STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

o

EARL WARREN, Governor

C. H. PURCELL, Director of Public Works

EDWARD HYATT, State Engineer

REPORT ON

WATERMASTER SERVICE

IN

SOUTH FORK PIT RIVER WATERMASTER SERVICE AREA
MODOC AND LASSEN COUNTIES, CALIFORNIA
1946 SEASON

By
J. VICTOR SCAMMON
Assistant Hydraulic Engineer

Sacramento, California

EDWARD HYATT, STATE ENGINEER
CHIEF OF DIVISION

EARL WARREN
GOVERNOR OF CALIFORNIA

C. H. PURCELL
DIRECTOR

STATE OF CALIFORNIA

Department of Public Works

SACRAMENTO 5

DIVISION OF WATER RESOURCES
401 PUBLIC WORKS BUILDING

January 26, 1947

Mr. Gordon Zander
Supervising Hydraulic Engineer
Sacramento, California

Attention: Mr. Harrison Smitherum
Senior Hydraulic Engineer

Dear Sir:

Herewith is submitted the annual report covering watermaster service within the South Fork Pit River Watermaster Service Area, Modoc and Lassen Counties, California, during the 1946 season.

The report presents a general description of the work and a discussion of the results obtained. Records of precipitation, run-off and other pertinent data are included.

Respectfully submitted,

J. VICTOR SCAMMON

J. Victor Scammon
Assistant Hydraulic Engineer

TABLE OF CONTENTS

	Page
INTRODUCTION	1
WATER SUPPLY	2
Precipitation	2
Stream Flow	2
DISTRIBUTION OF WATER	5
OWNERSHIP OF LANDS AND WATER RIGHTS	7

TABLES

1. Snow Survey Data - Upper Pit River
2. Precipitation Data - Upper Pit River
3. Daily Discharge in Cubic Feet per Second - South Fork Pit River Above Likely
4. Daily Release in Cubic Feet per Second - West Valley Reservoir
4A. Seasonal Operation Record - West Valley Reservoir 1936-1946
5. Total Seasonal Irrigation Water Supply of the South Fork Pit River
6. Comparison of Run-Off During Irrigation Season - South Fork Pit River Above Likely
7. Snow Survey Deductions - South Fork Pit River Above Likely and Pine Creek near Alturas at Power House
8. Daily Discharge in Cubic Feet per Second - Fitzhugh Creek Above Clark Ranch
9. Daily Discharge in Cubic Feet per Second - Pine Creek near Alturas at Power House
10. Comparison of Average Snow Water Content on Cedar Pass and Eagle Peak with Pine Creek Run-off
11. Daily Release in Cubic Feet per Second - Big Sage Reservoir
12. Seasonal Operation Record, 1935-1946- Big Sage Reservoir
13. Daily Discharge in Cubic Feet per Second - Pit River Near Canby

PLATES

1. Hydrograph of South Fork Pit River Above Likely and West Valley Reservoir Releases
2. Hydrograph of Pine Creek near Alturas at Power House
3. Hydrograph of Pit River near Canby and Big Sage Reservoir Releases.

REPORT ON
WATERMASTER SERVICE
IN
SOUTH FORK PIT RIVER WATERMASTER SERVICE AREA
MODOC AND LASSEN COUNTIES, CALIFORNIA
1946 SEASON

INTRODUCTION

The South Fork Pit River Watermaster District, now termed Watermaster Service Area, Counties of Modoc and Lassen, California, was created by the order of the Division of Water Resources, entered December 31, 1934. As created the service area embraced the water rights determined by a decree entered October 30, 1934, by the Superior Court, Modoc County, in the case of W. E. Armstrong vs. Frank McArthur, et al, No. 3273, with the exception of certain rights defined in the paragraphs of said decree enumerated in said order. Subsequent thereto, orders changing said service area have been entered by the Division of Water Resources on December 31, 1936, whereby certain water rights on springs and spring channels near Likely, California, were excluded; on April 19, 1937, whereby the water rights of the South Fork Irrigation District were included in the watermaster service area; and on January 30, 1940, whereby the said service area was enlarged by incorporating therein the Pine Creek and Hot Springs Valley Watermaster Districts, theretofore created by the orders entered by the Division of Water Resources on January 12, 1935.

Watermaster service in the South Fork Pit River Watermaster Service Area for 1946 season covered the regulation of diversions from the South Fork of Pit River and its tributaries, Pit River and Rattlesnake Creek in Hot Springs Valley, and Pine Creek near Alturas all included within

the scope of the service area as enlarged by said order of January 30, 1940. Watermaster service was carried on throughout the season in accordance with the "Distribution of Water" procedure contained in Sections 4000 to 4360, inclusive, of the Water Code. Such service extended over the period from April 1 to September 30. J. Victor Scammon, Deputy Watermaster, South Fork Pit River Watermaster Service Area, administered the distribution of water from the various streams within the district during the period April 1 to September 30. Harrison Smitherum was supervising watermaster.

WATER SUPPLY

Precipitation

The results of the annual snow surveys made on the four courses in the Upper Pit River watershed are shown in Table 1 of this report. The table is arranged to show the water content of the snow at the beginning of the run-off period, April 1 to July 31, inclusive, as compared with the average water content over years of actual measurements. This information is used to forecast the probable April - July flow of the South Fork of Pit River above Likely, and enables the watermaster to rough out a schedule of operation for the irrigation season. The forecast of the probable run-off is especially valuable in the operation of West Valley Reservoir.

