediment	Revised	
Elev.	Area	Capacity	Depth	Type II	Area	Volume	Volume	Area	Capacity
934	955	90,000	1.000	0	0		18085	955	71,915
						385			
920	875	79,000	.947	.69	55		17700	820	61,300
						1320			
900	770	63,000	.868	.96	77		16380	693	46,620
						1650			
880	660	48,500	.789	1.105	88		14730	572	33,770
						1830			
860	555	36,500	.710	1.19	95		12900	460	23,600
						1940			
840	460	26,250	.631	1.235	99		10960	361	15,290
						1990			
820	360	18,000	.552	1.245	100		8970	260	9,030
						1990			
800	275	12,000	.473	1.235	99		6980	176	5,020
						1950			
780	205	7,250	.394	1.195	96		5030	109	2,220
						1860			
760	145	3,600	.315	1.12	90		3170	55	430
						1710			
740	85	1,500	.236	1.01	81		1460	4	40
(738	80	1,300	.228	1.00)		1060			
720	25	400	.157	.85	25		400	0	0
						350			
700	5	50	.078	.63	5		50	0	0
						50			
						18085			
680	0	0	0	0			0	0	0

New Zero Elevation at 738'

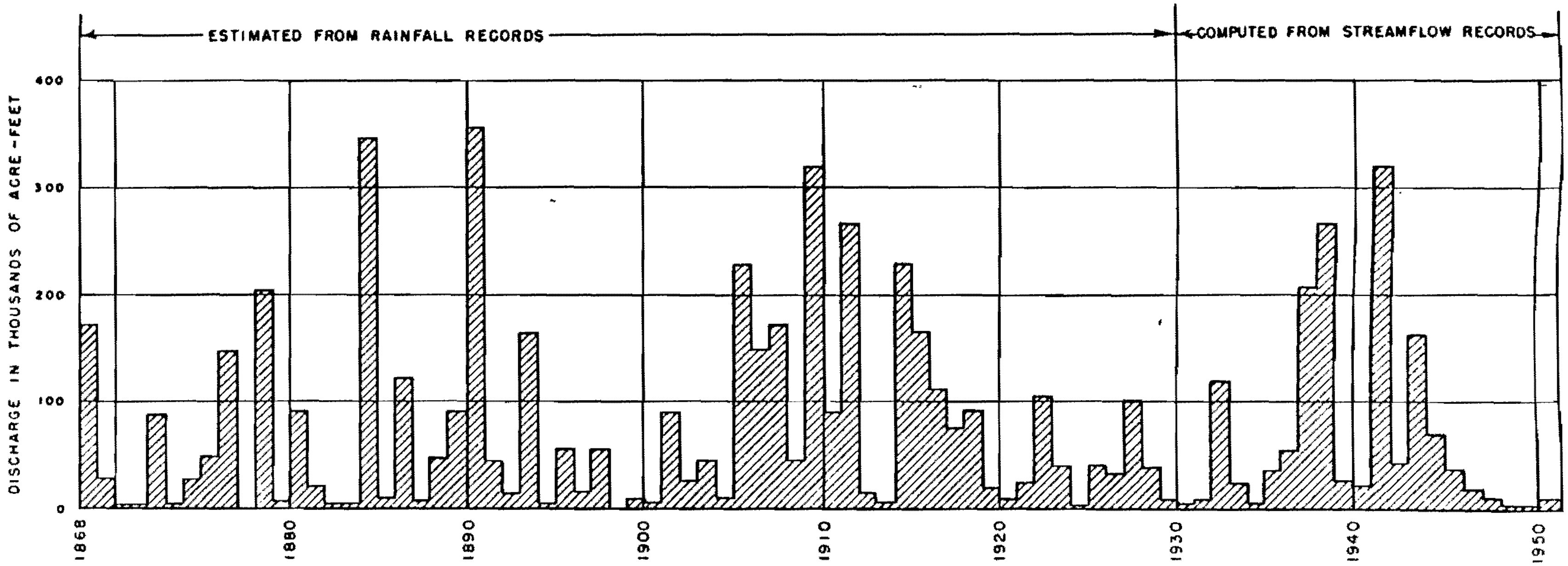
$K = \frac{80}{1.00} = 80.0$

AM 00814

Based on average estimated and/or recorded annual rainfall at the following stations:
Suey Ranch, Musick, Sisquoc Ranch, Permasse Ranch, and Upper Huasna.
83 Years Average – 17.47 inches



ANNUAL RAINFALL



ANNUAL DISCHARGE OF SANTA MARIA RIVER AT FUGLER POINT

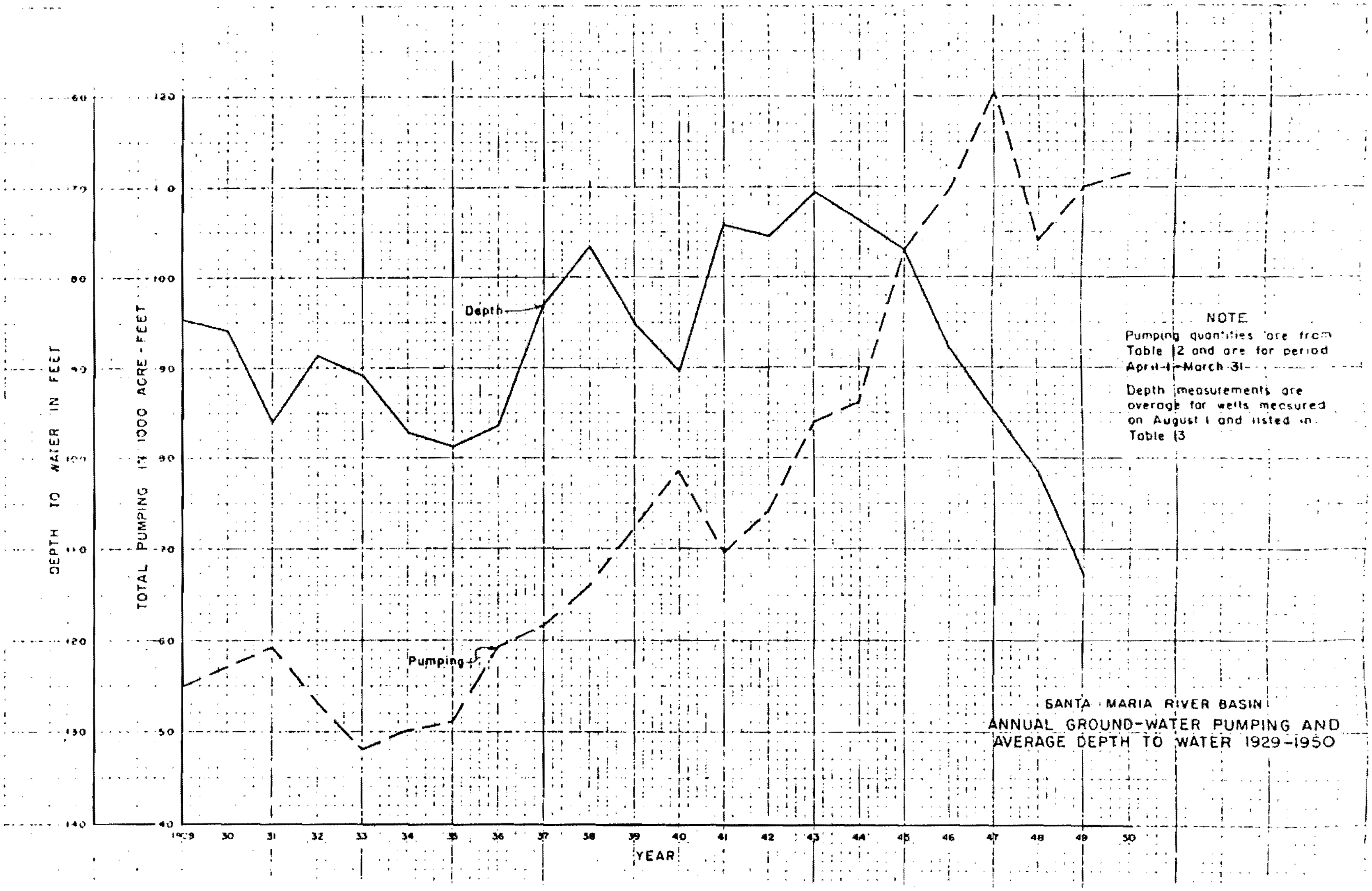
MAY, 1955

575-208-14

PLATE I

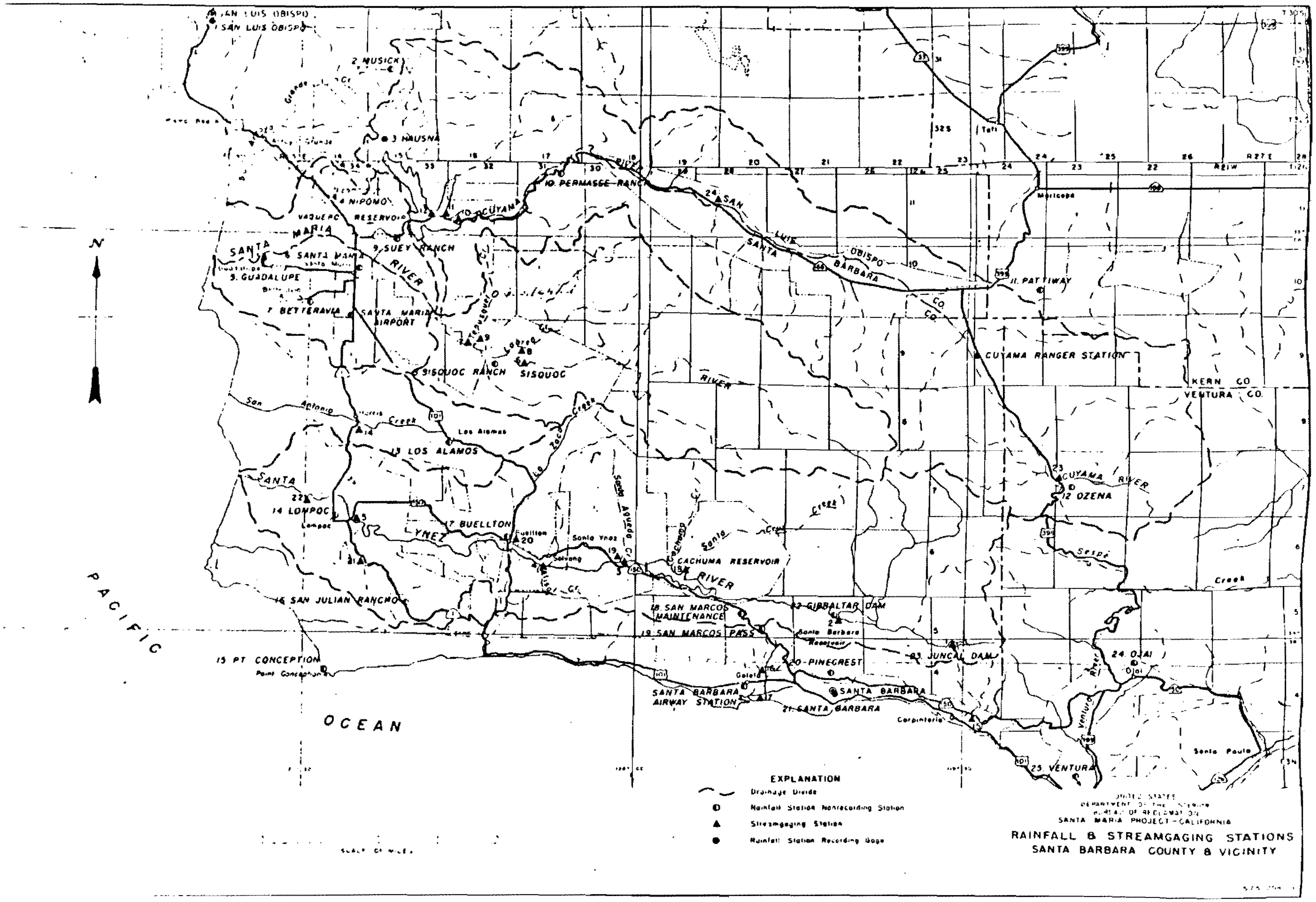
AM 00815

PLATE 11



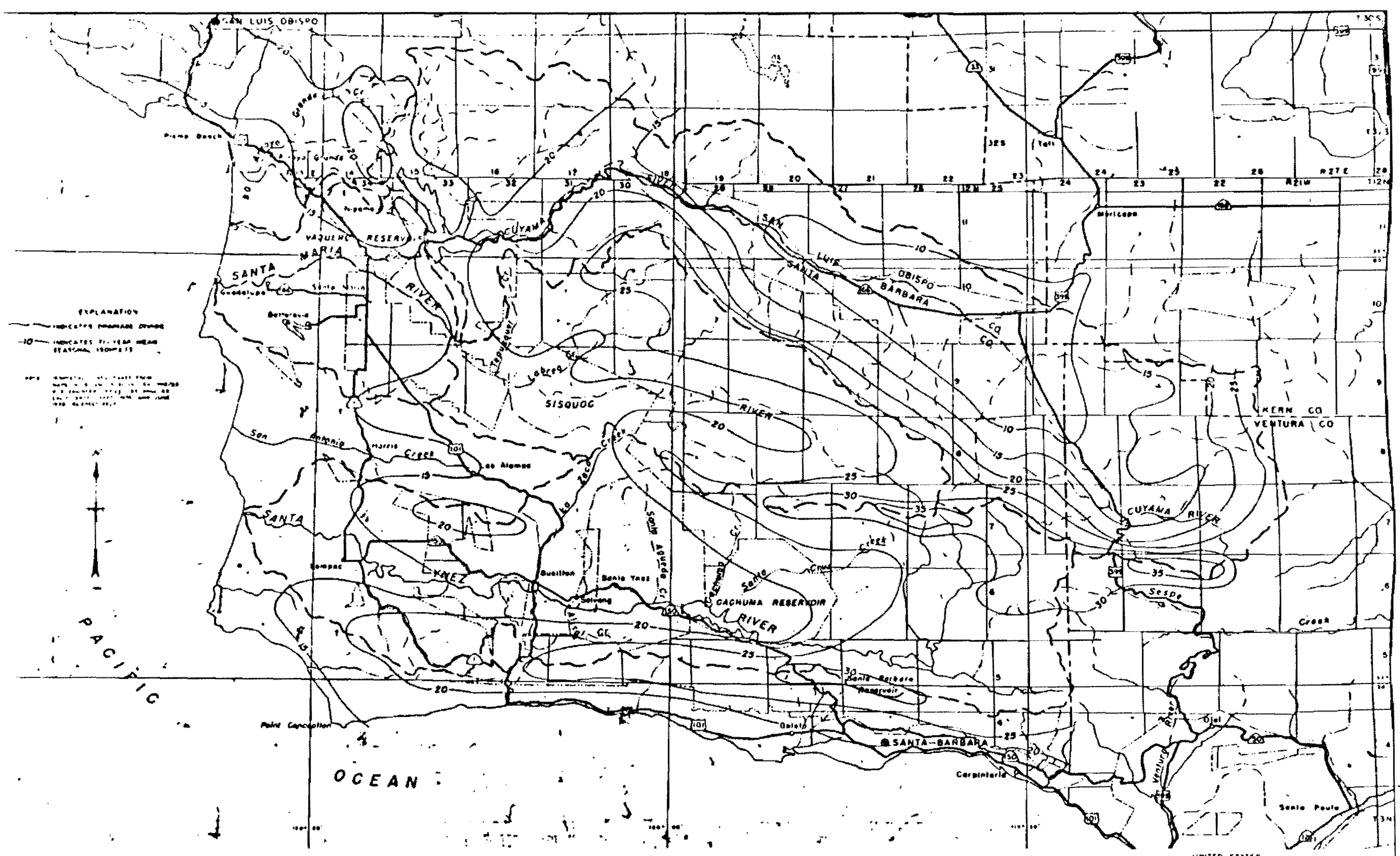
AM 00816

PLATE I



AM 00817

PLATE 2

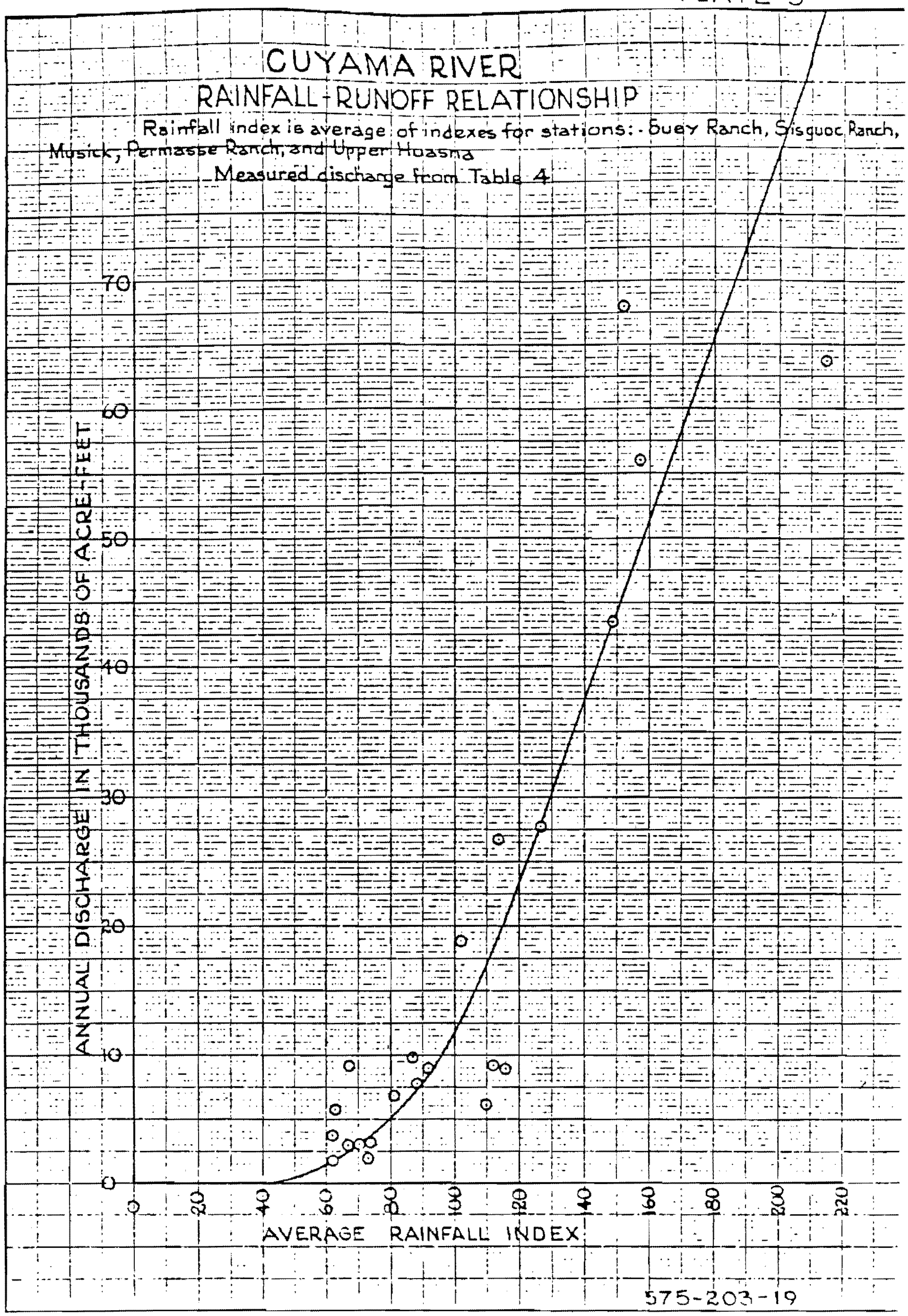


UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SANTA MARIA PROJECT – CALIFORNIA