Table 2 gives the monthly, seasonal and average amounts of precipitation for stations in the Upper Pit River Area. Each of the stations listed has a common 17 year record and comparisons are made using the 17 year averages. For precipitation data prior to 1940-41 reference is made to the watermaster report for the 1940 season, and for 1940-41 to 1944-45 reference is made to the watermaster report for the 1945 season.

Stream Flow

South Fork Pit River: The record of the daily discharge of the South Fork of Pit River above Likely is given in Table 3. These data were

compiled from records of the United States Geological Survey. The station is below the junction of West Valley Creek and about four miles upstream from Likely. The data exclude any record of use in Jess Valley and storage in West Valley Reservoir, but do include the record of storage releases from that reservoir.

Table 4 is a record of the daily releases, in cubic feet per second, from West Valley Reservoir during the irrigation season.

The total net available water supply of the South Fork of Pit River for the irrigation season from April 1 to September 30 is shown in Table 5.

A comparison of the seasonal irrigation water supply to the South Fork Area over an 18 year period is given in Table 6.

The basic data for a comparison of the run-off in the South Fork of Pit River above Likely to the results of the annual snow surveys is given in Table 7. The Division of Water Resources issues an annual snow survey report as of April 10th, in which forecasts for the April - July Flow are made. The 1946 forecast of the South Fork of Pit River above likely was 54,000 acre feet. The actual flow of that period was 41,640 acre feet. An inspection of Table 2 shows a deficiency in precipitation during the forecast period accounting somewhat for the difference in actual and forecast run-off.

Plate 1 shows graphically the data presented in Tables 3 and 4. The solid line represents South Fork Flow and the dotted line the storage releases from West Valley Reservoir.

Fitzhugh Creek: Table 8 is a record of the available water supply of Fitzhugh Creek above the Clark Ranch. The daily discharge data were computed from current meter measurements and a continuous record of the water stage throughout the entire season. This creek flows in a westerly direction entering the South Fork Valley at a point about 10 miles south of Alturas.

Pine Creek Near Alturas: Table 9 is a record of the flow of Pine Creek near Alturas at the Power House. A continuous water stage recorder is

maintained by the Division of Water Resources at a point above all irrigation diversions. Plate II shows the daily hydrograph of flow prepared from the data in Table 9.

Table 10 gives the basic data for a comparison of the run-off in the Pine Creek Basin to the results of the annual snow surveys. No forecast is made for this creek in the annual snow survey bulletin issued by the Division of Water Resources.

Pit River and Rattlesnake Creek in Hot Springs Valley and Big Sage Reservoir: The principal sources of water for irrigation in the Hot Springs Valley are the North and South Forks of Pit River, Big Sage Reservoir, and Rattlesnake Creek. Water from the latter source enters Pit River about four miles west of Alturas and is principally in the form of water stored in Big Sage Reservoir which is released down Rattlesnake Creek to meet irrigation demands.

Prior to 1940, the flow entering at the head of Hot Springs Valley was measured at the Station on Pit River below the junction of the North and South Forks. Channel improvements made on the North Fork of Pit River in the winter of 1939 now causes the water from that source to by-pass the station so that measurements there are of no value. Furthermore, due to backwater conditions from river dams it has not been feasible to establish a new measuring station below the new junction of the North Fork and South Fork of Pit River. Therefore, no record of the flow entering Hot Springs from these sources is presented in this report.

Table 11 is a record of water released from storage in Big Sage Reservoir. Table 12 presents a comparison of the seasonal operations for the years 1935 to 1946, inclusive.

Below Rattlesnake Creek there are other small streams tributary

to Pit River in Hot Springs Valley which contribute to the water supply during the early part of each season. In 1946 the flow from these sources failed about June 1.

A stream flow measuring station is maintained by the U. S. Geological Survey on Pit River near Canby. This station is located at the outlet of Hot Springs Valley, and in the absence of other records, the flow at this station is indicative of water supply conditions in the Hot Springs Valley area. The record of this station, also, covers the measurement of return flow from irrigation in the area. Table 13 is a record of the flow of Pit River near Canby, as taken from records compiled by the U. S. Geological Survey.

A hydrograph prepared from the data in Table 12 is presented on Plate III. Superimposed thereon is a hydrograph of the flow released from Big Sage Reservoir.

DISTRIBUTION OF WATER

South Fork of Pit River

The regulation of diversions of the natural flow from the South Fork of Pit River, including Fitzhugh Creek and other upstream tributaries, was made in accordance with schedules 2 and 3 of the South Fork of Pit River Judgement and Decree No. 3273, which set forth the several rights and priorities. The natural flow of West Valley Creek, less the amounts of the allotments of the Van Loan West Valley Ranch, was permitted to pass through the West Valley Reservoir without charge as regulated storage release.