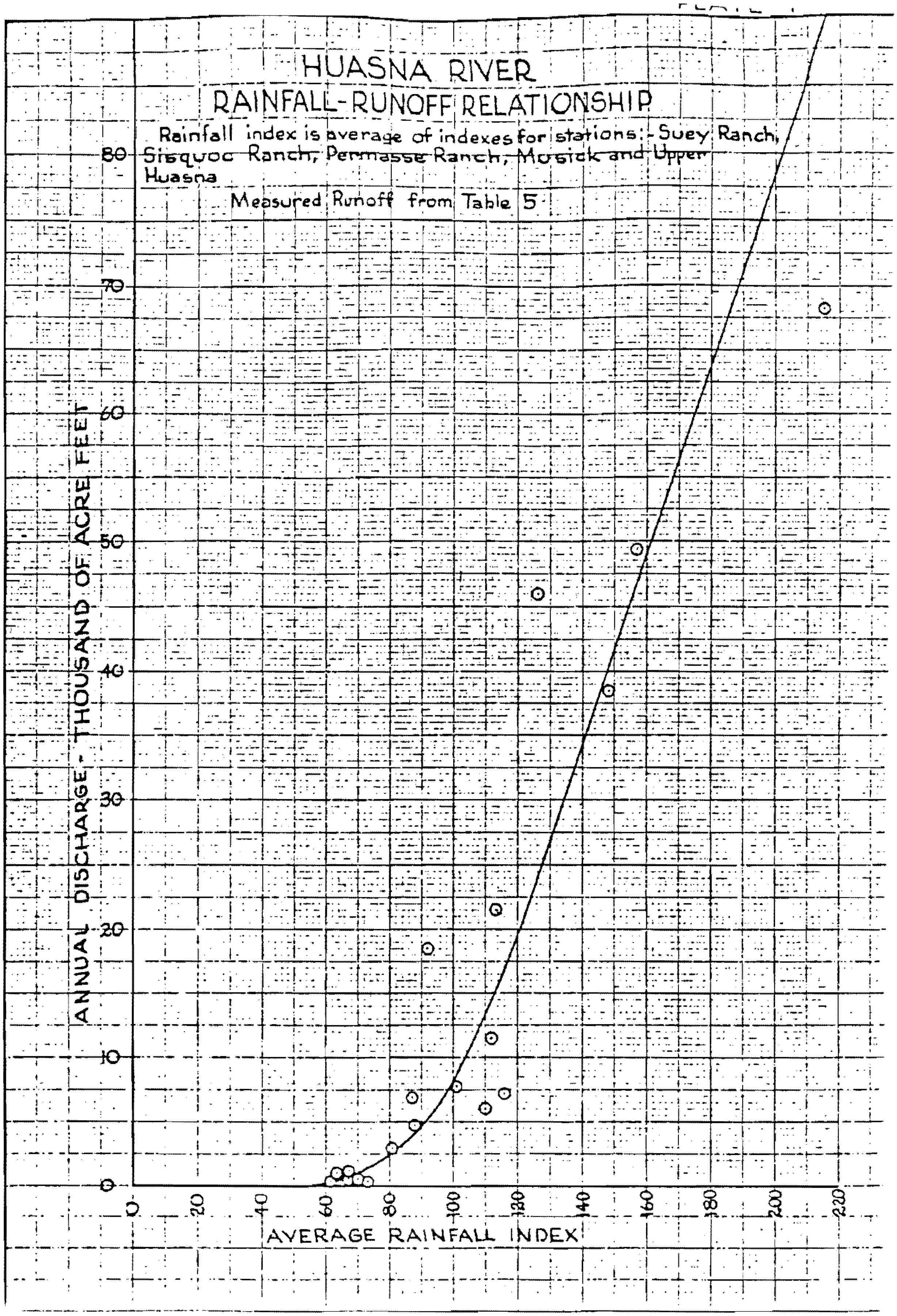
ISOHYETS
71-YEAR MEAN SEASONAL RAINFALL
1867-1938

575-208-20

AM 00818

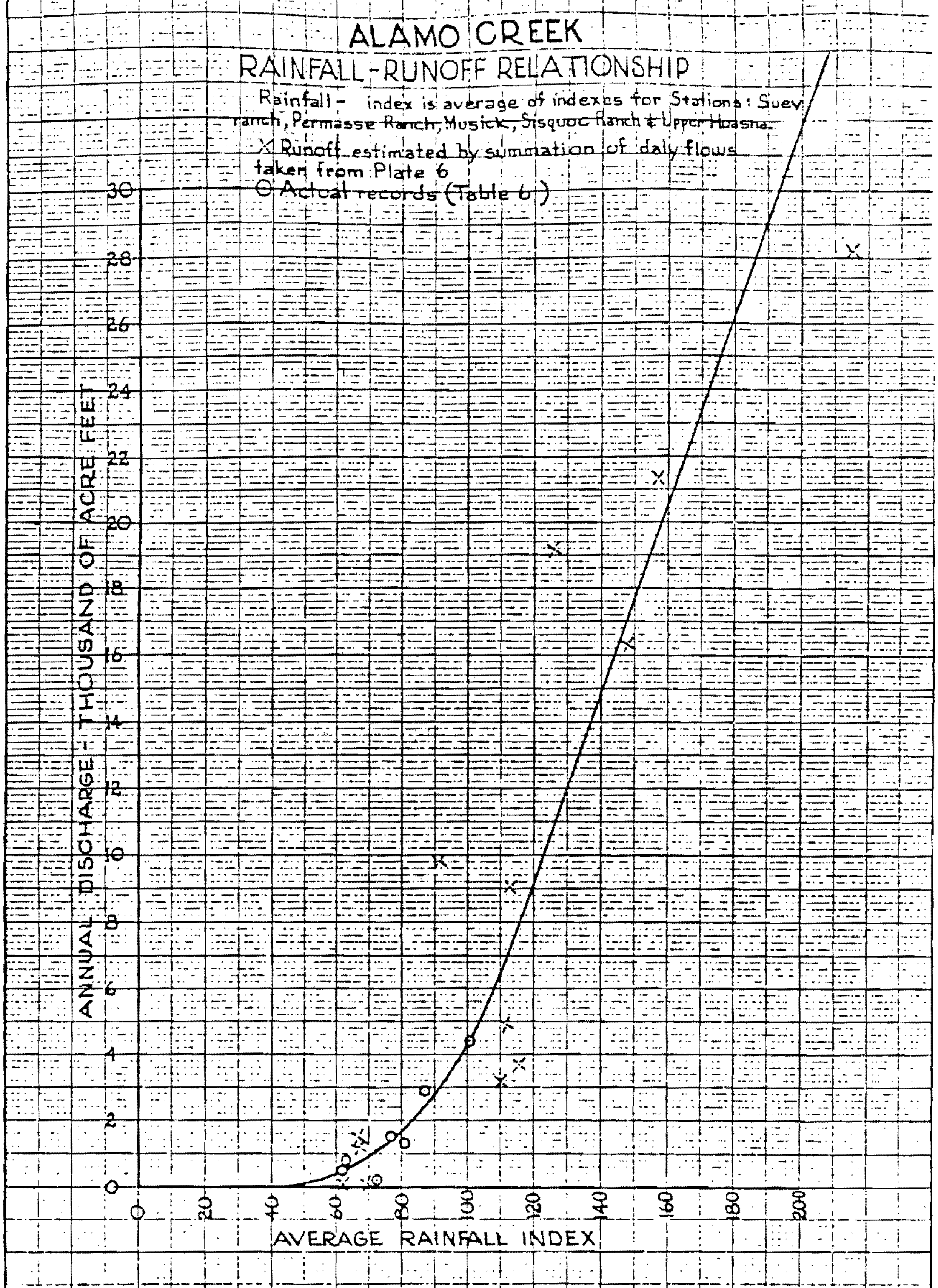

CUYAMA RIVER
RAINFALL-RUNOFF RELATIONSHIP
Rainfall index is average of indexes for stations: - Suey Ranch, Sisquoc Ranch, Musick, Permasse Ranch, and Upper Huasna
Measured discharge from Table 4
ANNUAL DISCHARGE IN THOUSANDS OF ACRE-FEET
0
10
20
30
40
50
60
70
0
20
40
60
80
100
120
140
160
180
200
220
AVERAGE RAINFALL INDEX
575-203-19

AM 00819


HUASNA RIVER
RAINFALL-RUNOFF RELATIONSHIP
Rainfall index is average of indexes for stations:- Suey Ranch, Sisquoc Ranch, Permasse Ranch, Mosick and Upper Huasna
Measured Runoff from Table 5
ANNUAL DISCHARGE - THOUSAND OF ACRE FEET
AVERAGE RAINFALL INDEX
0
10
20
30
40
50
60
70
80
0
20
40
60
80
100
120
140
160
180
200
220

AM 00820

PLATE 5



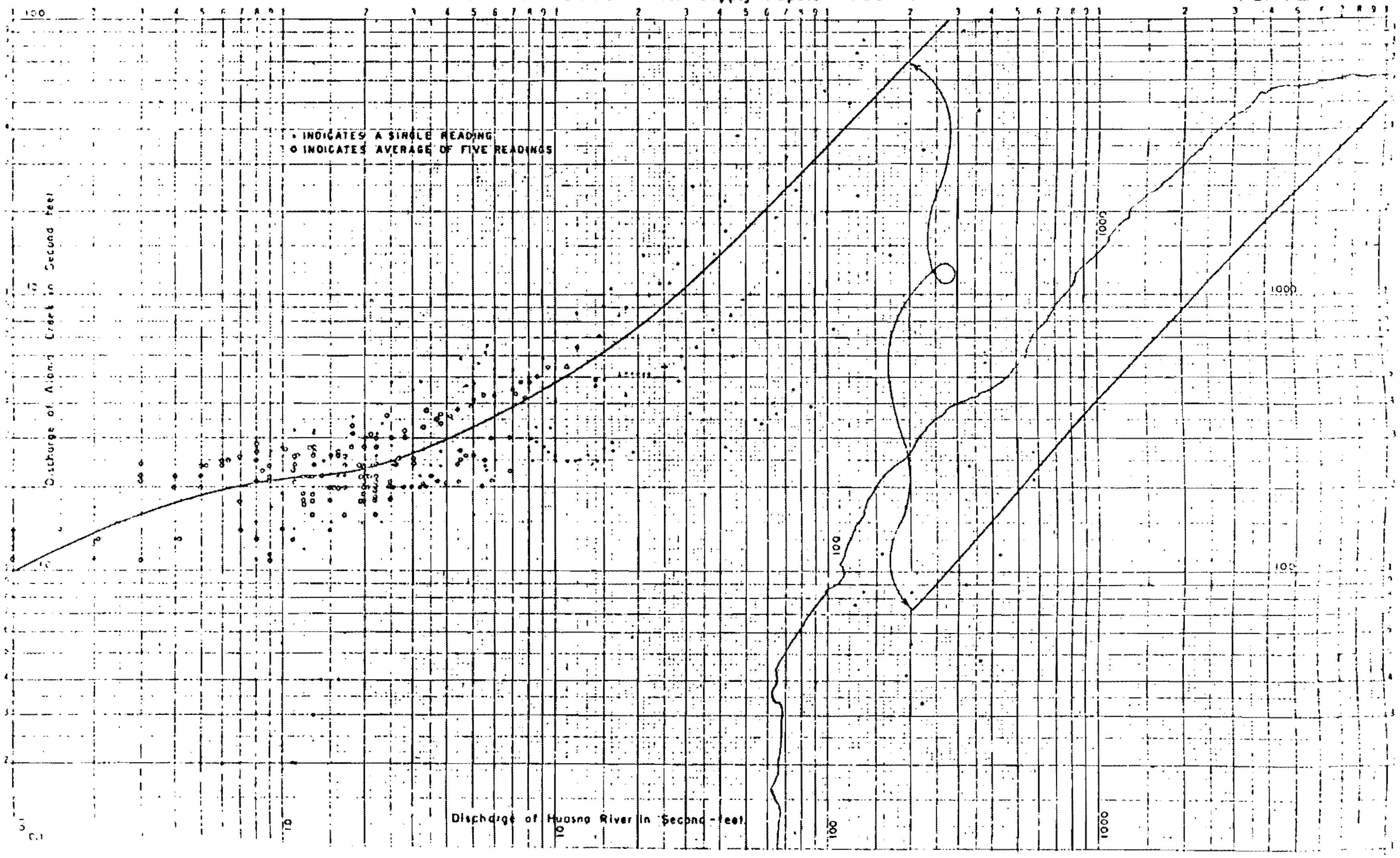
575-203-21

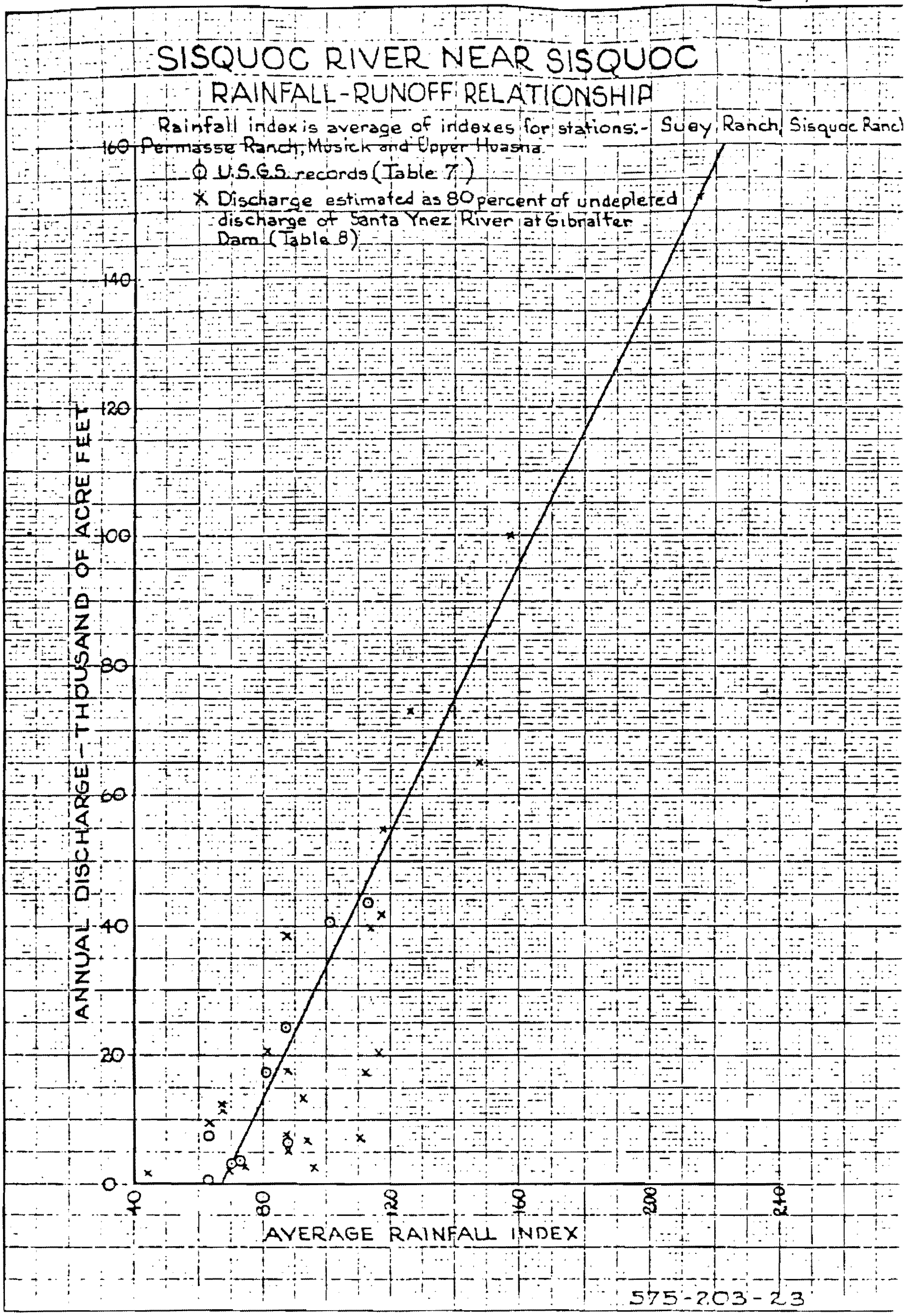
AM 00821

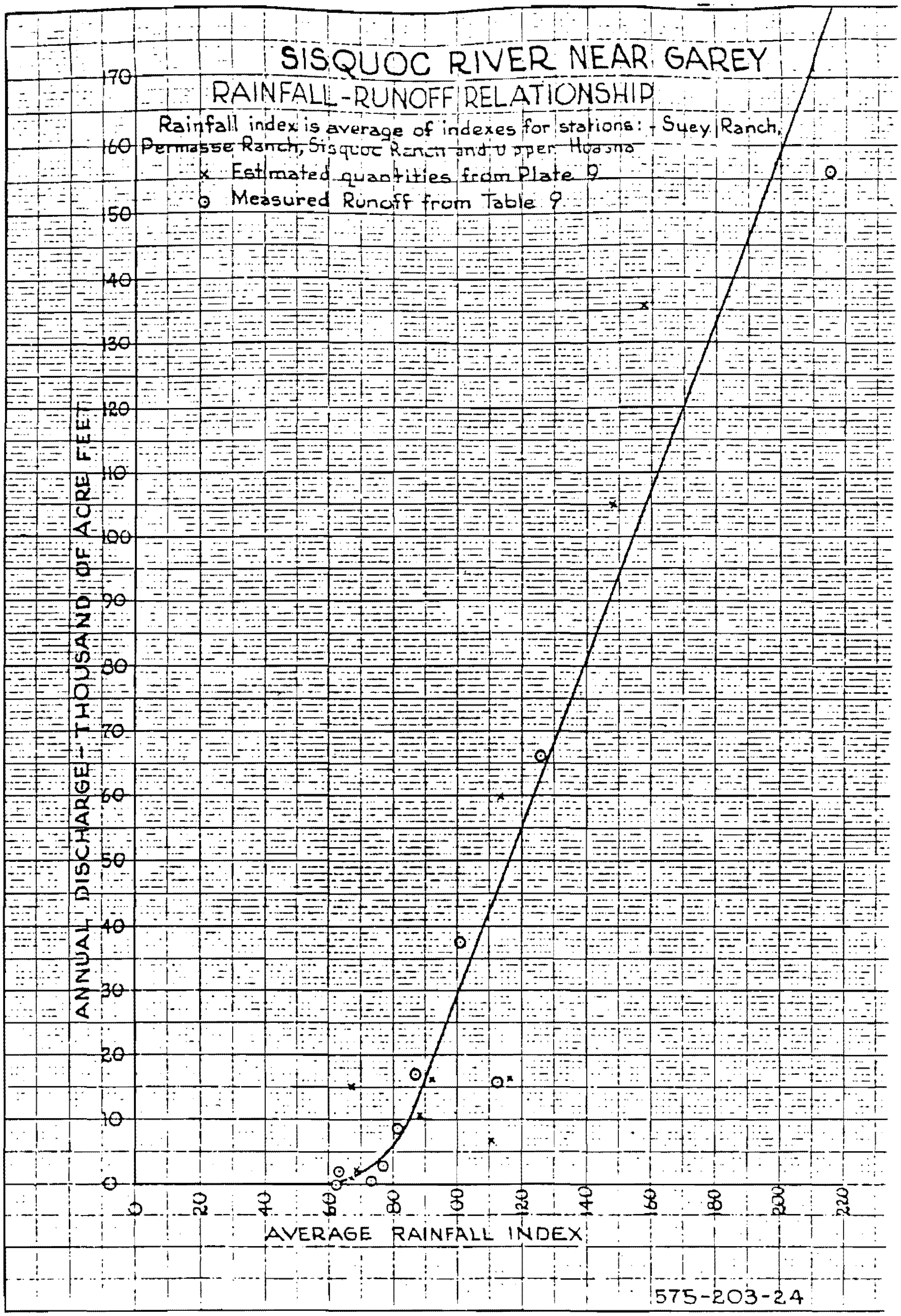
RELATIONSHIP OF DAILY DISCHARGE OF HUASNA RIVER WITH ALAMO CREEK

Data from USGS Water Supply Papers 1930 - 1947

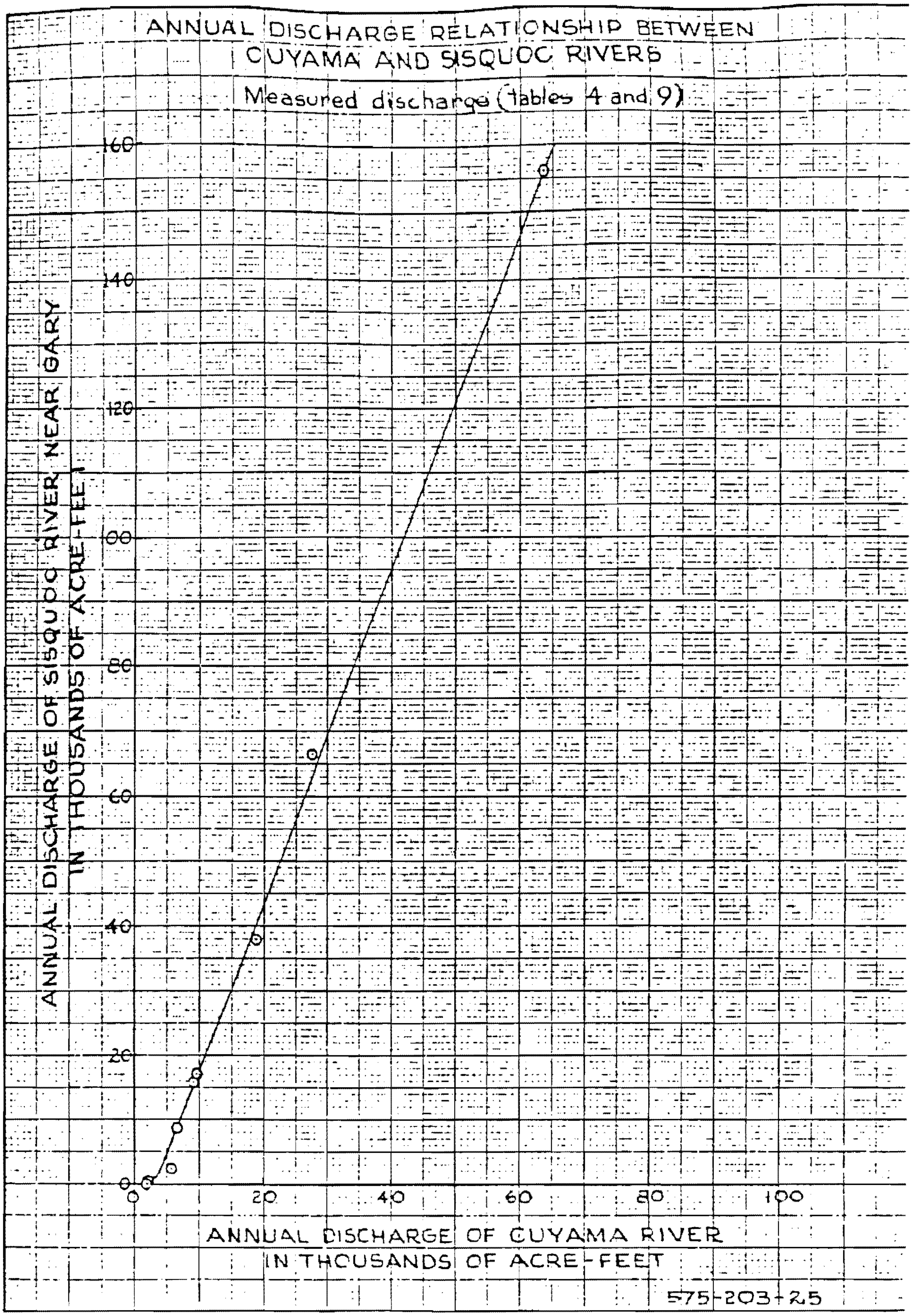
PLATE 6




SISQUOC RIVER NEAR SISQUOC
RAINFALL-RUNOFF RELATIONSHIP
Rainfall index is average of indexes for stations:- Suey Ranch, Sisquoc Ranch, Permasse Ranch, Musick and Upper Huasna.
⊙ U.S.G.S. records (Table 7)
X Discharge estimated as 80 percent of undepleted discharge of Santa Ynez River at Gibraltar Dam (Table 8)
ANNUAL DISCHARGE - THOUSAND OF ACRE FEET
AVERAGE RAINFALL INDEX
0
20
40
60
80
100
120
140
160
40
80
120
160
200
240
575-203-23


SISQUOC RIVER NEAR GAREY
RAINFALL-RUNOFF RELATIONSHIP
Rainfall index is average of indexes for stations: - Suey Ranch, Permasse Ranch, Sisquoc Ranch and Upper Huasna
x Estimated quantities from Plate 9
⊙ Measured Runoff from Table 9
ANNUAL DISCHARGE - THOUSAND OF ACRE FEET
AVERAGE RAINFALL INDEX
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
200
220
575-203-24

AM 00824



ANNUAL DISCHARGE RELATIONSHIP BETWEEN
CUYAMA AND SISQUOC RIVERS
Measured discharge (tables 4 and 9)
ANNUAL DISCHARGE OF SISQUOC RIVER NEAR GARY
IN THOUSANDS OF ACRE-FEET
160
140
120
100
80
60
40
20
0
0
20
40
60
80
100
ANNUAL DISCHARGE OF CUYAMA RIVER
IN THOUSANDS OF ACRE-FEET
575-203-25

AM 00825

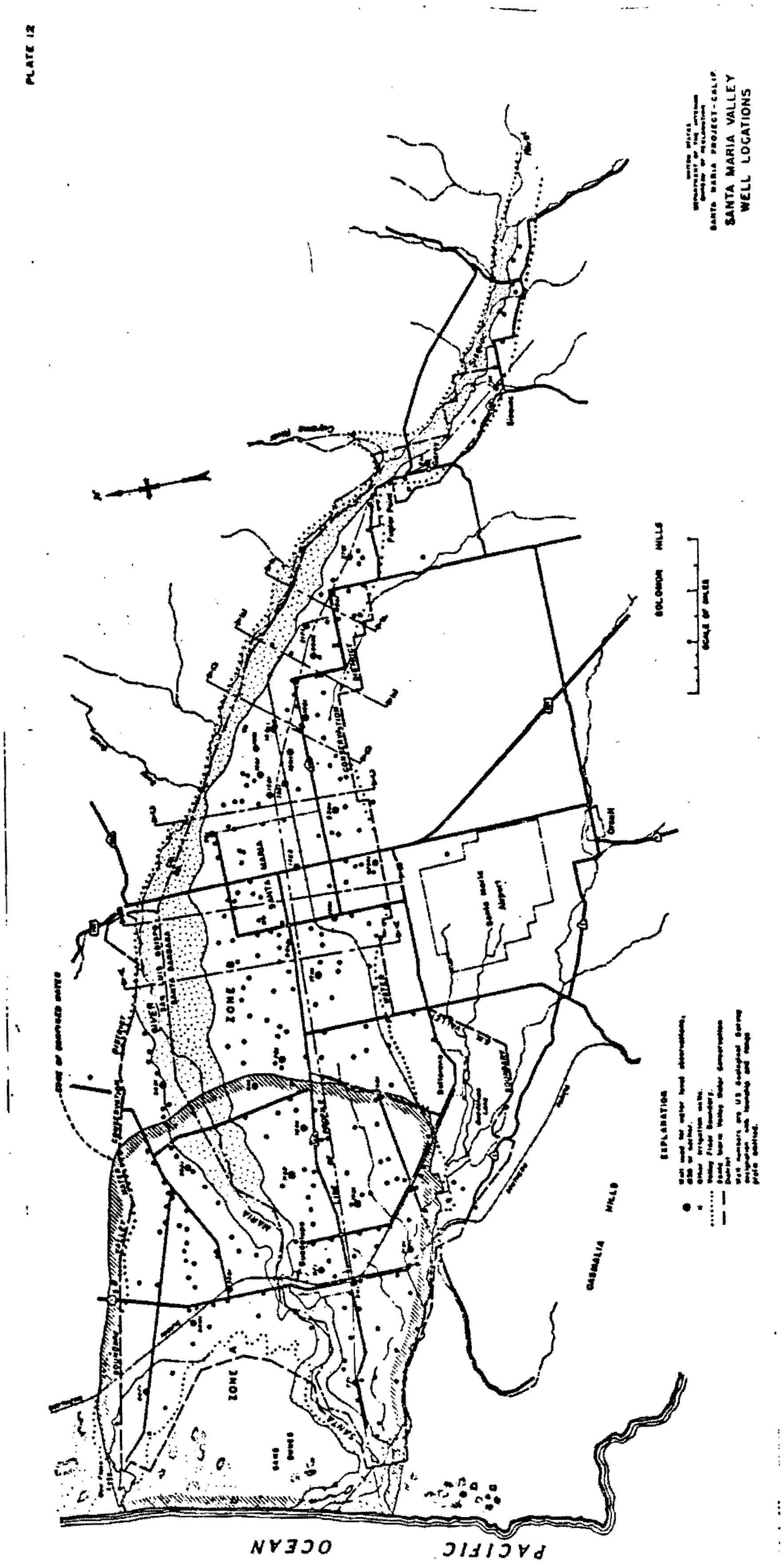
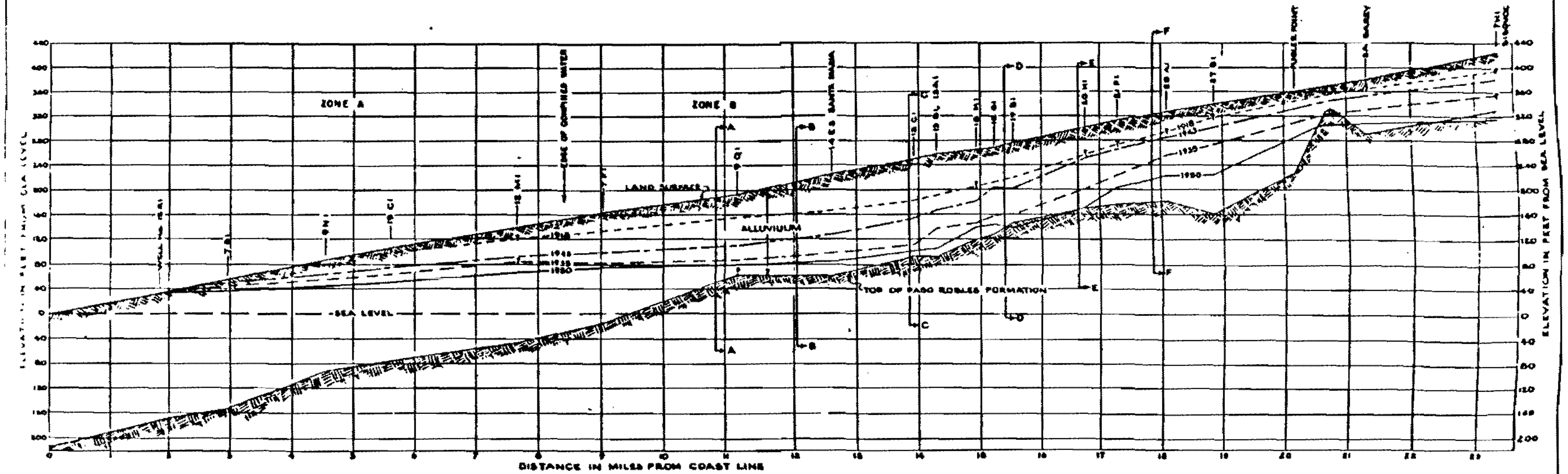


PLATE 12
SANTA MARIA PROJECT - CALIF.
SANTA MARIA VALLEY
WELL LOCATIONS
SOLOMON HILLS
CASMALIA HILLS
ZONE 1
ZONE 2
PACIFIC OCEAN

AM 00826

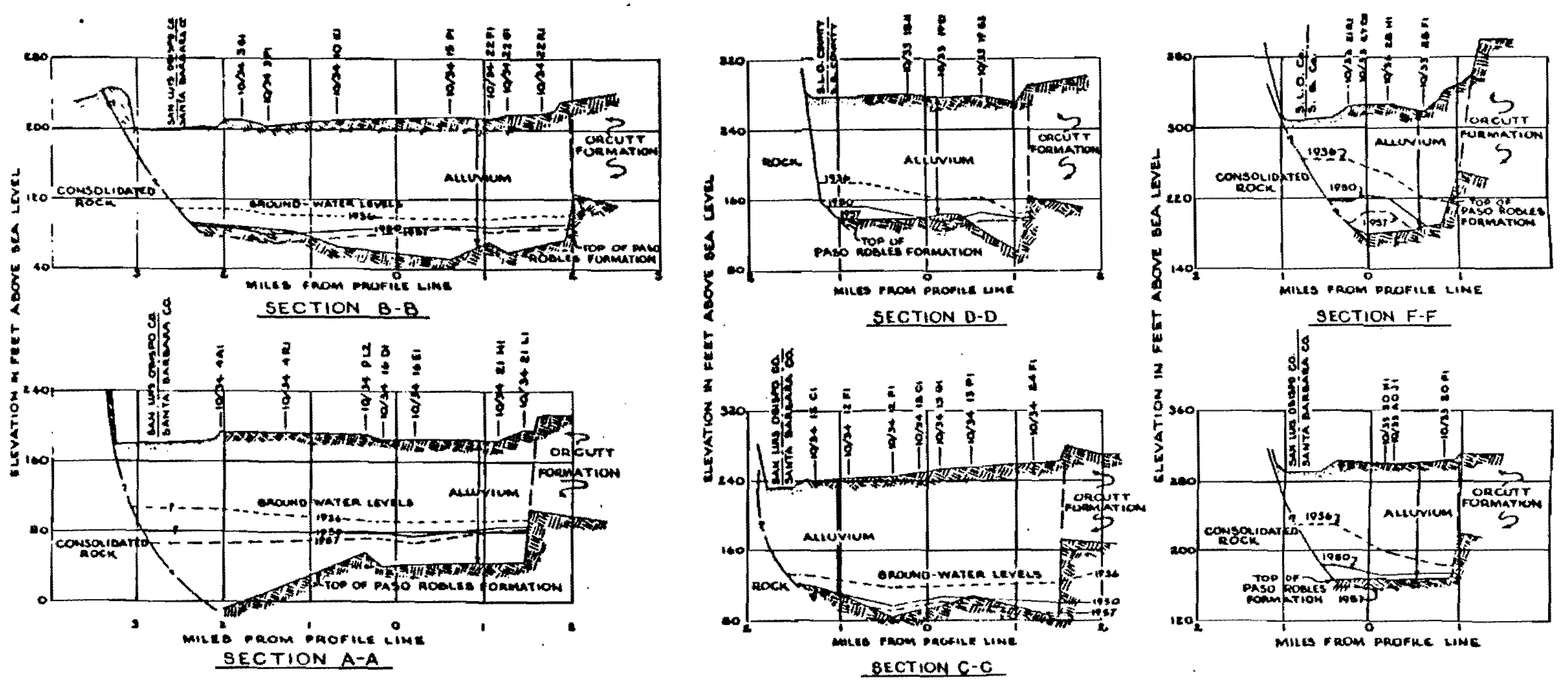


NOTES

Profile location shown on Plan (Plate 3).
Cross-sections shown on Plate 5

SANTA MARIA PROJECT

GROUNDWATER PROFILES
SANTA MARIA AND LOWER SISQUOC VALLEYS



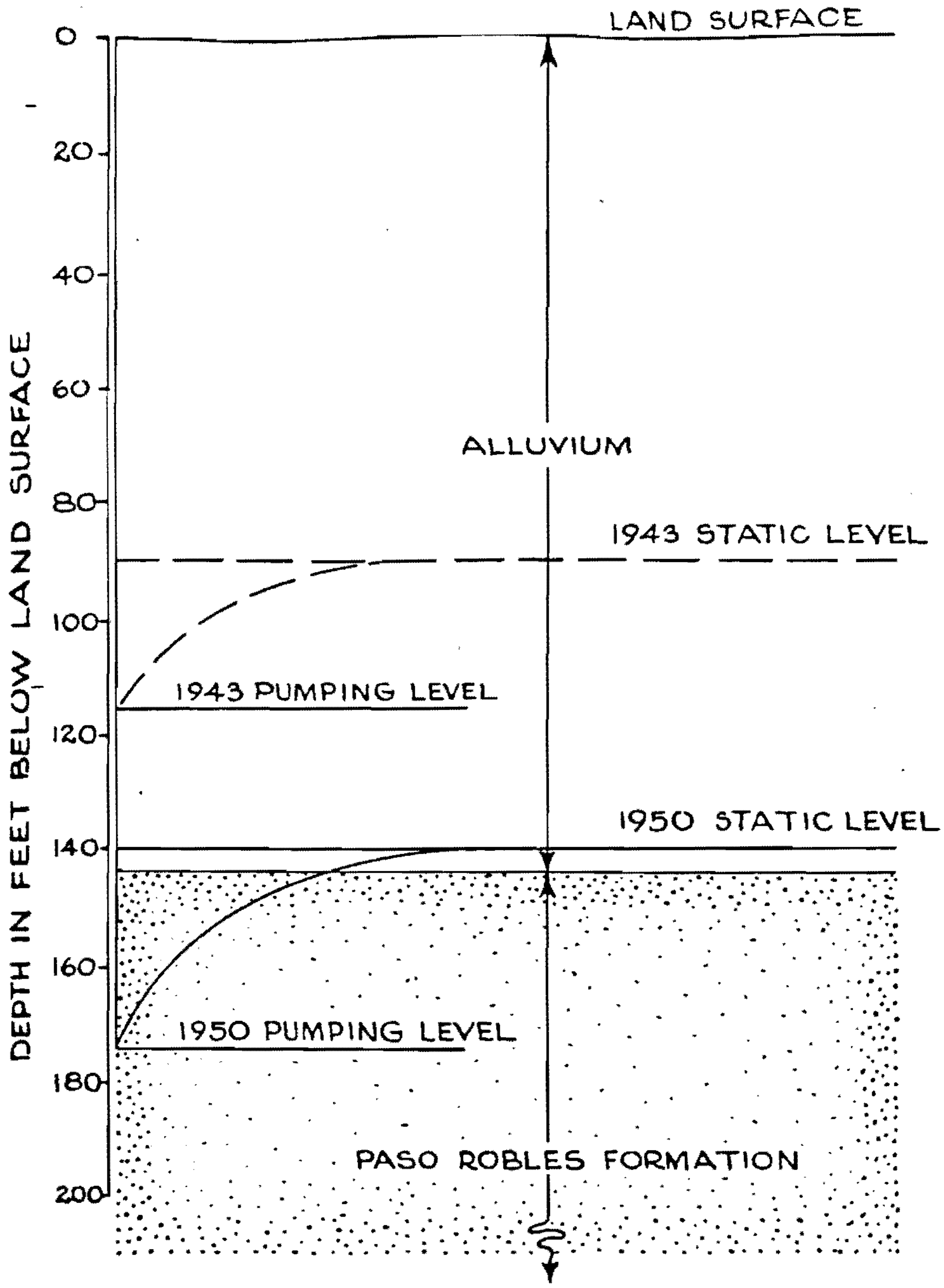
NOTE

Cross-section locations are indicated on both Plan and Profiles. (Plates 3 and 4)