The regulation of West Valley Reservoir storage was performed in accordance with the by-laws adopted by the South Fork Irrigation District. Water released from the reservoir flows down the natural channels and co-mingles with the natural run-off, but is separated again by the watermaster at

the points of diversion of each member of the district requesting reservoir water. The amount of water to which each person was entitled was determined by multiplying the amount of the total storage at the beginning of the season by the percentage factor of each owner listed below:

NAME	Per Cent
W. E. Armstrong (Now Arthur H. Burmister)	2.18
V. F. Christenson	20.46
A. T. Coffman (Now Elmer R. Rhyne)	0.73
J. D. Flournoy (Now Arthur Flournoy)	3.98
W. H. Flournoy (Now D. E. Van Loan)	2.51
R. O. Gaustad (Now Jacob F. Derner)	1.79
R. J. Gaustad (Now Peter and John McGarva)	1.95
Jesse Hughes (Now Maston Ramsey)	2.23
Frank McArthur (Vaughn)	45.62
Douglas McGarva	0.24
John and Peter McGarva	2.63
K. Nelson	2.74
Ray Stepp (Now Arthur H. Burmister)	1.07
A. L. Stinson (Now Arthur Flournoy	0.03
D. E. Van Loan	8.53
Gary Williams	2.51
Roy Williams (Now Somer and Georgia Besson)	0.80
	100.0

On June 10th West Valley Reservoir was opened in order to complete the spring irrigation of meadow hay crops with all share holders using their respective allotments. Reservoir water was necessary due to below normal precipitation during the months of April, May, and June. Care was exercised in releasing reservoir water to each user when he became ready for fall irrigation, to prevent wetting adjoining fields which were in process of being harvested. Weather conditions were good during the spring as the growing season was warm and during the summer and fall conditions were very good for harvesting crops as there was no storm of any consequence. The greatest release from West Valley Reservoir was at the rate of 160 cubic feet per second. The period of release was longer than usual because of good growing weather for fall pasture.

Pine Creek near Alturas

Distribution of Pine Creek water was made in accordance with the

allotments set forth in Schedule 2 of the Pine Creek Agreement. The season's flow for 1946 was average. It amounted to 8,190 acre feet as compared with the 27 year mean of 7,717 acre feet. For other comparisons see table 10. The largest single diversion from Pine Creek goes to P. S. and G. B. Dorris, who are entitled to receive one-half of the total allotments shown in Schedule 2. In the past it has been customary, upon request by G. B. Dorris, to shut off the Dorris Lower Ditch (Diversion 10) during haying operations on his ranch and distribute the Dorris water among the other users on the stream, up to the extent of their beneficial requirements. Any water in excess of that which could be beneficially used was then diverted into the Dorris Reservoir as provided for in Paragraph 7 of the Pine Creek Agreement. This method of operation was necessary to keep water off the lands where haying was in progress.

In the Fall of 1945 a drain ditch was dug on the G. B. Dorris property to better control the water during all periods of the irrigation season. The drain ditch runs along the east boundary of the NW¼ of SW¼ of Section 28, T. 42 N., R. 13 E.M.D.B.M. and thence west one-half mile along the Dorris south property line to Pine Creek. It is equipped with check gates and serves as a spreading works for water diverted through the Dorris Lower Ditch. (Diversion 10) and as a collecting ditch and by-pass ditch to keep water off the hay lands when not wanted and to deliver water to lower lands on the G. B. Dorris and P. S. Dorris ranches.

The drain ditch was first operated during the 1946 season. As the result of such operation the Dorris ranches retained continuous control and use of their allotments of water throughout the irrigation season. None of such allotment was available for distribution to the other users.

Hot Springs Valley

Distribution of Pit River water was made in accordance with the allotments set forth in Schedules 2 and 3 of the Hot Springs Valley Agreement

The distribution of Big Sage Water was made in accordance with the by-laws of the Hot Springs Valley Irrigation District. However, the major part of the water from both sources is used by the same parties through the same irrigation system and devices. The same method of distributing the water also applies to both stored water and natural flow.

General

Better than average crops were obtained by all and no controversies occurred. Four hundred acre feet of water was sold to certain users in Big Valley for 1946 fall irrigation.

OWNERSHIP OF LANDS AND WATER RIGHTS

Change in Ownership

On September 30, 1946, a search was made through the official records of Modoc County for recent changes in ownership in lands and water rights embraced in the South Fork Pit River Watermaster Service Area. Further assistance came from various persons living within the area who furnished additional information concerning transfers of ownership.

The changes in ownerships of lands and water rights, which have occurred subsequent to filing "Statement for South Fork Pit River Watermaster Service Area, Counties of Modoc and Lassen, California, for 1946," are listed in the following tabulation. The new names should appear in the 1947 statement.

Tract No.	Name of Water Right Owner Appearing in 1946 Statement	Name of Water Right Owner to Appear in 1947 Statement	Amount of Water c.f.s.
7- 1	John and Peter B. McGarva	United States of America (Forest Service)	1.75
7-17	Royal E. and Marion G. Williams b	Somer and Georgia Beeson	0.70
7-20	John Blevins	Cecil Blevins	1.20
7-36	George M. and J. E. Clark	George M. and H. E. Clark and B., C. and Dorothy Taylor	5.00
7-37) 7-40)	W. E. Armstrong and Arthur H. Burmister	Arthur H. Burmister	5.10
7-42	Elmer O. and Eldon F. Thomas	Elmer O. Thomas	1.37
7-50	P. S. Dorris	A. D. and H. M. Dorris	15.00
7-56	P. S. Dorris	A. D. and H. M. Dorris	0.70
7-63	S. B. Kelley and B. L. Kelley	S. B. Kelley	0.86
7-64	Clarence E. and Zelma C. Shives	Fred Ball	0.71
7-65	C. T. Watkins	Fred Ball	0.06
7-71	Marvin L. Essex	Marvin L. Essex	0.475
divided in half	Total amount water 0.95 c.f.s.	William Hagge	0.475