SANTA MARIA PROJECT

GROUNDWATER LEVELS
SANTA MARIA VALLEY

AM 00828



AVERAGE POSITION OF PUMPED WATER SURFACE WITH RESPECT TO PASO ROBLES FORMATION IN 1943 AND 1950

DATA FROM TABLE 14 575-203-27

AM 00829

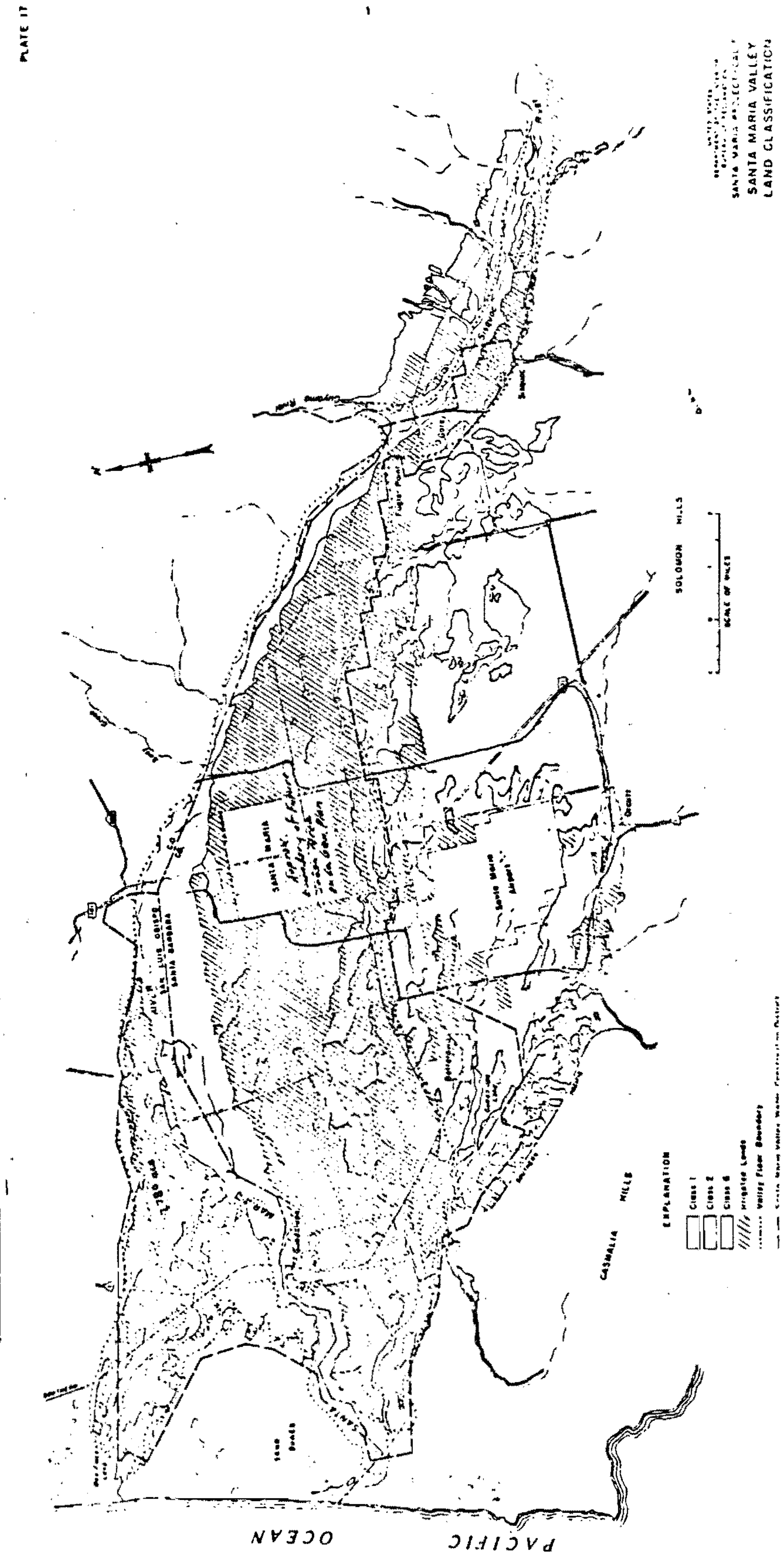


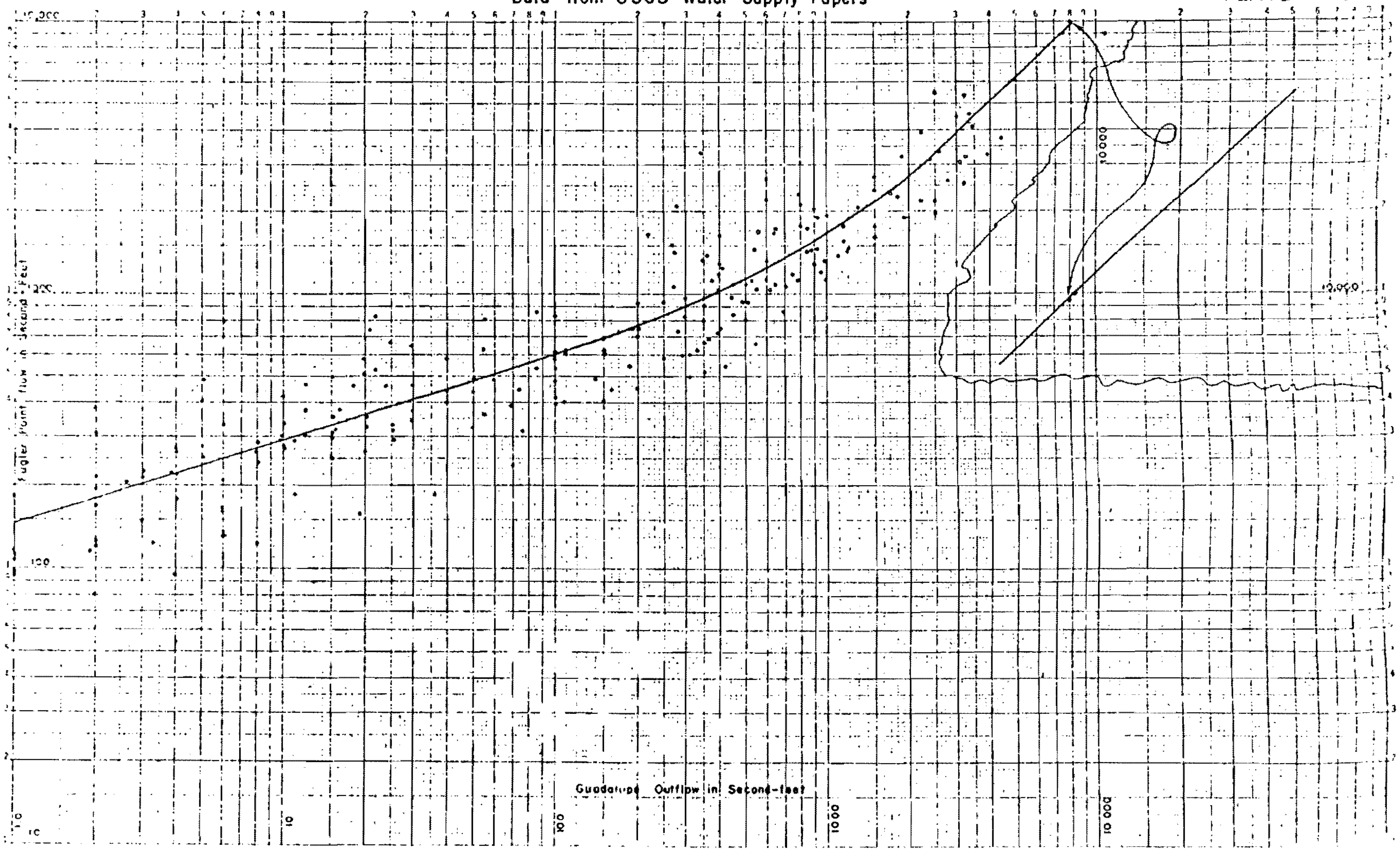
PLATE 17
SANTA MARIA VALLEY
LAND CLASSIFICATION
SOLOMON HILLS
CASMALIA HILLS
EXPLANATION
PACIFIC OCEAN

AM 00830

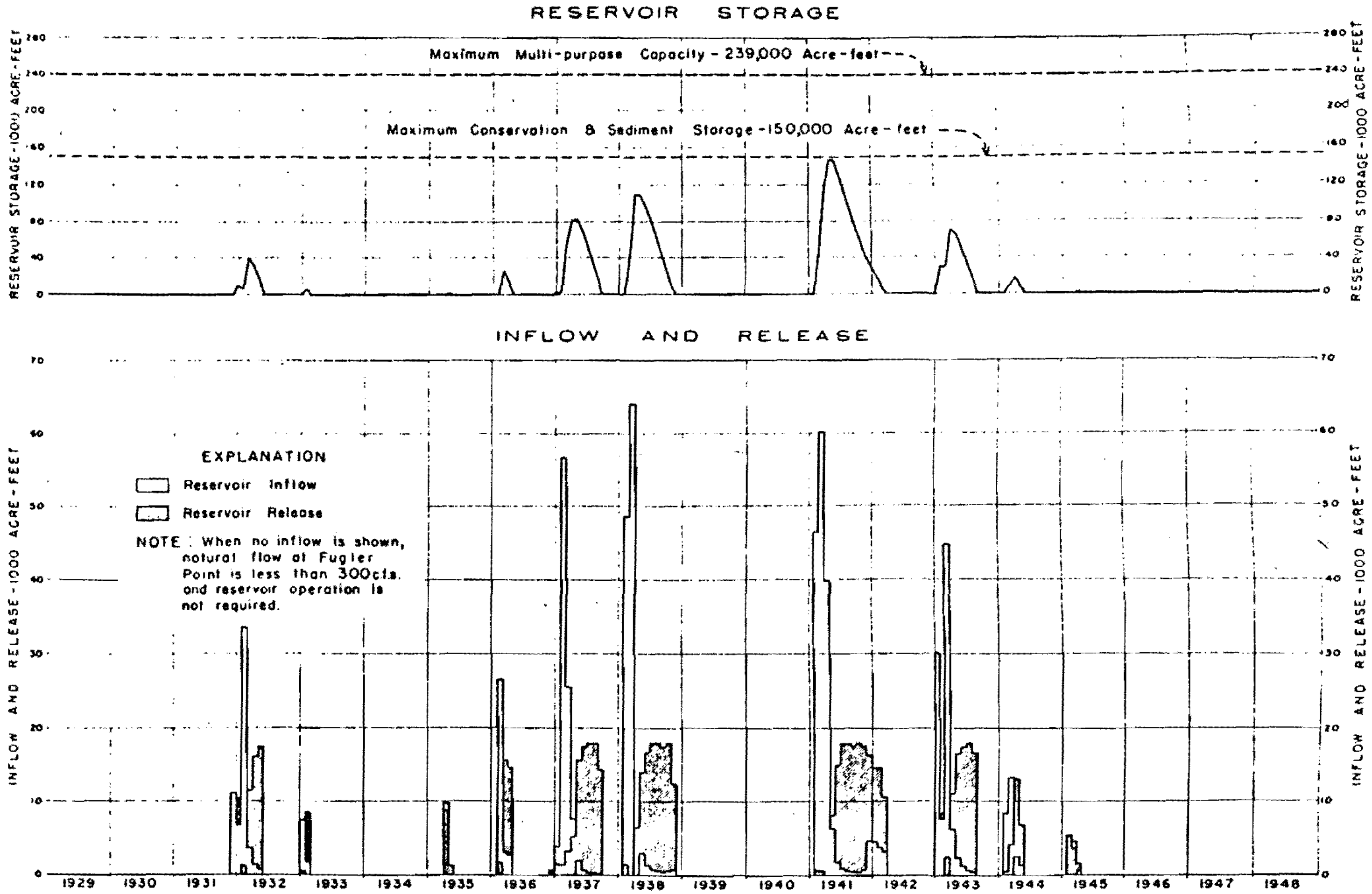
RELATIONSHIP OF DAILY INFLOW WITH OUTFLOW OF SANTA MARIA RIVER AND TRIBUTARIES

Data from USGS Water Supply Papers

PLATE 18

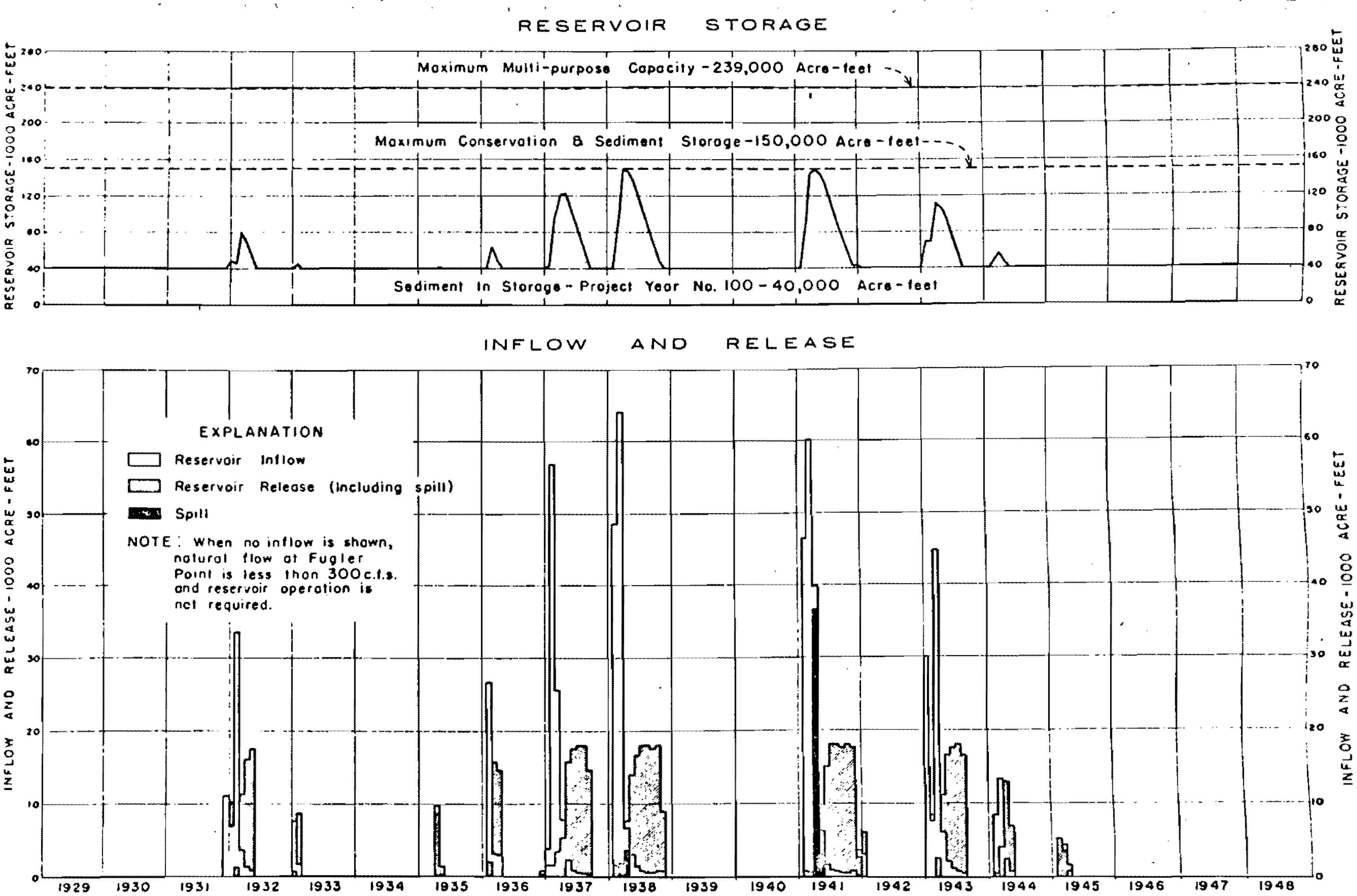


AM 00831



VAQUERO RESERVOIR
Operation for Project Year No. 1
Period of Operation - 1929-30 to 1947-48
Reservoir Capacity - 239,000 Acre-feet

AM 00832



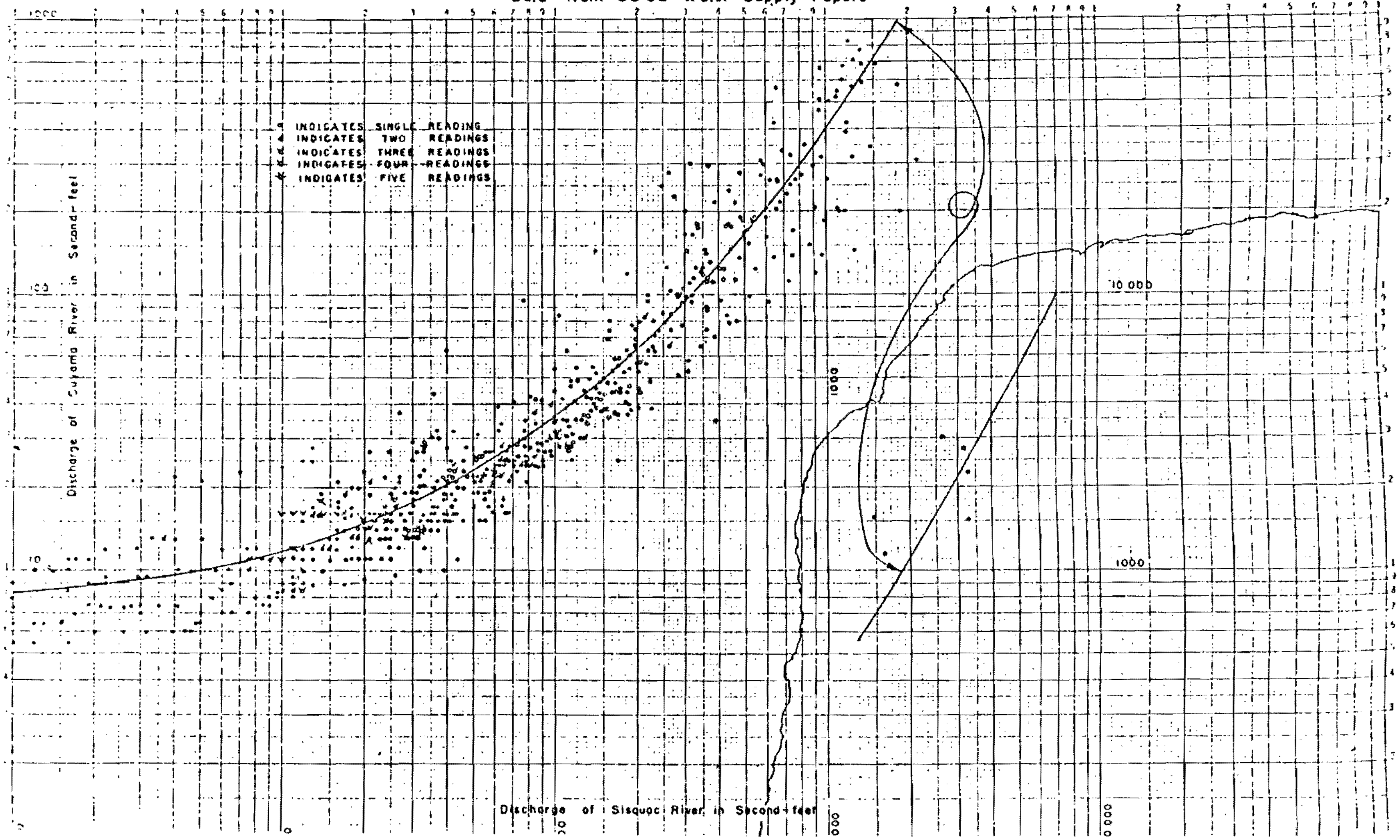
VAQUERO RESERVOIR
Operation for Project Year No. 100
Period of Operation - 1929-30 to 1947-48
Reservoir Capacity - 239,000 Acre-feet