TABLE 1
SNOW SURVEY DATA—UPPER PIT RIVER

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Eagle Peak Course Elev. 7500 Ft. Date of Survey	4/3	4/1	3/30	3/30	4/2	4/10	4/9	3/29	3/31	3/30	4/4	3/26	3/29	3/24	3/27	3/30	4/5
Depth of Snow—Inches	24.3	13.3	43.8	38.1	9.9	66.1	50.5	47.3	71.3	27.2	38.4	35.1	38.6	56.7	35.5	63.5	53.3
Water Content—Inches	11.0	5.2	18.7	14.3	3.3	22.6	22.1	17.5	23.6	10.4	15.6	13.8	14.7	23.7	13.5	22.2	21.2
Density—Percent	45.3	39.1	42.6	37.5	33.3	34.2	43.7	37.1	33.1	38.2	40.6	39.3	38.1	41.8	38.0	35.0	39.8
Record Average—Inches								14.32	15.35	14.8	14.9	14.8	14.8	15.5	15.3	15.8	16.1
% of Record Aver.	78.0	36.3	131.0	100.0	23.0	158.0	154.0	122.0	153.7	70.5	104.7	93.3	99.3	152.9	88.2	140.5	131.7
Cedar Pass Course Elev. 7200 Ft. Date of Survey	3/31	3/30	3/26	3/28	3/31	3/27	4/5	4/10	3/26	3/28	3/22	3/24	3/27	3/22	3/25	3/29	3/28
Depth of Snow Inches	29.3	22.1	49.2	43.9	2.2	56.4	68.2	54.4	79.1	28.2	35.9	40.8	47.4	62.3	33.4	67.5	55.4
Water Content Inches	13.0	8.3	19.8	16.3	0.9	21.1	26.2	21.6	25.2	10.5	14.6	17.9	19.3	25.8	12.3	22.4	22.9
Density—Percent	44.4	37.6	40.3	37.1	40.8	37.4	38.4	39.6	31.8	37.2	40.7	43.8	40.7	41.4	36.8	33.2	41.3
Record Average—Inches								15.9	16.9	16.3	16.1	16.3	16.0	17.2	16.9	17.2	17.5
% of Record Average	82.0	50.4	118.0	102.5	5.7	133.0	165.0	136.0	149.1	64.4	90.7	109.0	120.6	150.0	72.8	130.2	130.8

TABLE 1 (Continued)

	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946
Blue Lake Ranch Course Elev. 7300 Ft.			New Course 1940														
Date of Survey											4/11	3/28	3/31	3/26	3/31	4/3	4/3
Depth of Snow-Inches											16.3	18.8	28.9	34.9	23.0	44.0	44.9
Water Content-Inches											6.4	8.5	11.7	15.3	8.5	15.8	16.2
Density—Percent											39.2	45.2	40.5	43.8	37.0	35.9	36.1
Record Average-Inches																	
% of Record Average																	
Adin Mountain Course—Elev. 6500 Ft.																	
Date of Survey	3/27	3/27	3/24	3/27	4/1	4/17	3/26	4/7	4/8	3/31	4/7	3/31	4/2	3/31	3/30	4/3	3/26
Depth of Snow-In.	13.3	6.1	30.0	37.6	0	45.9	47.2	37.4	61.4	17.5	10.8	24.6	32.1	30.4	24.9	41.2	44.0
Water Content-In.	6.1	2.9	13.3	14.1	0	18.8	20.0	16.7	28.1	8.1	4.3	11.3	13.9	13.2	9.4	15.8	16.2
Density—Percent	45.6	47.3	44.3	37.5	0	40.9	42.4	44.8	45.8	46.2	39.8	45.9	43.3	43.4	37.8	38.4	37.0
Record Average-In.								11.5	13.3	12.8	12.0	12.0	12.1	12.2	12.0	12.2	12.5
% of Record Aver.	53.0	25.2	115.6	122.5	0	163.7	174.0	145.2	211.3	63.3	35.8	94.1	114.9	108.2	78.3	129.5	129.6

TABLE 2

PRECIPITATION - UPPER PIT RIVER STATION - 1929 to 1946

MONTHLY, SEASONAL AND AVERAGE AMOUNTS IN INCHES

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Season
Jess Valley, Modoc County, California, Elev. 5,400 ft.													
16 Yr Total	19.36	23.59	28.62	33.22	34.48	28.53	29.42	27.47	21.49	6.00	3.22	11.22	266.62
1945-1946	1.36	3.25	2.29	1.44	1.28	2.53	0.59	1.32	0.98	0.79	0.20	9.41	16.44
17 Yr Total	20.72	26.84	30.91	34.66	35.76	31.06	30.01	28.79	22.47	6.79	4.21	12.62	283.06
17 Yr Rec.Mean	1.22	1.58	1.82	2.04	2.10	1.83	1.76	1.69	1.32	0.49	.25	0.74	16.72
Alturas, Modoc County, California, Elev. 4,460 ft.													
16 Yr Total	16.16	19.39	26.61	30.19	25.30	19.60	17.17	16.69	11.84	3.47	2.94	5.79	195.15
1945-1946	2.09	2.08	1.47	0.72	0.58	1.49	0.48	0.72	0.48	0.67	T	0.12	10.90
17 Yr Total	18.25	21.47	28.08	30.91	25.88	21.09	17.65	17.41	12.32	4.14	2.94	5.91	206.05
17 Yr Rec.Mean	1.07	1.27	1.65	1.82	1.52	1.24	1.04	1.02	0.72	0.24	0.17	0.35	12.12
Lakeview, Lake County, Oregon, Elev. 4,759 ft.													
16 Yr Total	17.92	20.61	29.07	27.81	29.56	22.50	20.63	21.68	18.19	2.42	2.95	8.45	221.79
1945-1946	1.19	1.60	1.81	1.19	0.90	1.27	0.21	0.32	0.38	0.42	T	0.25	9.54
17 Yr Total	19.11	22.21	30.88	29.00	30.46	23.77	20.84	22.00	18.57	2.84	2.95	8.70	231.33
17 Yr Rec.Mean	1.12	1.31	1.82	1.71	1.79	1.40	1.26	1.29	1.09	0.17	0.17	0.51	13.60
Bieber, Lassen County, California, Elev. 4,200 ft.													
16 Yr Total	21.63	25.65	41.95	40.52	43.24	31.50	22.85	21.40	11.13	2.71	0.99	6.66	270.23
1945-1946	2.43	2.97	2.93	1.80	2.32	1.70	1.27	0.82	0.27	0.50	0	0.22	17.23
17 Yr Total	24.06	28.62	44.88	42.32	45.56	33.20	24.12	22.22	11.40	3.21	0.99	6.88	287.46
17 Yr Rec.Mean	1.41	1.68	2.64	2.49	2.68	1.95	1.42	1.31	0.67	0.19	0.06	0.41	16.90

For records prior to 1940-1941, see 1940 Report.
For records prior to 1945-1946, see 1945 Report.

TABLE 3

DAILY DISCHARGE IN CUBIC FEET PER SECOND
SOUTH FORK PIT RIVER ABOVE LIKELY
For Year Ending September 30, 1946

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	26	39	30	47	25	63	49	322	119	67	73	26
2	26	36	33	49	25	54	54	316	116	66	70	27
3	25	36	35	51	25	45	49	316	106	58	68	27
4	19	34	35	46	25	44	47	322	88	55	67	30
5	20	36	35	42	20	57	47	325	90	46	66	33
6	22	37	36	35	20	92	47	322	92	27	66	33
7	26	36	37	30	20	67	49	307	91	26	66	32
8	26	37	36	15	20	58	49	296	87	26	66	34
9	27	37	35	11	20	60	49	276	83	26	82	35
10	31	39	30	11	20	53	48	260	106	24	104	36
11	33	38	25	10	20	52	50	238	122	22	102	38
12	31	39	15	10	20	52	60	226	117	21	122	40
13	29	37	10	10	20	53	67	216	156	21	148	37
14	28	37	10	10	20	54	77	207	172	21	154	35
15	27	41	10	10	20	65	92	207	170	22	166	34
16	29	40	10	10	25	77	114	184	172	21	164	30
17	27	40	10	10	25	64	142	170	172	28	172	22
18	27	39	10	10	30	54	174	162	166	39	187	25
19	26	38	10	11	31	96	216	156	144	39	189	23
20	29	35	10	11	34	103	204	158	119	38	187	21
21	27	36	20	15	37	106	238	170	127	37	182	21
22	29	38	59	33	36	72	248	154	124	50	182	10
23	29	40	48	36	47	62	279	172	116	64	180	17
24	29	45	43	50	57	67	316	160	68	64	178	16
25	29	51	43	43	62	52	344	154	54	67	180	13
26	29	48	44	35	56	50	372	202	55	60	148	12
27	29	41	55	30	82	46	382	231	76	53	78	25
28	29	38	88	25	74	54	388	168	73	64	77	37
29	30	40	115	25		41	398	140	71	62	77	38
30	45	30	67	25		42	350	129	68	66	47	36
31	41		53	25		41		122		76	27	
Total	880 *	1158 *	1097 *	781 *	916 *	1896 *	4999 *	6788 *	3320 *	1456 *	3675 *	852 *
Mean	28.4	38.6	35.4	25.2	32.7	61.2	167	219	111	43.7	119	28.4
Acre-Feet	1750	2300	2,180	1,550	1,820	3,760	9,920	13,460	6,590	2,690	7,290	1,690

Mean - 75.9
Acre-Feet - 55,000

TABLE 4

MEAN DAILY RELEASE IN CUBIC FEET PER SECOND
WEST VALLEY RESERVOIR
For Season Ending September 30, 1946

Day	May	June	July	August	September	October
1			20	30	10	15
2			20	30	10	15
3			20	30	10	15
4			20	30	15	15
5			0	30	15	15
6			0	30	15	15
7	NO DISCHARGE DURING MAY		0	30	15	15
8			0	30	15	15
9			0	30	15	** 15
10		*55	0	90	15	
11		55	0	90	15	
12		55	0	120	15	
13		110	0	120	15	
14		110	0	140	15	
15		110	0	140	15	
16		110	0	160	10	
17		110	16	160	10	
18		110	16	160	10	
19		110	16	160	10	
20		65	16	160	10	
21		65	25	160	10	
22		65	25	160	10	
23		0	25	160	10	
24		0	25	160	10	
25		0	25	160	0	
26		30	30	60	0	
27		30	30	60	15	
28		30	30	60	15	
29		30	30	60	15	
30		30	30	10	15	
31			30	10		
Total		1280	449	2830	360	135
Total Acre-Ft.		2540	891	5610	714	268