AM 00833

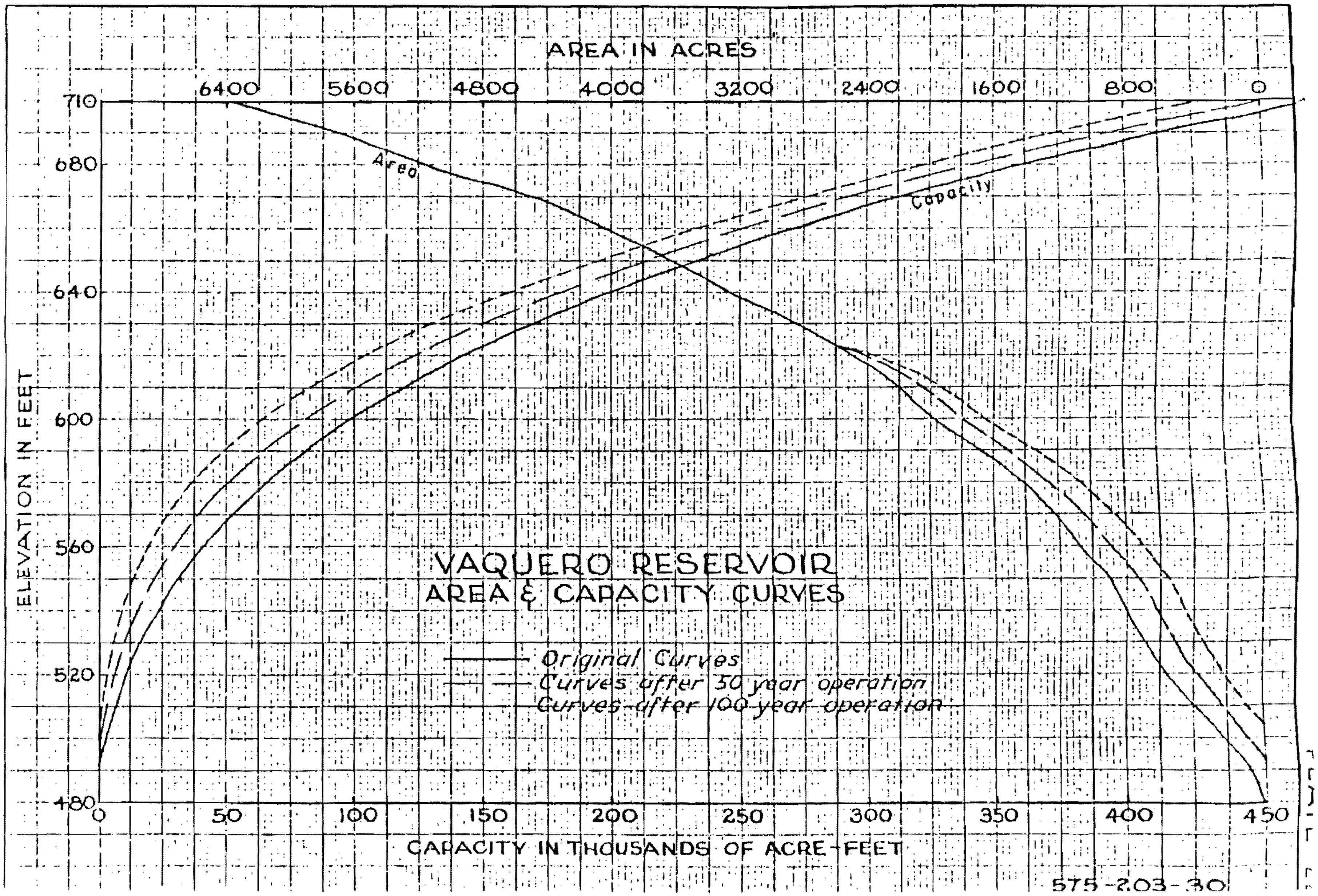
PLATE 21

RELATIONSHIP OF DAILY DISCHARGE OF SISQUOC RIVER NEAR GAREY AND CUYAMA RIVER 10 MILES NORTHEAST OF SANTA MARIA

Data from USGS Water Supply Papers

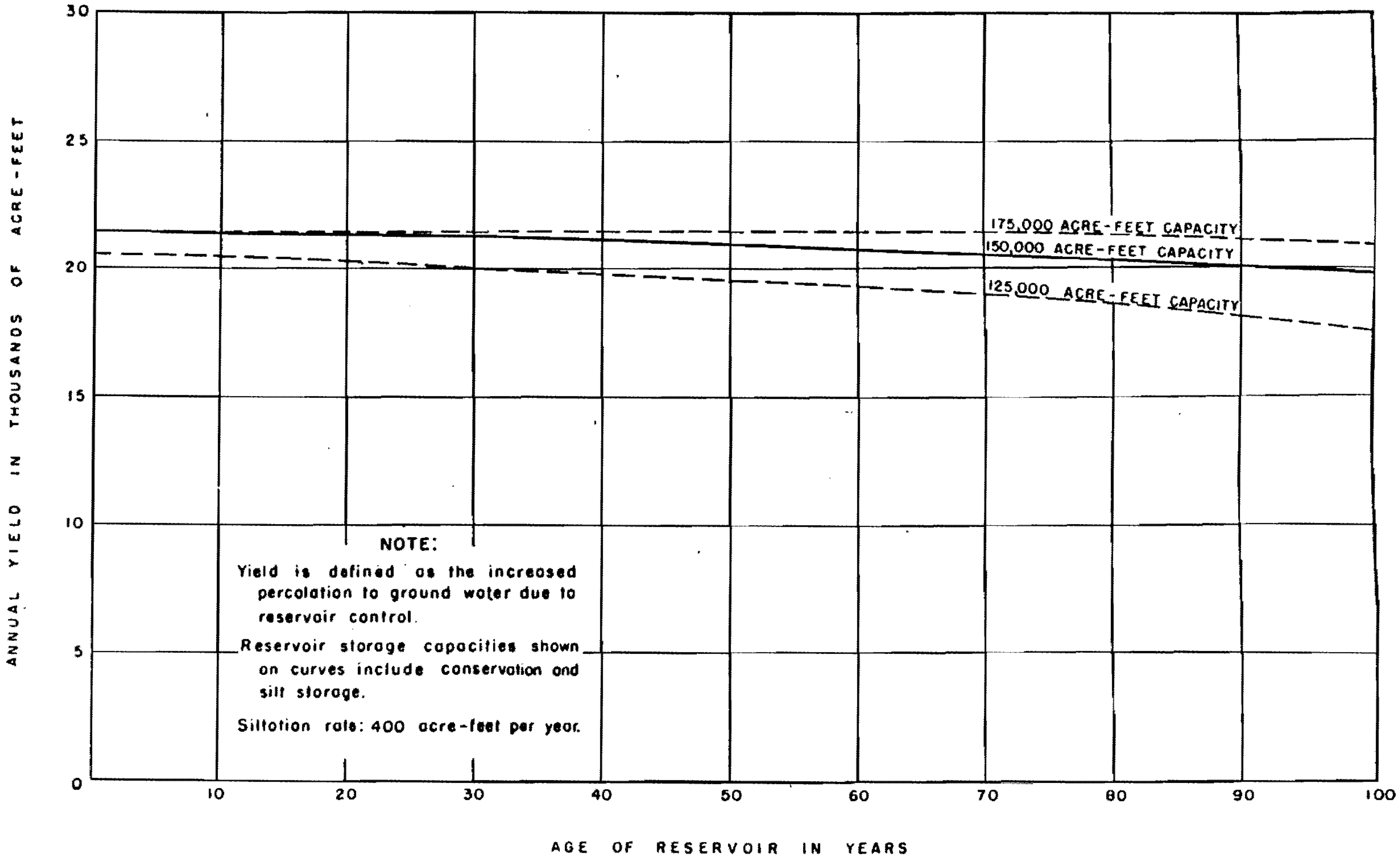


AM 00834


AREA IN ACRES
6400
5600
4800
4000
3200
2400
1600
800
0
710
680
640
600
560
520
480
ELEVATION IN FEET
Area
Capacity
VAQUERO RESERVOIR
AREA & CAPACITY CURVES
Original Curves
Curves after 30 year operation
Curves after 100 year operation
0
50
100
150
200
250
300
350
400
450
CAPACITY IN THOUSANDS OF ACRE-FEET
575-203-30

AM 00835

AGE-YIELD RELATIONSHIP OF VAQUERO RESERVOIR



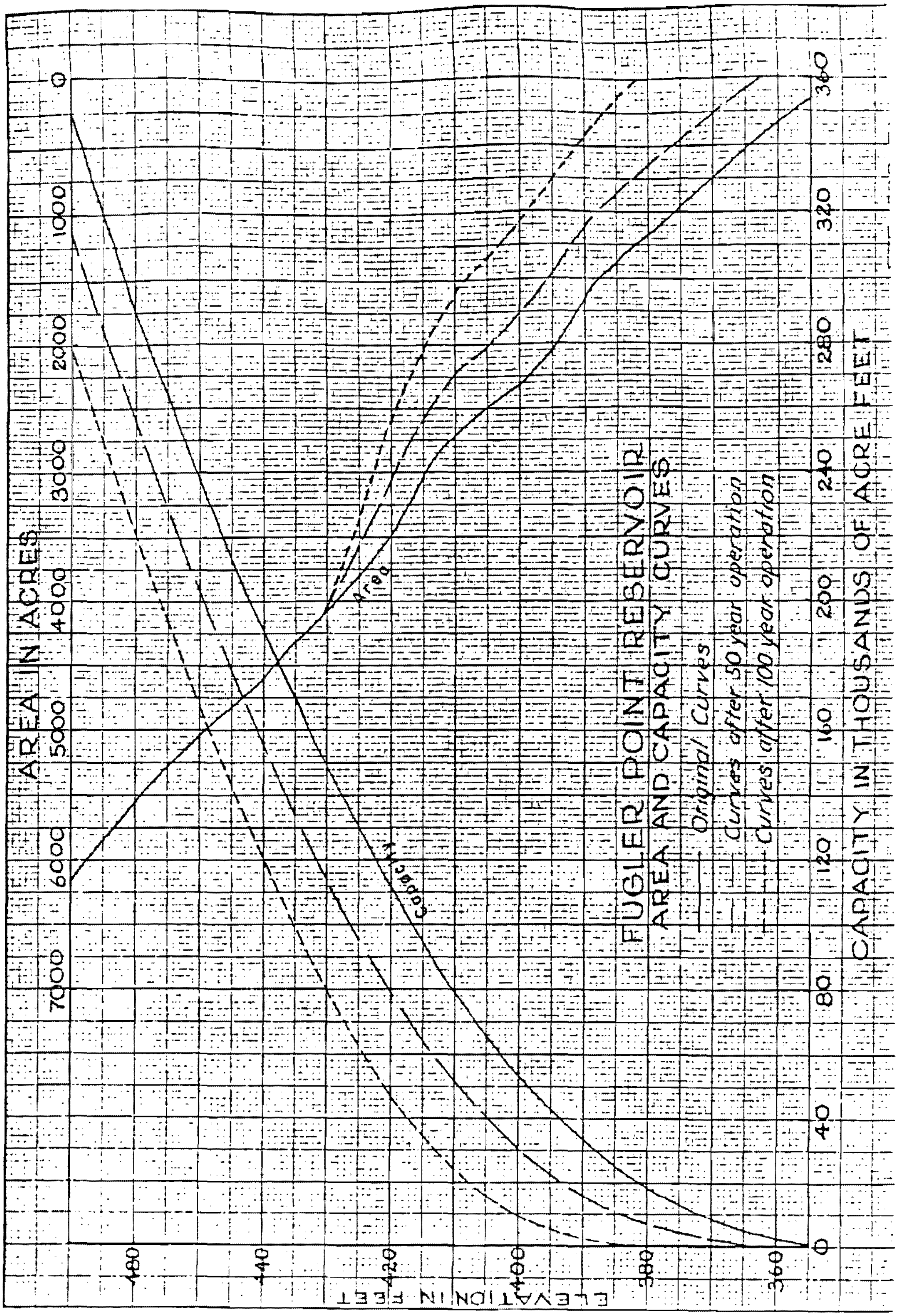
AM 00836

PLATE 2

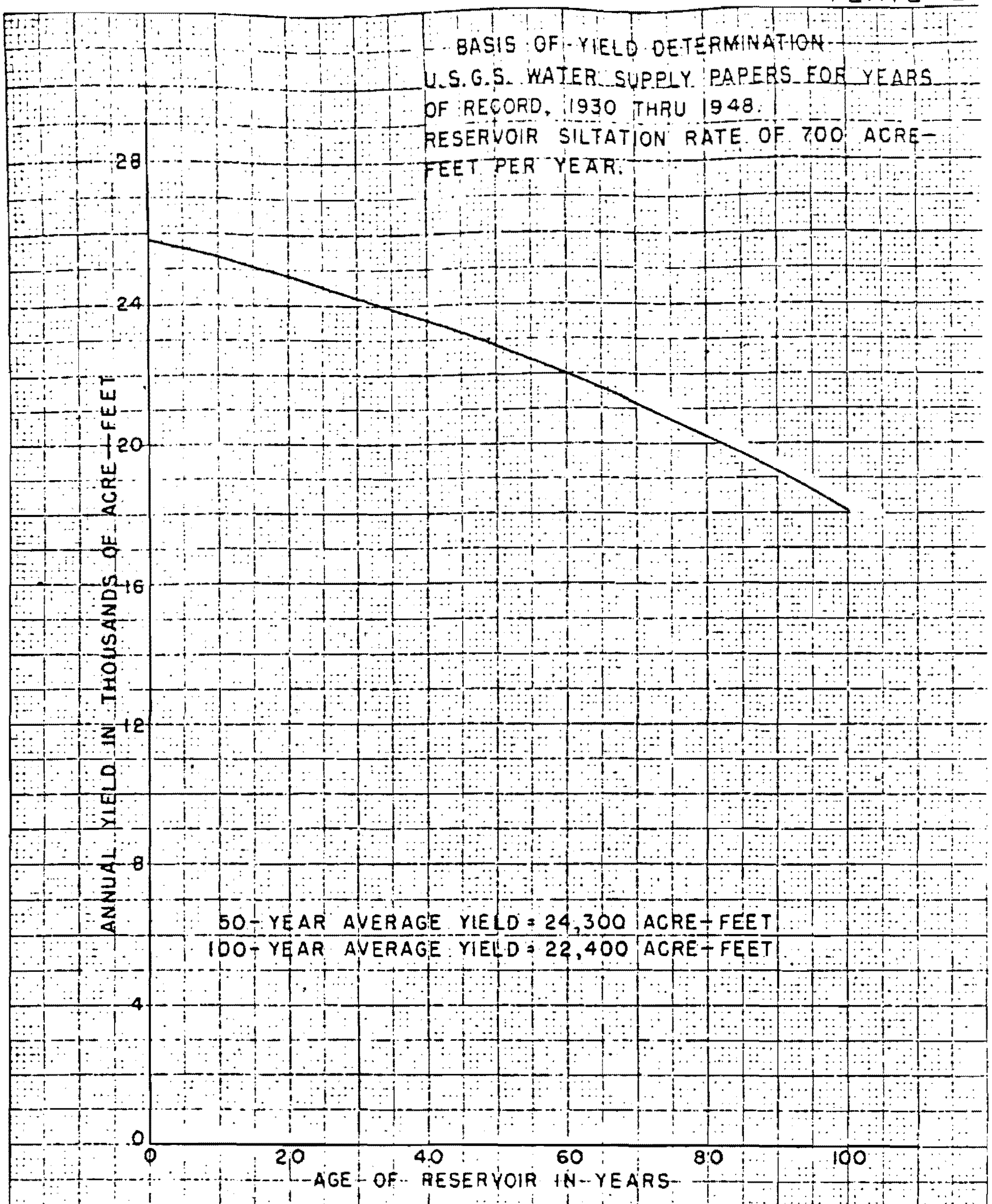
MAY 1955

GPO 989478

575-208-15

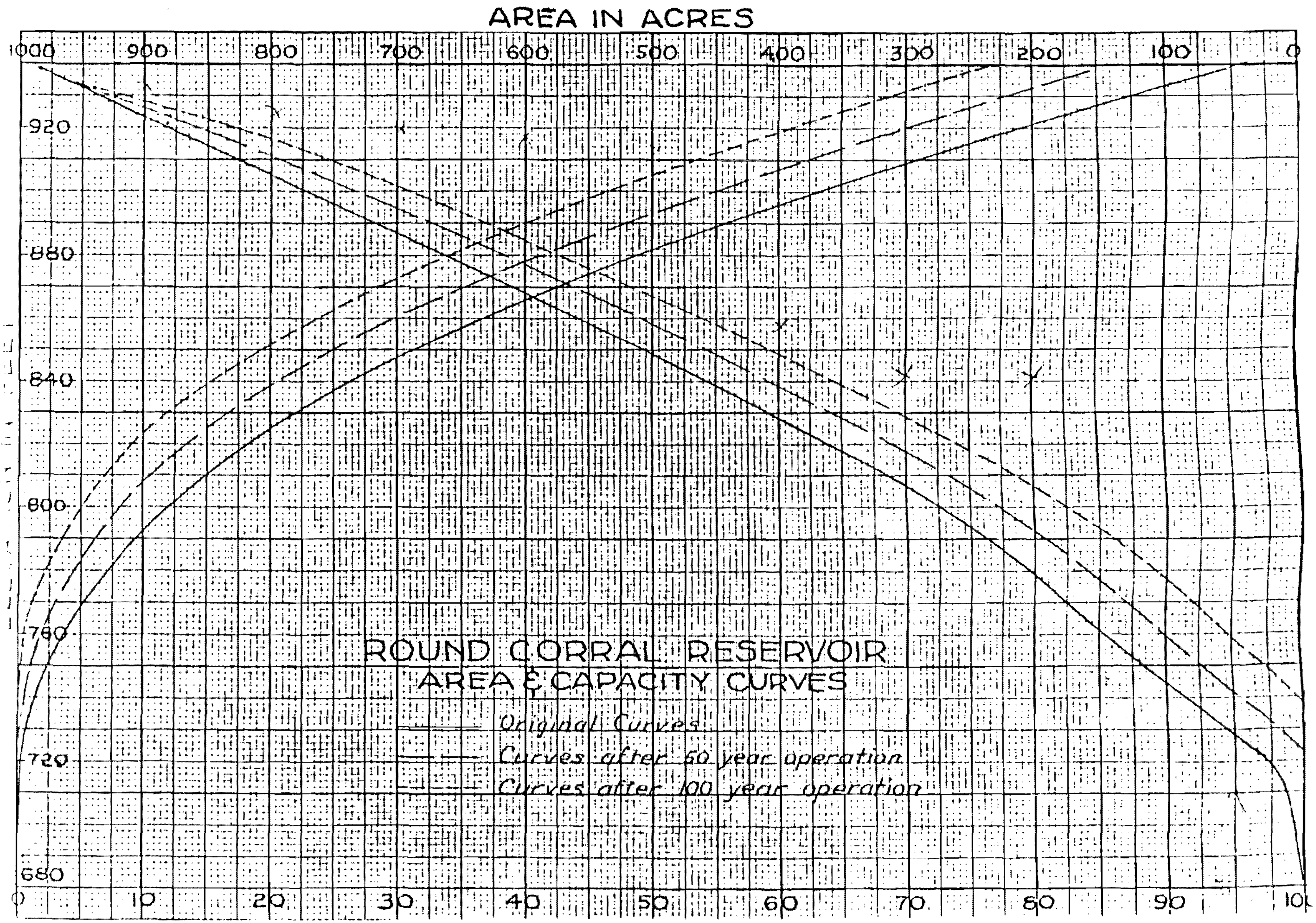

FUGLER POINT RESERVOIR
AREA AND CAPACITY CURVES
Original Curves
Curves after 50 year operation
Curves after 100 year operation
AREA IN ACRES
7000
6000
5000
4000
3000
2000
1000
0
CAPACITY IN THOUSANDS OF ACRE FEET
0
40
80
120
160
200
240
280
320
360
ELEVATION IN FEET
360
380
400
420
440
460
480
Area
Capacity