Total acre-feet for season - 10,000
*Reservoir first opened - Storage 17,590 acre-feet
**Reservoir last closed - Storage 7,980 acre-feet

TABLE 4A
WEST VALLEY RESERVOIR
SEASONAL OPERATION RECORD 1936 to 1946

	STORAGE ON HAND AS OF						Irrigation Release	Total ** Storage Differential
	Date First Obs.	Acre-Feet	Date Opened	Acre Feet	Date Closed	Acre-Feet	Acre-Feet	Open and Close
1935		Work was started on construction of dam in August 1935 and was completed late in 1936						
1936								
1937	May	8,000				0	7,000	
1938	Spilling		Aug. 3		Sept. 9		7,950	
1939			May 7		Aug. 22		11,680	
1940	May 30	16,620	May 30	16,620	Sept. 18	3,820	11,780	12,800
1941	April 13	17,840	July 11	17,490	Sept. 10	10,700	7,050	6,790
1942	April 11	17,950	June 24	17,700	Sept. 18	8,050	9,490	9,650
1943	April 15	18,230	July 17	17,400	*Nov. 23	7,510	9,500	9,890
1944	April 6	12,640	May 27	14,800	Sept. 29	6,700	10,200	8,100
1945	March 31	13,205	June 22	17,400	Sept. 25	7,980	8,360	9,420
1946	April 1	16,590	June 10	17,590	Oct. 9	7,470	10,000	10,120

*Last observation of season. Closed October 20th
**Includes all losses and accretions

TABLE 5
TOTAL SEASONAL IRRIGATION WATER SUPPLY OF THE
SOUTH FORK OF PIT RIVER ABOVE LIKELY
APRIL 1 TO SEPTEMBER 30, 1946

	April	May	June	July	Aug.	Sept.	Total
U.S.G.S. Record #693	9 920	13,460	6,590	2,690	7,290	1,690	41,640
Operation-West Valley Reservoir	+1,200	0	-2,540	- 900	-5,610	- 710	- 8,560
Consumption in Jess Valley	0	900	1,800	1,200	500	500	4,900
Full Natural Flow	11,120	14,360	5,850	2,990	2,180	1,480	37,980

WEST VALLEY RESERVOIR

Reservoir started spilling about April 16 and stopped spilling June 11 The largest flow to pass over the spillway was approx. 20 c.f.s.

No diversion was made through intake ditch from South Fork of Pit River into reservoir in 1946.

No consideration is given to consumptive use above West Valley dam or diversion from Cedar Creek into Tule Lake Reservoir in the above table. Cedar Creek and Tule Lake Reservoir will not contribute to the flow of South Fork of Pit River except possibly on extremely wet years.

TABLE 6
COMPARISON OF RUNOFF IN ACRE-FEET DURING IRRIGATION SEASON
SOUTH FORK OF PIT RIVER ABOVE LIKELY
From 1929 to 1946

Year	April	May	June	July	Aug.	Sept	Seasonal Total
			Acre Feet				
1929*	3,930	7,480	4,180	1,160	664	714	18,128
1930*	6,410	7,750	2,950	956	830	1,160	20,056
1931*	2,200	1,580	721	474	638	626	6,239
1932*	7,440	19,600	9,160	2,370	1,390	1,040	41,000
1933	3,370	5,260	4,290	898	910	857	15,585
1934	3,250	2,020	2,210	658	613	649	9,400
1935	8,020	17,920	9,790	2,050	1,470	966	40,216
1936	11,700	12,640	6,360	1,640	1,360	1,280	34,980
1937**	2,840	8,380	4,500	3,000	5.830	920	25,470
1938	10,960	29,700	11,840	3,020	7,950	3,100	66,570
1939*	5,600	5,790	4,630	3,410	5,570	855	25,855
1940**	3,260	8,610	5,000	4,150	6,540	1,680	31,240
1941**	4,100	13,630	6,220	3,520	6,990	1,660	36,140
1942**	9,400	17,640	12,400	3,410	8,490	2,320	53,660
1943**	16,210	16,400	11,960	4,650	9,400	3,110	61,730
1944**	3,470	9,110	9,210	3,570	6,500	4,550	36,410
1945**	5,110	20,870	15,310	3,490	7,970	3,910	56,660
1946**	9,920	13,460	6,590	2,690	7,290	1,690	41,640

Above data taken from the U.S.G.S. records of flow of the South Fork Pit River above Likely, California.

*Irrigation diverions above station were not regulated by watermaster.

**Includes storage release from West Valley Reservoir.

TABLE 7

SNOW SURVEY DEDUCTIONS

COMPARING FULL NATURAL RUNOFF, APRIL 1 to JULY 31
SOUTH FORK OF PIT RIVER ABOVE LIKELY, TO PINE CREEK NEAR ALTURAS
IN RELATION TO SNOW WATER CONTENT, ON EAGLE PEAK APRIL 1

Year	Natural Flow Pine Creek Acre-Feet	Natural Flow So.Fk. Pit River Acre-Feet	Water Content Eagle Peak Inches
1919	5,953		
1920	6,675		
1921	10,260		
1922	7,780		
1923	5,110		
1924	5,100		
1925	7,920		
1926	6,190		
1927	10,080		
1928	7,640		
1929	5,495		
1930	5,894	24,000	11.0
1931	2,615	11,000	5.2
1932	10,300	44,500	18.7
1933	5,665	19,800	14.3
1934	3,453	13,400	3.3
1935	9,293	45,300	22.6
1936	9,300	38,300	22.1
1937	5,510	25,800	17.5
1938	12,890	64,800	23.6
1939	4,604	19,320	10.4
1940	6,796	23,500	15.6
1941	7,180	31,480	13.8
1942	9,880	45,780	14.7
1943	13,700	52,580	23.7
1944	10,120	31,610	13.5
1945	14,800	56,660	22.2
1946	8,190	41,640	21.2
Total 17 Yr.	140,190	589,470	273.4
Total 28 Yr.	218,393		
17 Yr. Mean	8,246	34,670	16.1
28 Yr. Mean	7,800	32,800 *	15.2

*Computed

TABLE 8
DAILY DISCHARGE IN CUBIC FEET PER SECOND
FITZHUGH CREEK ABOVE CLARK RANCH
APRIL 11, TO SEPTEMBER 30, 1946.

Day	April	May	June	July	Aug.	Sept.
1		13.5	17.5	10.2	0.6	0.8
2		11.0	14.5	9.4	0.6	0.8
3		9.6	11.0	7.6	0.6	1.0
4		9.4	11.0	7.4	0.6	1.1
5		9.6	11.2	6.5	0.7	1.1
6		11.2	14.5	6.2	0.8	1.1
7		8.5	18.5	5.4	0.8	1.1
8		6.2	19.5	4.2	0.8	1.1
9		5.8	17.0	3.4	0.7	1.1
10		5.0	4.6	3.0	0.7	1.1
11	12.6	3.8	5.4	2.2	0.7	1.1
12	28.0	4.4	7.4	1.5	0.7	1.1
13	31.0	4.4	11.0	1.2	0.6	1.1
14	33.5	4.6	15.0	1.2	0.8	1.1
15	42.0	4.4	18.0	1.2	0.8	1.1
16	50.0	4.6	19.0	1.1	0.8	1.1
17	57.5	4.3	20.0	1.0	0.7	1.1
18	59.0	3.7	19.5	1.0	0.7	1.1
19	53.5	3.8	18.5	0.9	0.7	1.1
20	47.5	4.2	17.0	0.8	0.7	1.1
21	39.0	5.2	16.0	0.8	0.7	1.1
22	32.5	8.5	17.0	0.8	0.7	1.1
23	33.0	13.5	18.0	0.8	0.8	1.0
24	34.0	20.2	19.0	0.8	0.8	1.0
25	30.0	23.0	30.0	0.9	0.8	1.0
26	26.0	29.5	24.0	1.1	0.8	1.0
27	22.0	31.5	22.5	1.2	0.8	1.0
28	20.0	37.5	21.0	0.8	0.8	1.0
29	18.0	25.0	13.5	0.8	0.9	1.0
30	13.5	22.5	11.5	0.8	1.0	1.0
31		20.0		0.7	1.0	
Total	* 683.	368.	483.	85.	23.	32.
Mean	34.2	11.9	16.1	2.7	0.7	1.0
Runoff in A.F.	* 1355.	730.	958.	169.	45.	63.

*denotes 20 day period Total acre-feet for 173 day period 3320

TABLE 9
DAILY DISCHARGE IN CUBIC FEET PER SECOND
PINE CREEK NEAR ALTURAS AT POWER HOUSE
APRIL TO SEPTEMBER 30, 1946.

Day	April	May	June	July	Aug.	Sept.
1	17.0	60.5	41.8	23.0	13.4	8.7
2	17.0	63.5	40.8	25.5	14.5	10.4
3	16.0	64.5	37.5	25.5	12.5	9.5
4	17.0	64.5	36.0	22.5	11.0	9.5
5	18.0	65.5	35.0	22.5	10.7	9.3
6	18.0	65.5	36.0	22.0	10.5	9.3
7	18.0	67.5	37.0	21.5	10.5	9.3
8	17.0	65.5	37.0	21.5	10.5	9.3
9	16.5	65.5	37.0	21.0	10.5	9.3
10	15.7	65.5	37.0	21.0	10.5	9.3
11	15.0	61.5	37.0	19.0	11.0	9.3
12	16.5	57.5	36.0	18.0	10.7	9.3
13	19.4	55.5	34.5	17.0	11.0	8.2
14	21.0	53.0	34.5	16.5	11.0	9.0
15	23.0	50.7	33.5	15.5	13.4	7.9
16	28.0	48.0	31.5	16.5	13.4	9.1
17	33.5	48.0	32.5	16.5	13.4	7.9
18	37.5	47.0	32.5	15.5	13.4	7.5
19	40.8	49.5	31.5	13.0	13.4	7.4
20	37.5	50.7	31.0	12.0	11.0	7.4
21	35.0	54.5	30.0	12.5	11.0	7.4
22	33.5	54.5	28.5	12.5	10.7	7.4
23	37.5	53.0	32.5	12.5	10.0	7.4
24	41.8	49.5	31.0	12.5	10.4	7.5
25	46.0	49.5	28.0	12.5	9.0	7.7
26	49.5	57.5	26.0	12.5	10.4	7.7
27	50.7	46.0	25.8	14.5	10.7	7.7
28	54.5	44.0	25.5	14.5	10.7	7.9
29	57.5	44.0	25.5	12.5	11.5	7.9
30	60.5	43.0	23.0	12.5	9.0	8.2
31		41.8		13.4	8.4	
Total	909	1710.	985.	528.	348.	254.
Mean	30.3	55.2	32.8	17.0	11.2	8.4
Total Runoff: in A.F.	1800.	3390.	1950.	1050.	690.	504.