AM 00837

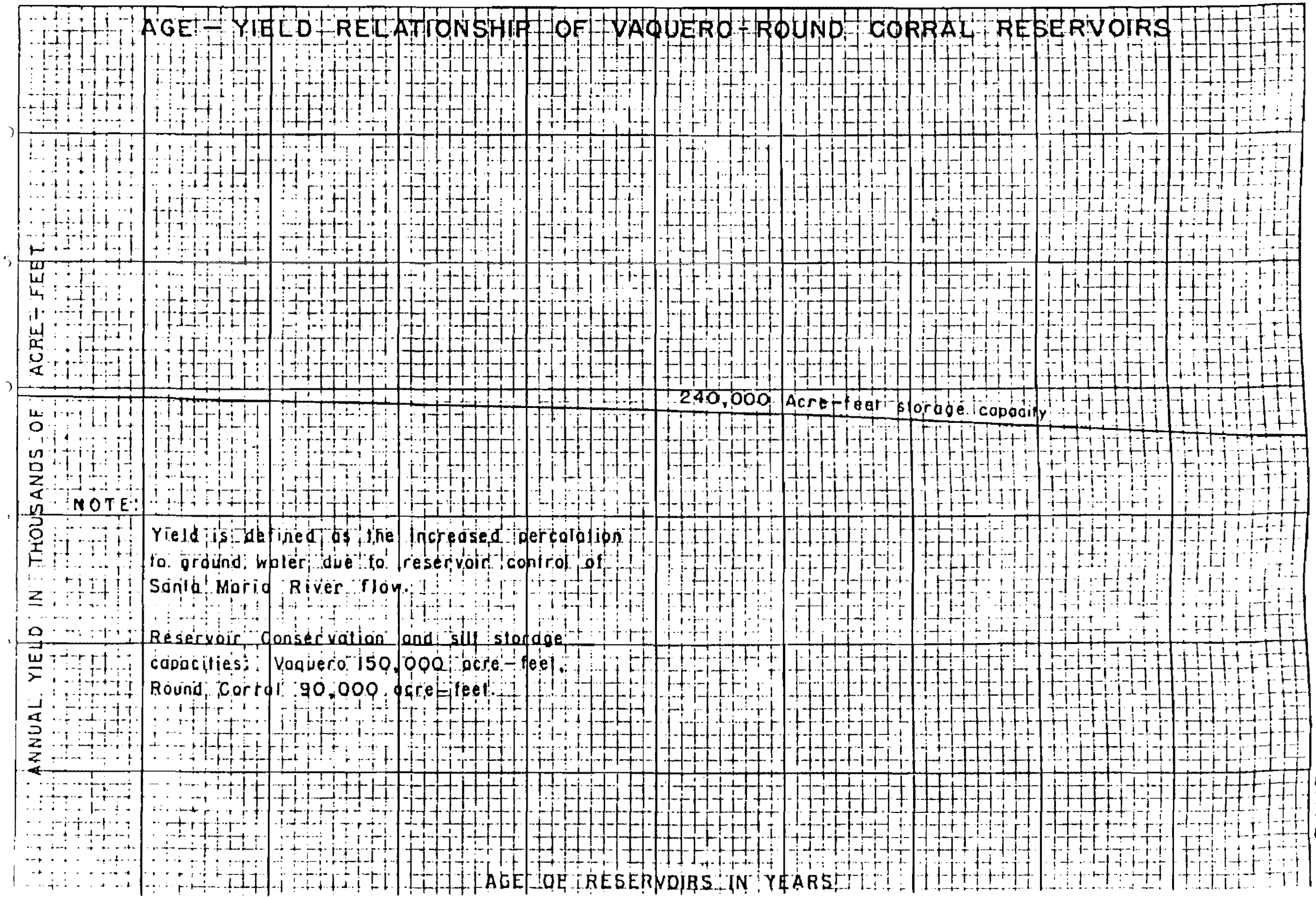


FUGLER POINT RESERVOIR
AGE-YIELD RELATIONSHIP
FOR 150,000 ACRE-FOOT CAPACITY

AM 00838

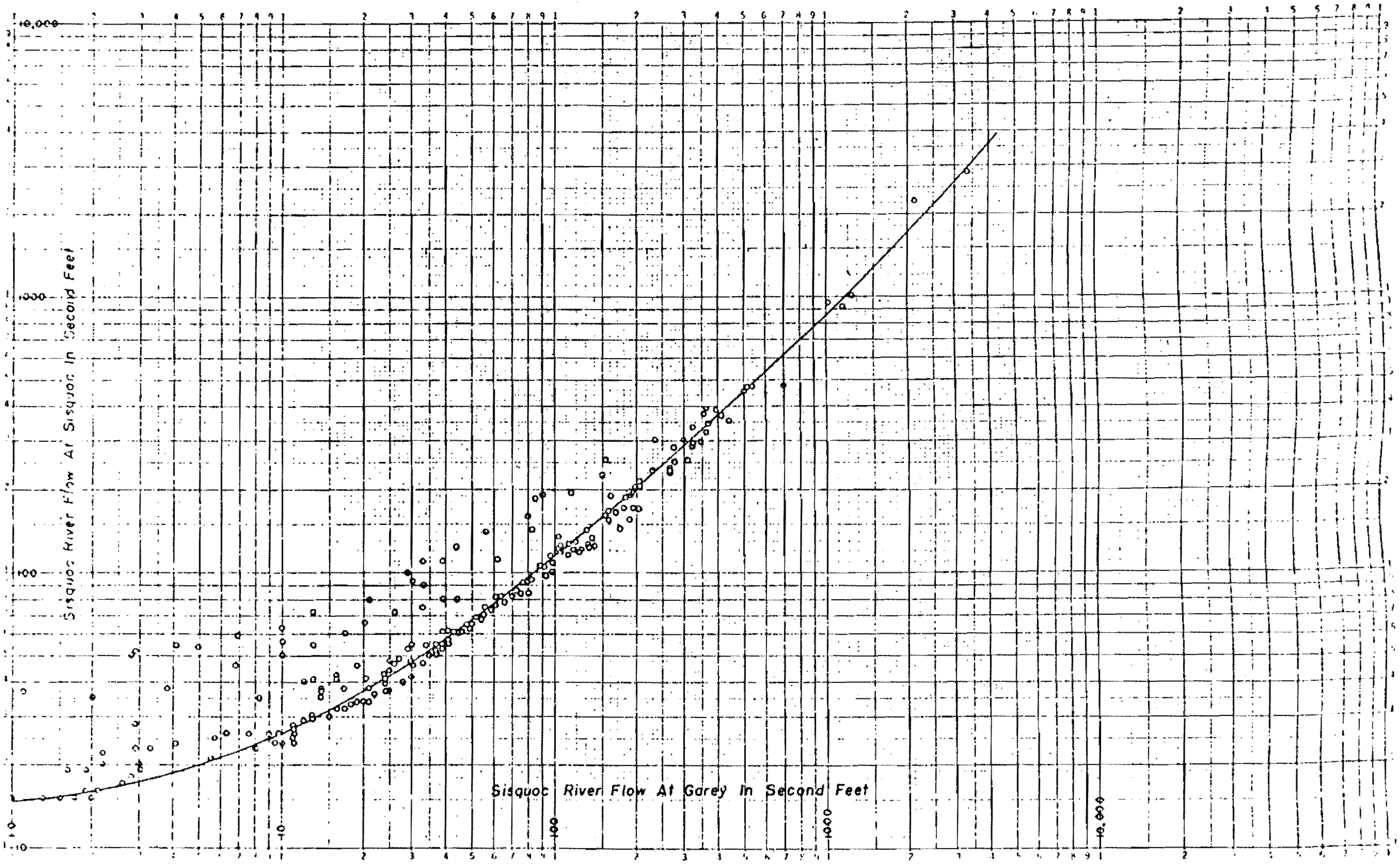

AREA IN ACRES
1000 900 800 700 600 500 400 300 200 100 0
920
880
840
800
760
720
680
0 10 20 30 40 50 60 70 80 90 10
ROUND CORRAL RESERVOIR
AREA & CAPACITY CURVES
Original Curves
Curves after 50 year operation
Curves after 100 year operation

AM 00839


AGE — YIELD RELATIONSHIP OF VAQUERO-ROUND CORRAL RESERVOIRS
ANNUAL YIELD IN THOUSANDS OF ACRE-FEET
240,000 Acre-feet storage capacity
NOTE:
Yield is defined as the increased percolation to ground water due to reservoir control of Santa Maria River flow.
Reservoir Conservation and silt storage capacities: Vaquero 150,000 acre-feet, Round Corral 90,000 acre-feet.
AGE OF RESERVOIRS IN YEARS

DAILY FLOW RELATIONSHIP OF SISQUOC RIVER AT SISQUOC AND GAREY GAGING STATIONS
DATA FROM U.S.G.S. WATER SUPPLY PAPERS

PLATE 28



AM 00841

AM 00842

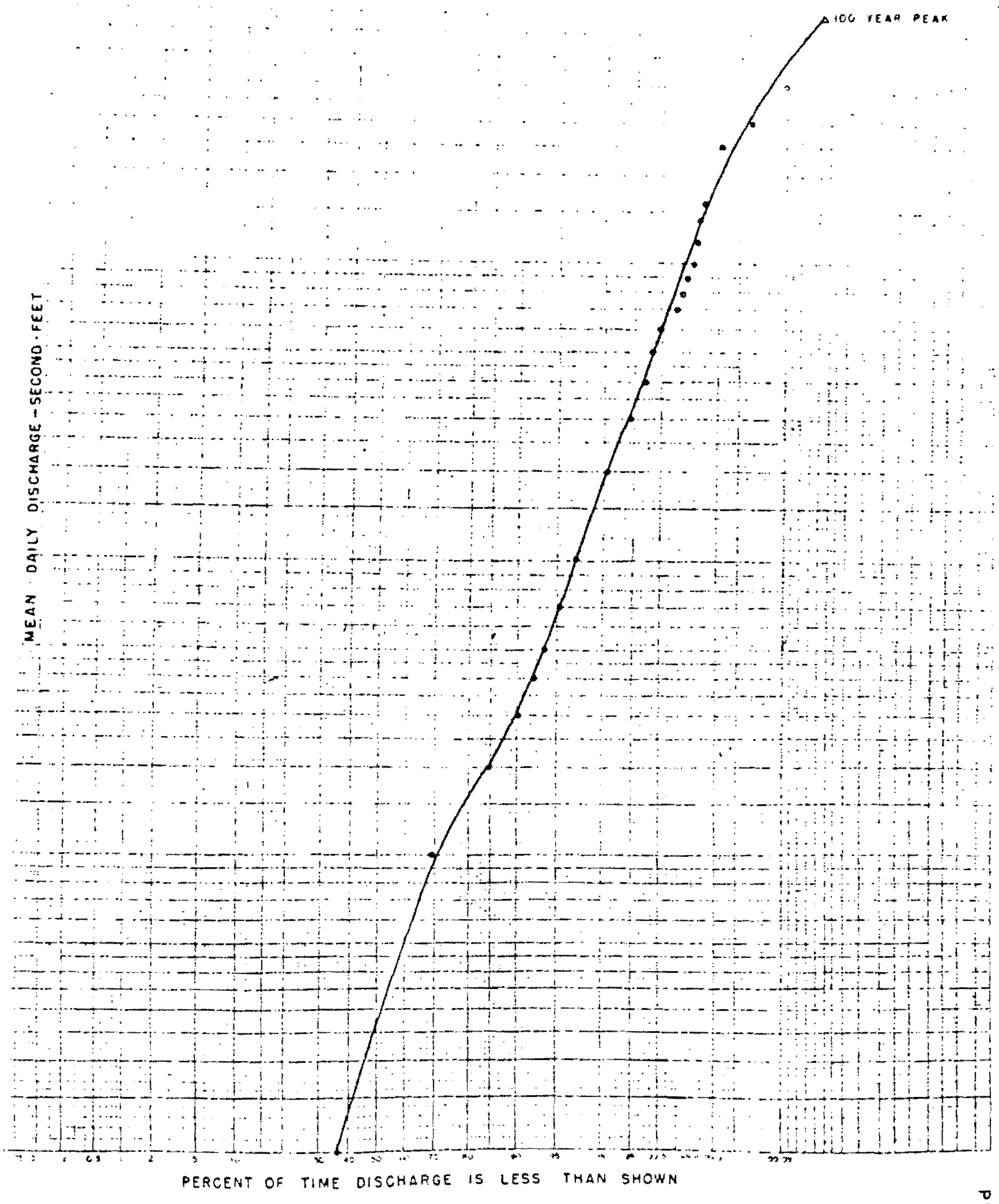
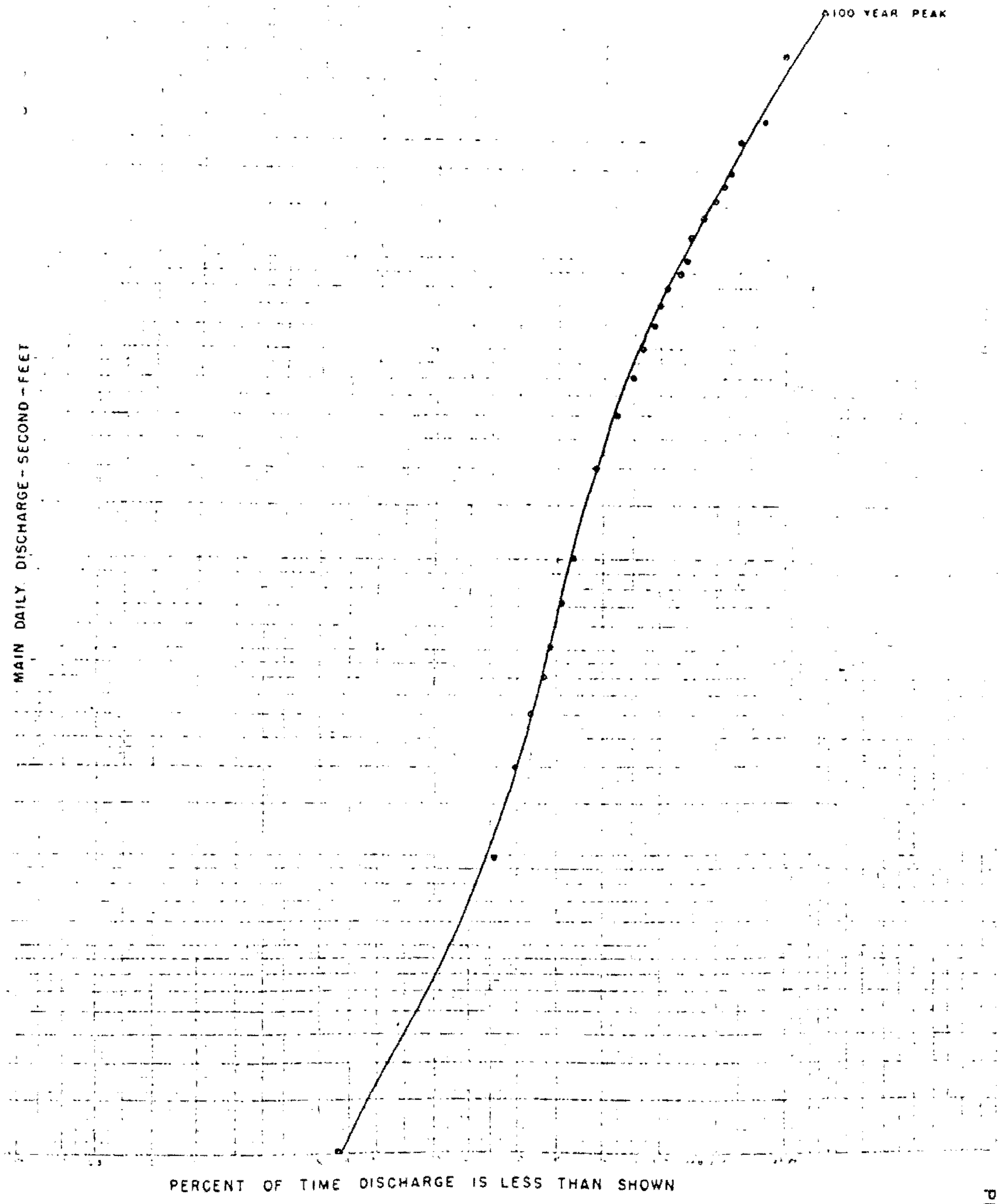


PLATE 29

CUYAMA RIVER NEAR SANTA MARIA
FLOW - DURATION CURVE
RECORDS 1930 - 1952

AM 00843



HUASNA RIVER NEAR SANTA MARIA
FLOW - DURATION CURVE
RECORDS 1930 - 1952

PLATE 30

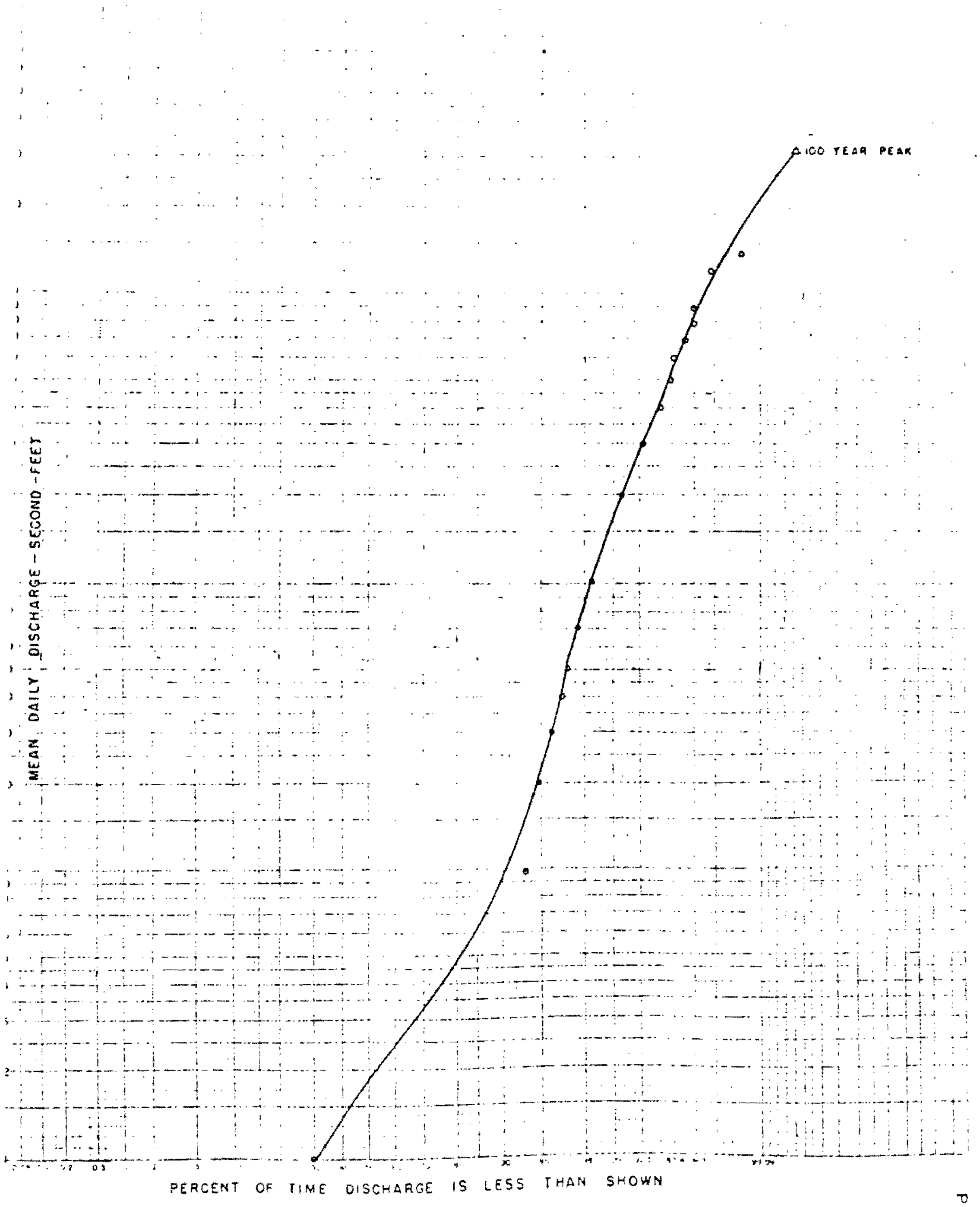


PLATE 31

ALAMO CREEK NEAR SANTA MARIA
FLOW-DURATION CURVE
RECORDS 1944-1952
HUASNA RIVER CORRELATION 1930-1943

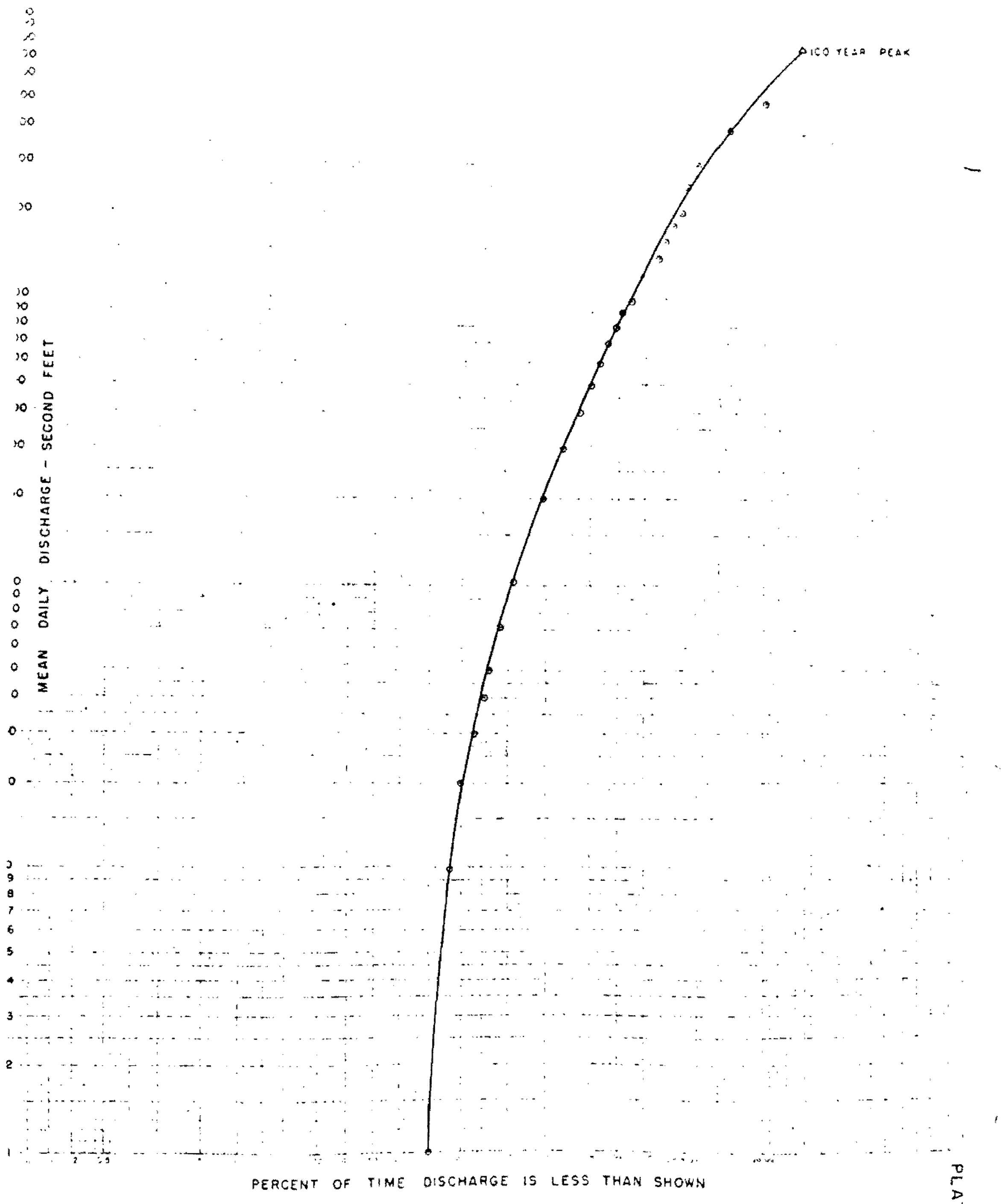


PLATE 32

SISQUOC RIVER NEAR GAREY
FLOW - DURATION CURVE
RECORDS 1941 – 1952
CUYAMA RIVER CORRELATION 1930-1940

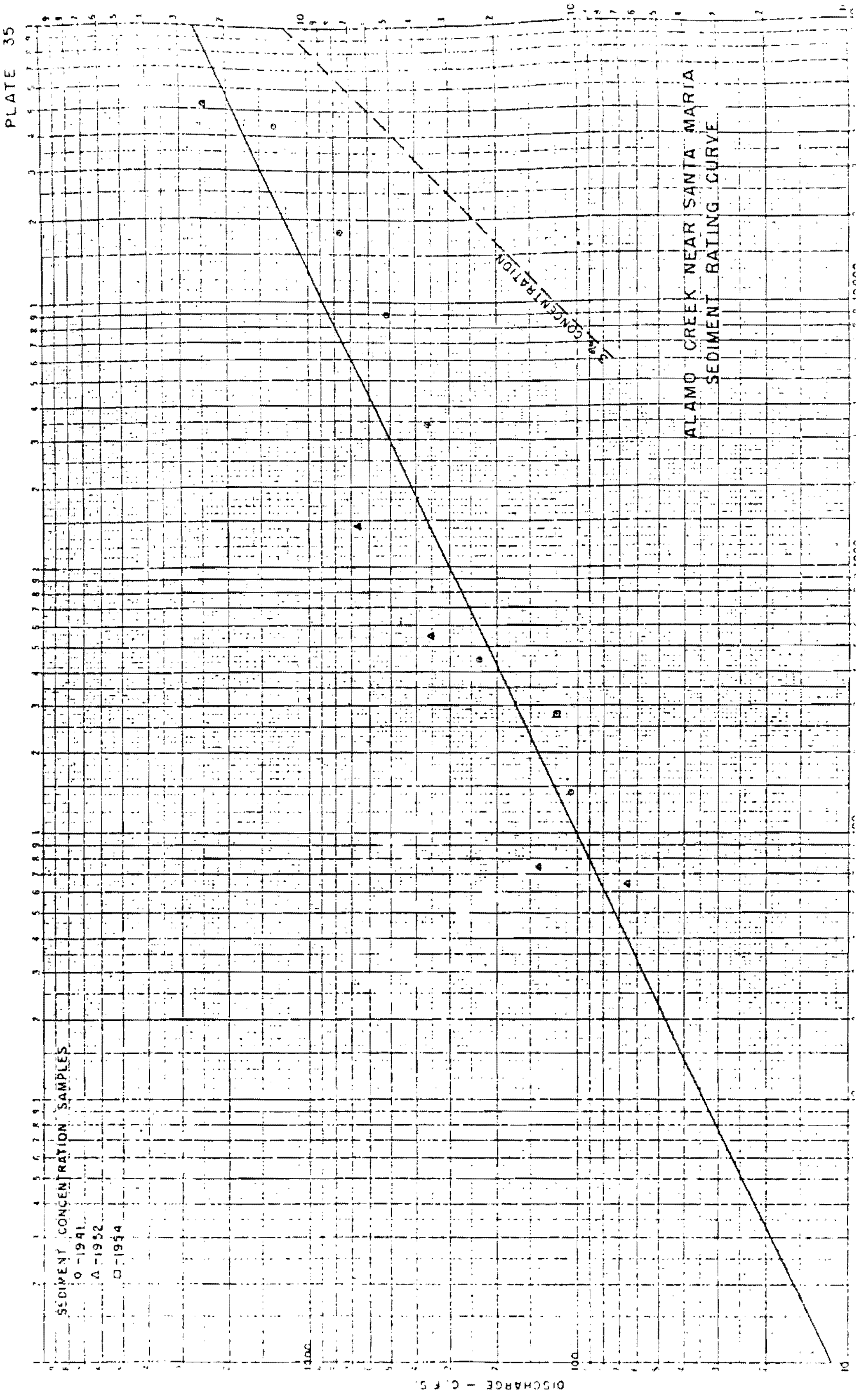


PLATE 35
ALAMO CREEK NEAR SANTA MARIA
SEDIMENT RATING CURVE
CONCENTRATION
SEDIMENT CONCENTRATION SAMPLES
o - 1941
Δ - 1952
□ - 1954
DISCHARGE — C.F.S.

AM 00846

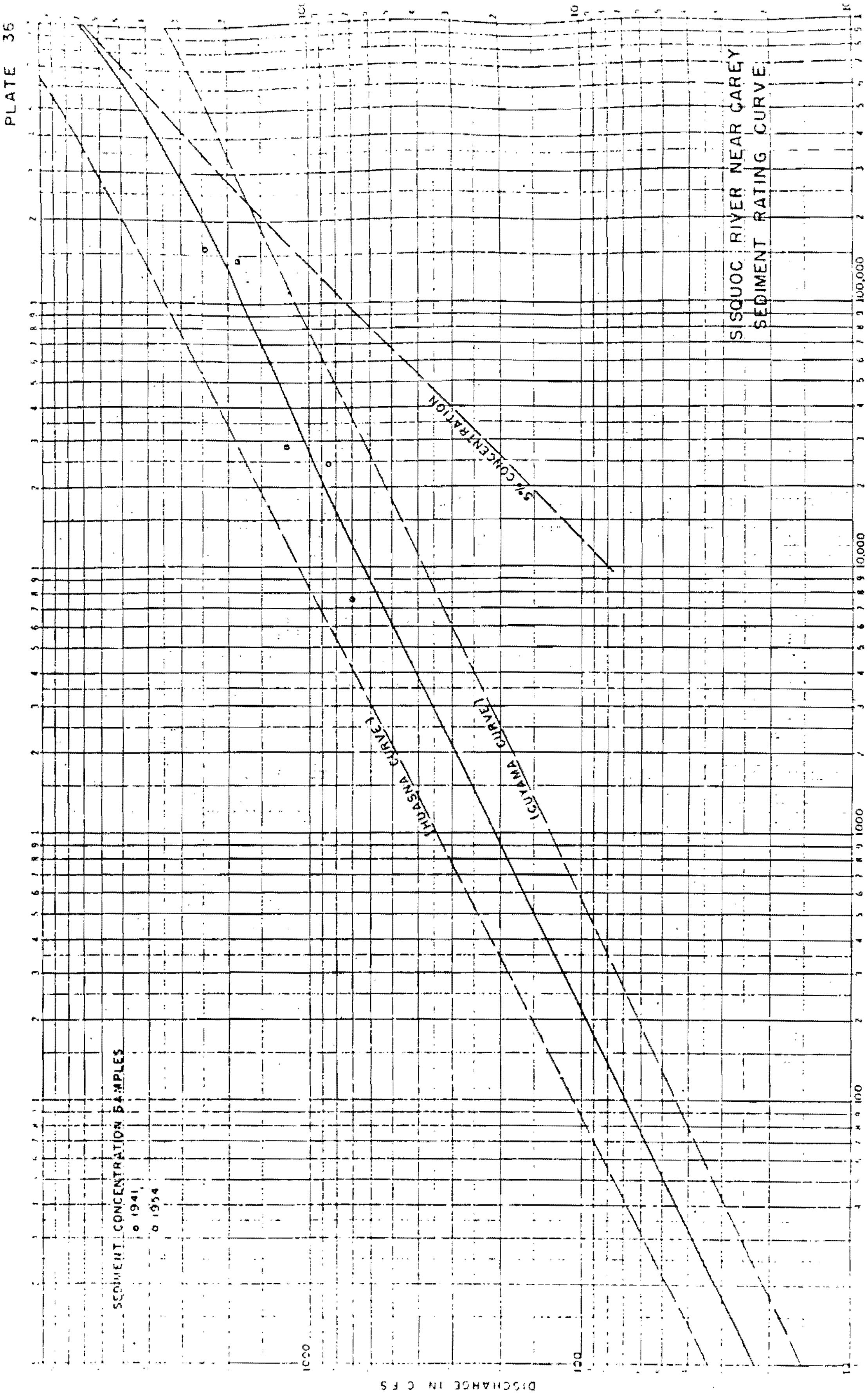


PLATE 36
SISQUOC RIVER NEAR CAREY
SEDIMENT RATING CURVE
5% CONCENTRATION
CUYAMA CURVE
HUASNA CURVE
SEDIMENT CONCENTRATION SAMPLES
o 1941
o 1954
100,000
10,000
1000
100
DISCHARGE IN C F S

AM 00847

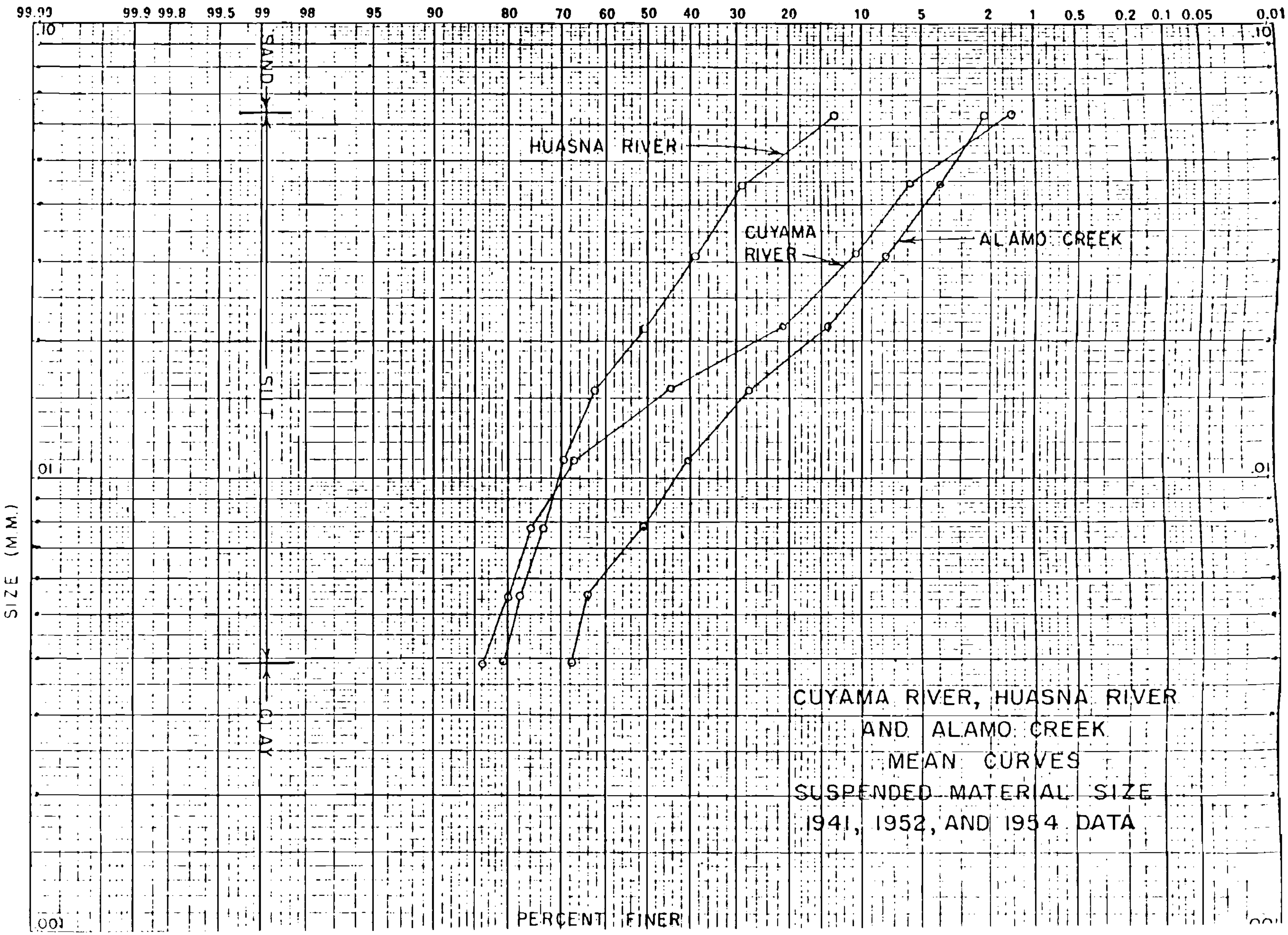
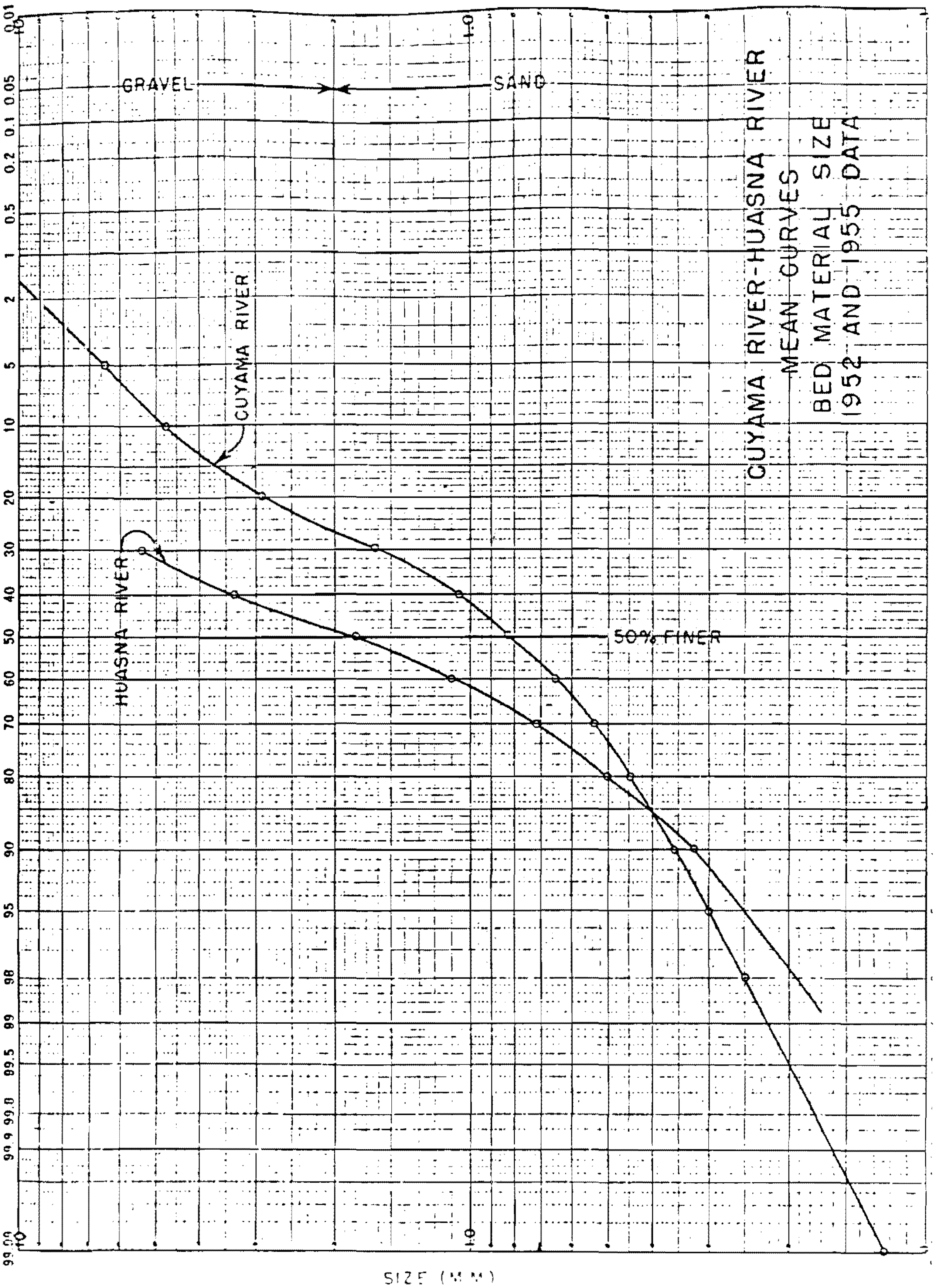


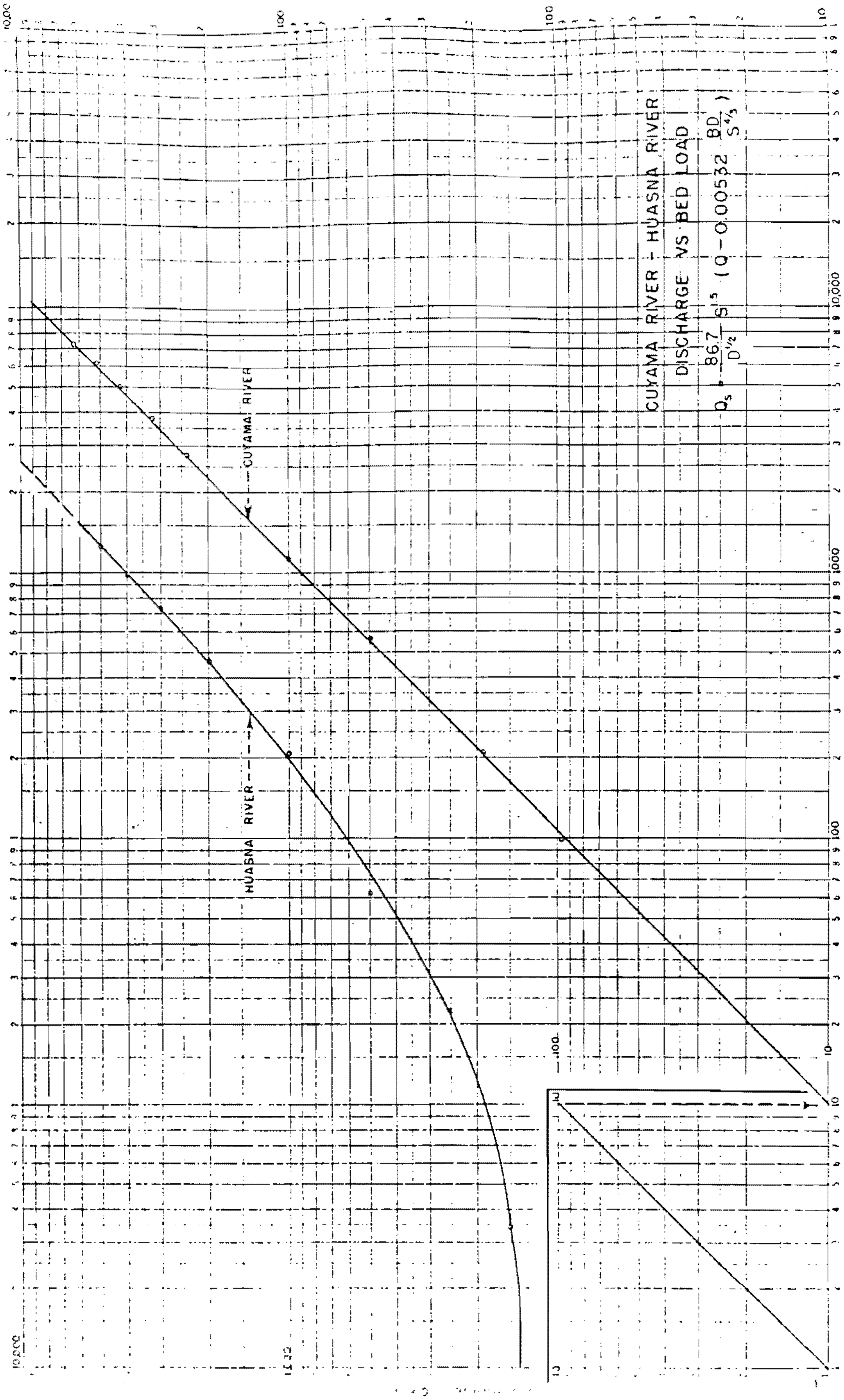
PLATE 3

AM 00848


CUYAMA RIVER-HUASNA RIVER
MEAN CURVES
BED MATERIAL SIZE
1952 AND 1955 DATA
GRAVEL
SAND
CUYAMA RIVER
HUASNA RIVER
50% FINER
1.0
SIZE (MM)

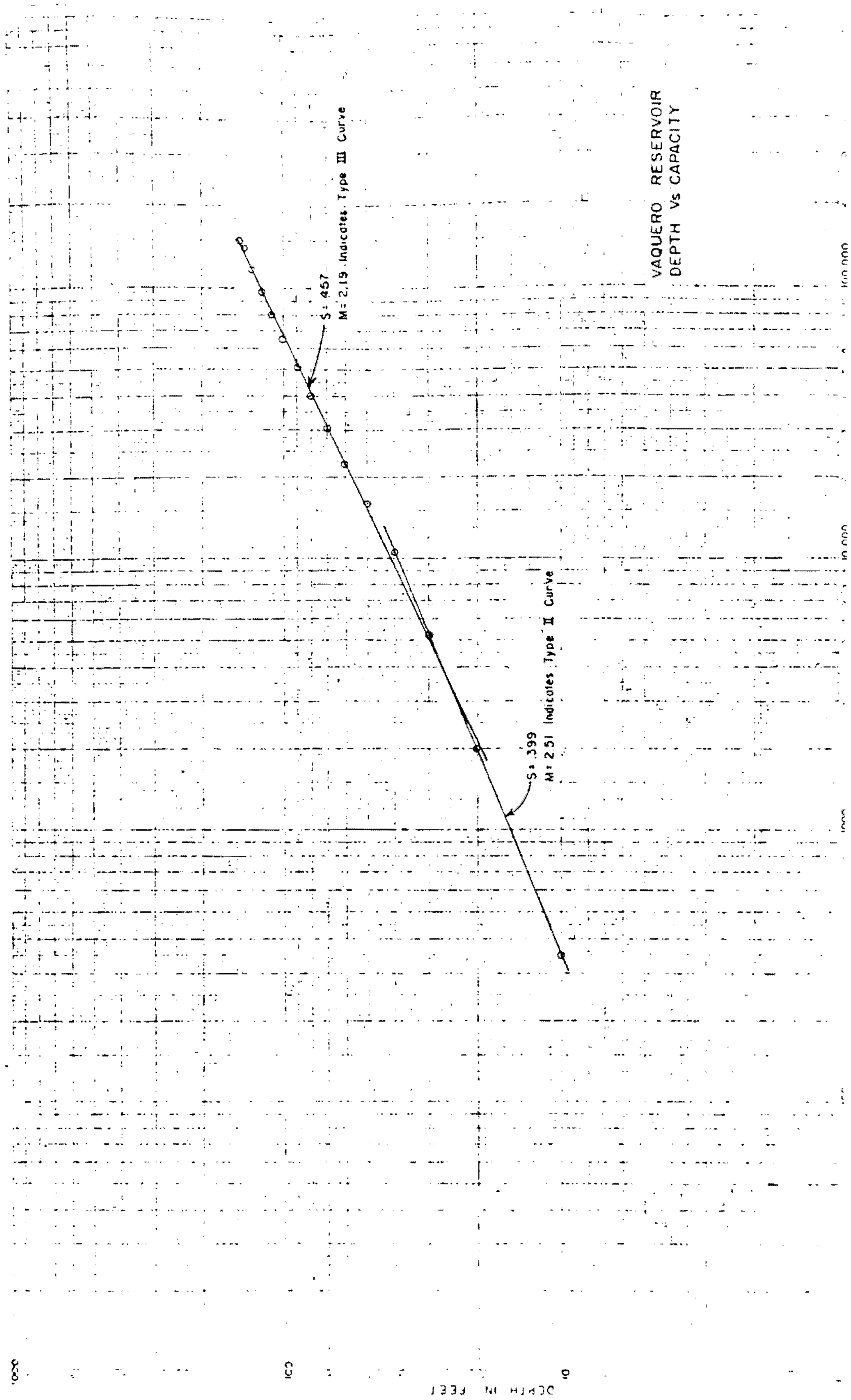
AM 00849

PLATE 39



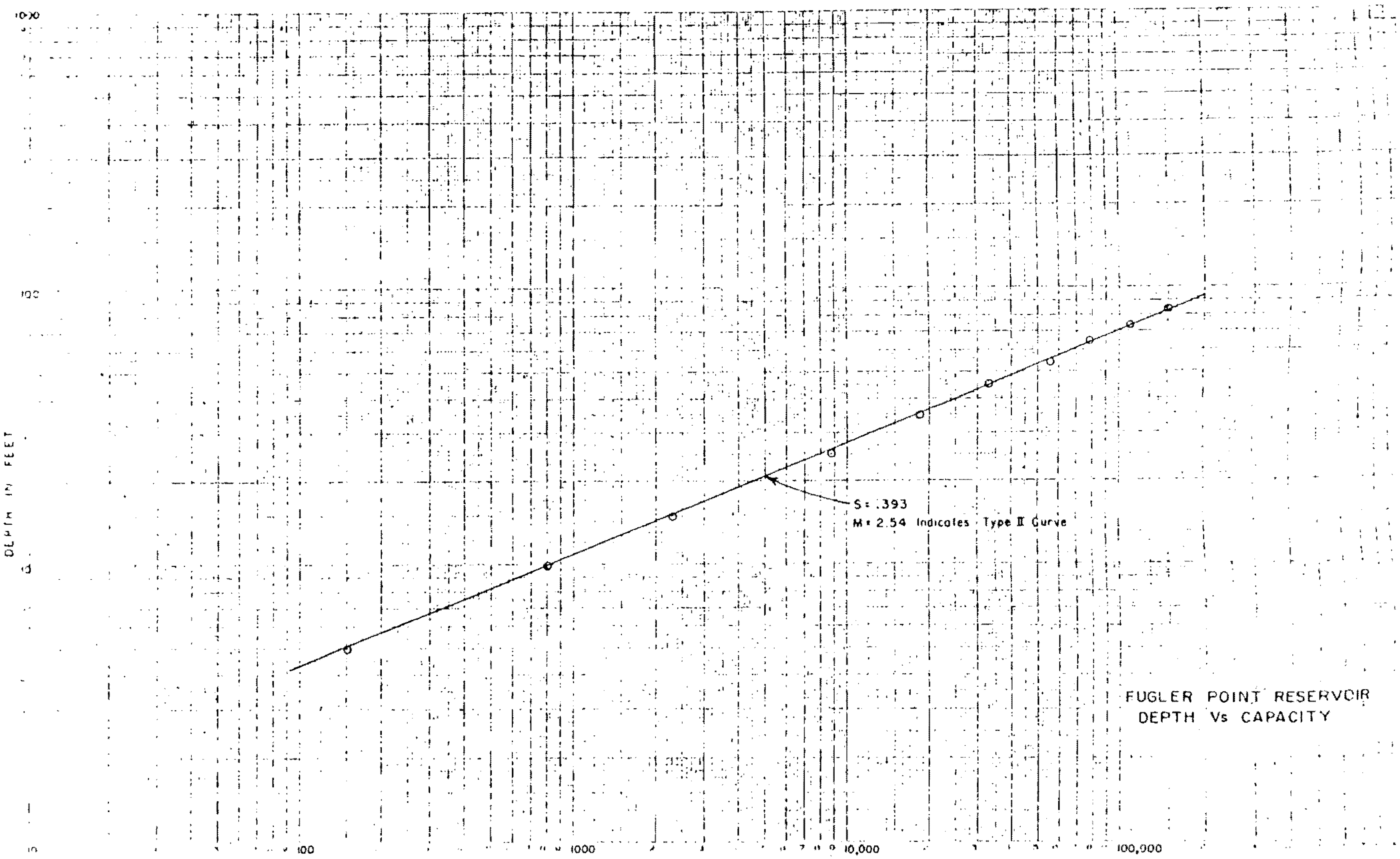
AM 00850

PLATE 40

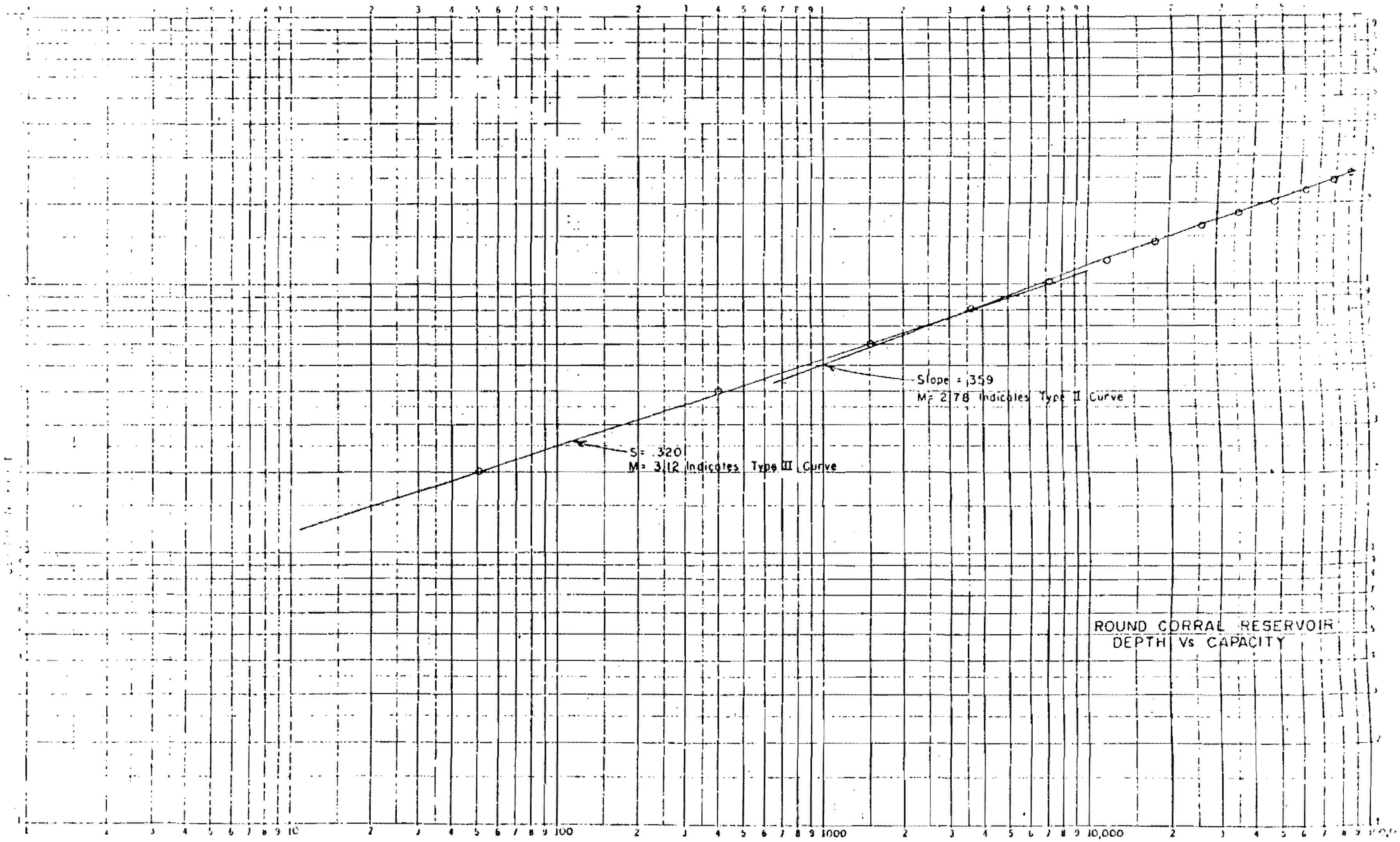


AM 00851

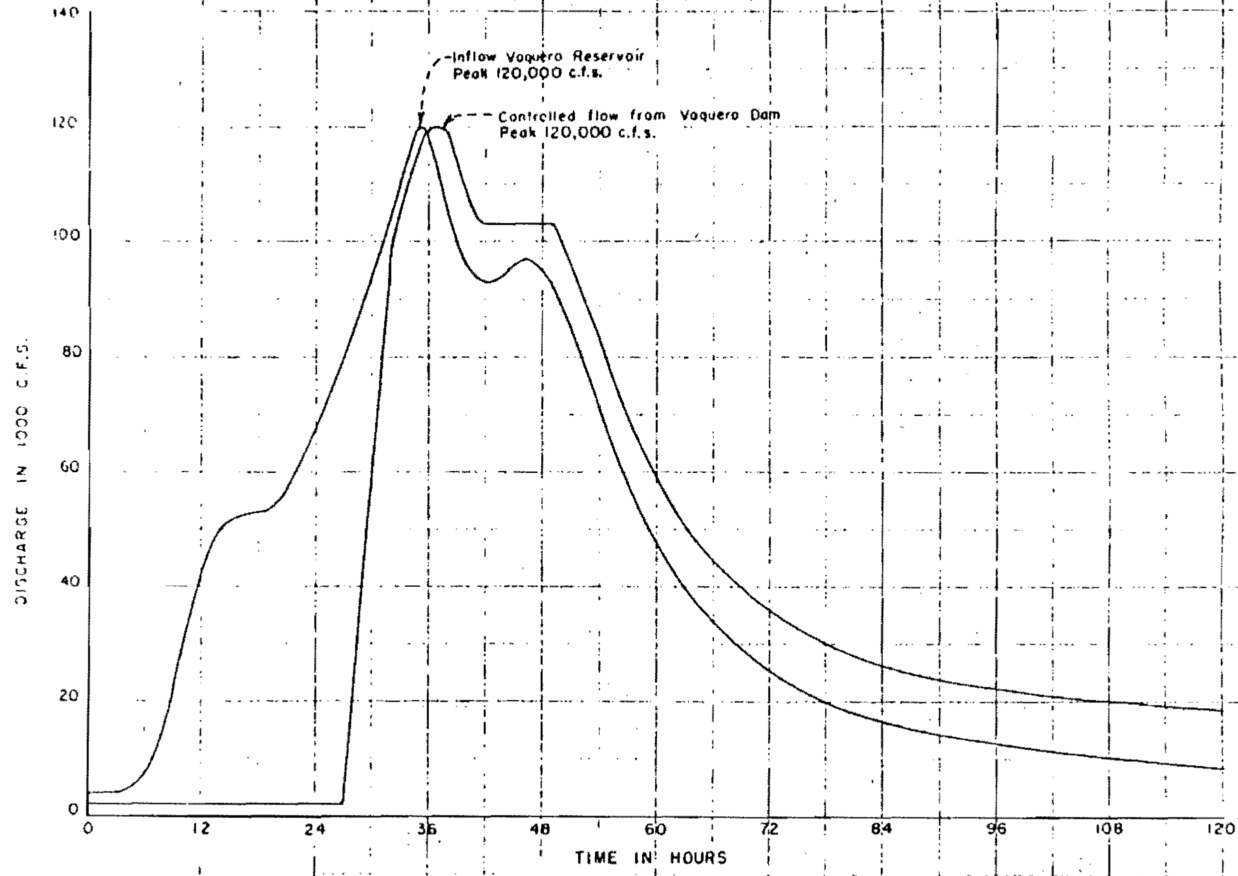
PLATE 41



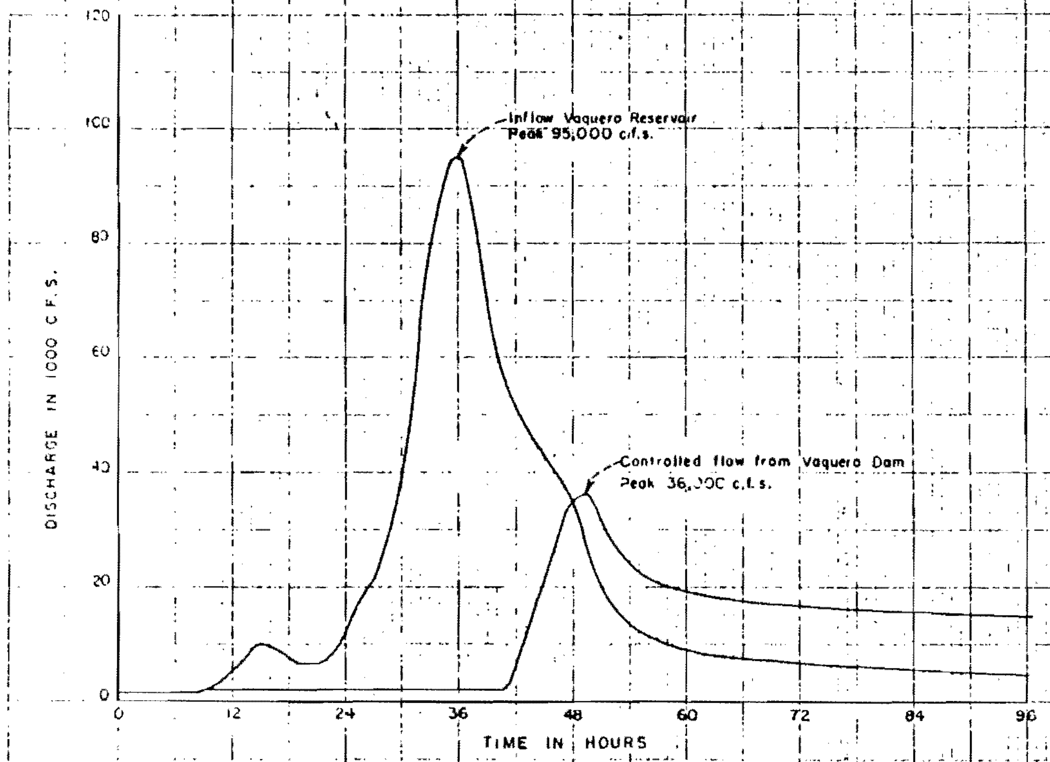
AM 00852


Slope = .359
M = 2.78 Indicates Type II Curve
S = .320
M = 3.12 Indicates Type III Curve
ROUND CORRAL RESERVOIR
DEPTH Vs CAPACITY
10
100
1000
10,000

AM 00853

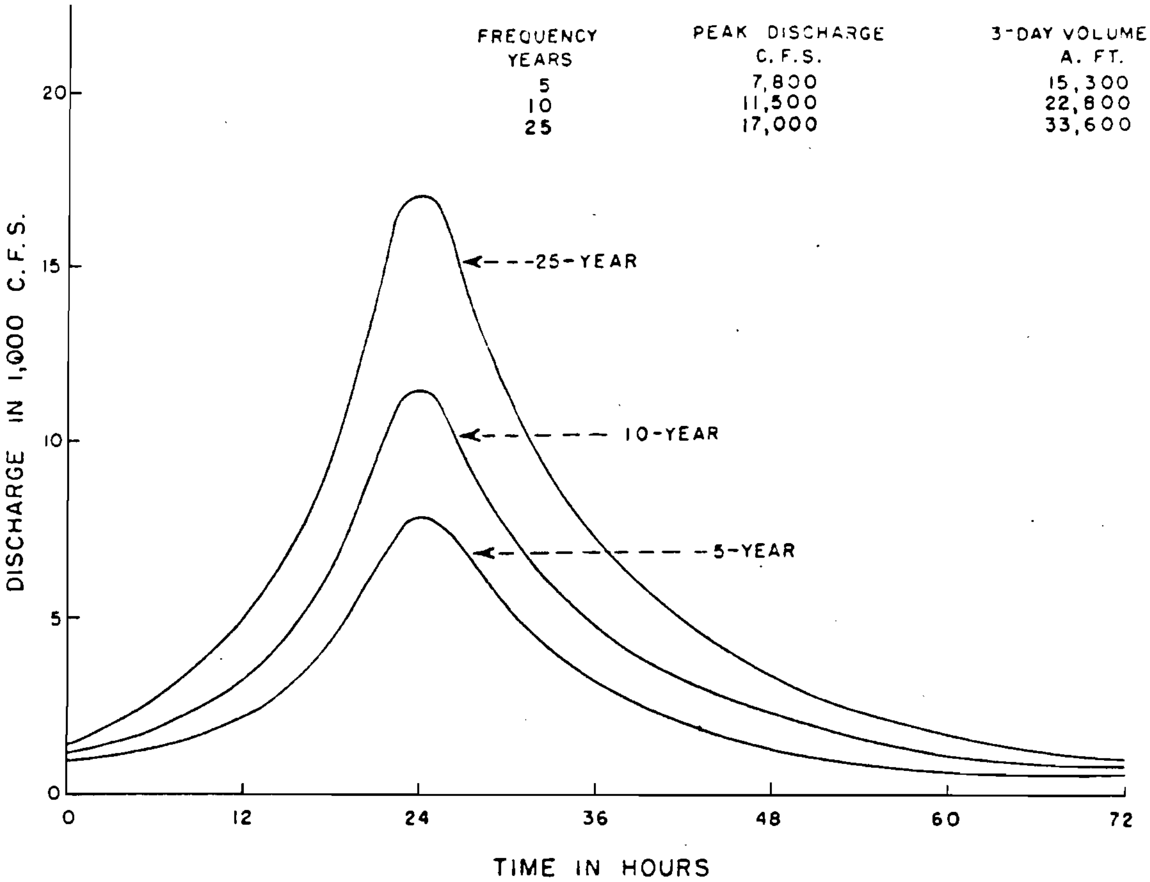


FLOOD ROUTING
SPILLWAY DESIGN FLOOD
VAQUERO DAM SITE



FLOOD ROUTING
STANDARD PROJECT FLOOD
VAQUERO DAM SITE

AM 00855



FREQUENCY YEARS	PEAK DISCHARGE C.F.S.	3-DAY VOLUME A. FT.
5	7,800	15,300
10	11,500	22,800
25	17,000	33,600

DIVERSION REQUIREMENT
HYDROGRAPHS
VAQUERO DAM SITE

AM 00856