Total acre-feet for 183 day period - 9384

TABLE 10
COMPARISON OF AVERAGE SNOW WATER CONTENT ON
CEDAR PASS AND EAGLE PEAK, WITH APRIL 1 to
JULY 31 PINE CREEK RUNOFF

Year	Runoff Acre-Feet	Average Water Content - Inches		
		Cedar Pass	Eagle Peak	Average
1919	5953			
1920	6675			
1921	10260			
1922	7780			
1923	5110			
1924	5100			
1925	7920			
1926	6199			
1927	10080			
1928	7640			
1929	5495			
1930	5894	13.0	11.0	12.0
1931	2615	8.0	5.2	6.6
1932	10300	19.8	18.7	19.2
1933	5665	16.3	14.3	15.3
1934	3453	0.9	3.3	2.1
1935	9293	21.1	22.6	21.8
1936	9300	26.2	22.1	24.1
1937	5510	21.6	17.5	19.6
1938	12890	25.2	23.6	24.4
1939	4604	10.5	10.4	10.4
1940	6796	14.6	15.6	15.1
1941	7180	17.9	13.8	15.8
1942	9450	19.3	14.7	17.0
1943	13700	25.8	23.7	24.7
1944	8710	12.3	13.5	12.9
1945	14800	22.4	22.2	22.3
1946	8190	22.9	21.2	22.0
17 Yr. Total	138350	297.8	273.4	285.3
28 Yr. Total	216,562			
17 Yr. Mean	8,140	17.5	16.1	16.8
28 Yr. Mean	7,740	16.6*	15.3*	15.9*

* Computed

TABLE 11
DAILY RELEASE IN CUBIC FEET PER SECOND
BIG SAGE RESERVOIR
MAY 1 TO OCTOBER 8, 1946

Day	May	June	July	Aug.	Sept.	Oct.
1		27	55	40	95	7
2	* 6	27	17	45	95	7
3	6	27	17	45	95	7
4	6	27	17	50	95	7
5	6	27	17	50	95	7
6	6	27	17	56	5	7
7	6	27	17	56	5	7
8	6	27	17	56	5	** 7
9	6	27	17	56	5	
10	6	27	17	56	5	
11	6	55	17	56	5	
12	22	55	17	56	5	
13	22	55	17	56	5	
14	22	55	17	56	5	
15	22	55	17	56	5	
16	22	55	17	56	5	
17	22	55	17	56	5	
18	22	55	17	56	5	
19	22	55	17	95	5	
20	27	55	17	95	5	
21	27	55	17	95	5	
22	27	55	17	95	5	
23	27	55	17	95	5	
24	27	55	17	95	5	
25	27	55	17	95	5	
26	27	55	17	95	5	
27	27	55	17	95	5	
28	27	55	17	95	7	
29	27	55	17	95	7	
30	27	55	40	95	7	
31	27		40	95		
Total	560	1370	611	2193	606	56
Mean	18.7	45.7	19.7	70.7	20.2	7.0
Total Ac.Ft.	1,100	2,720	1,210	4,350	1,200	111

*Reservoir Opened
**Reservoir Closed

Total release for season - 10,700 acre-feet

TABLE 12
BIG SAGE RESERVOIR
SEASONAL OPERATION RECORD - 1935-1946

Year	Storage on Hand as of Date	Ac.Ft.	Date	Ac.Ft.	Total Decrease Ac.Ft.	Irrigation Release Ac. Ft.	Net Losses Ac. Ft.
1934	Apr.24	6,400	July 7	500	5,900	4,325	1,025
1935	May 12	15,400	Sept.15	6,300	9,100	3,750	5,350
1936	May 8	25,200	Sept. 6	12,900	12,300	6,850	5,450
1937	May 24	23,300	Sept. 6	9,600	13,900	8,270	5,630
1938	May 31	58,000	Sept.30	43,000	15,000	6,860	8,140
1939	Apr. 2	53,000	Sept.12	31,750	21,250	13,100	8,150
* 1940	May 9	51,700	Sept.22	32,600	19,100	10,700	8,400
* 1941	Apr.14	51,000	Sept. 7	39,000	12,000	7,270	4,730
* 1942	Apr.20	64,500	Sept. 5	51,000	13,500	6,190	7,310
* 1943	May 23	77,000	Sept.30	58,600	18,400	8,900	9,500
1944	May 11	61,200	Sept.30	45,400	15,800	7,410	8,390
1945	Apr. 1	57,800	Sept.30	47,200	10,600	9,120	1,480
1946	Apr.11	61,800	Oct. 8	41,900	19,900	10,700	9,200

* Includes sale of water to Big Valley users.

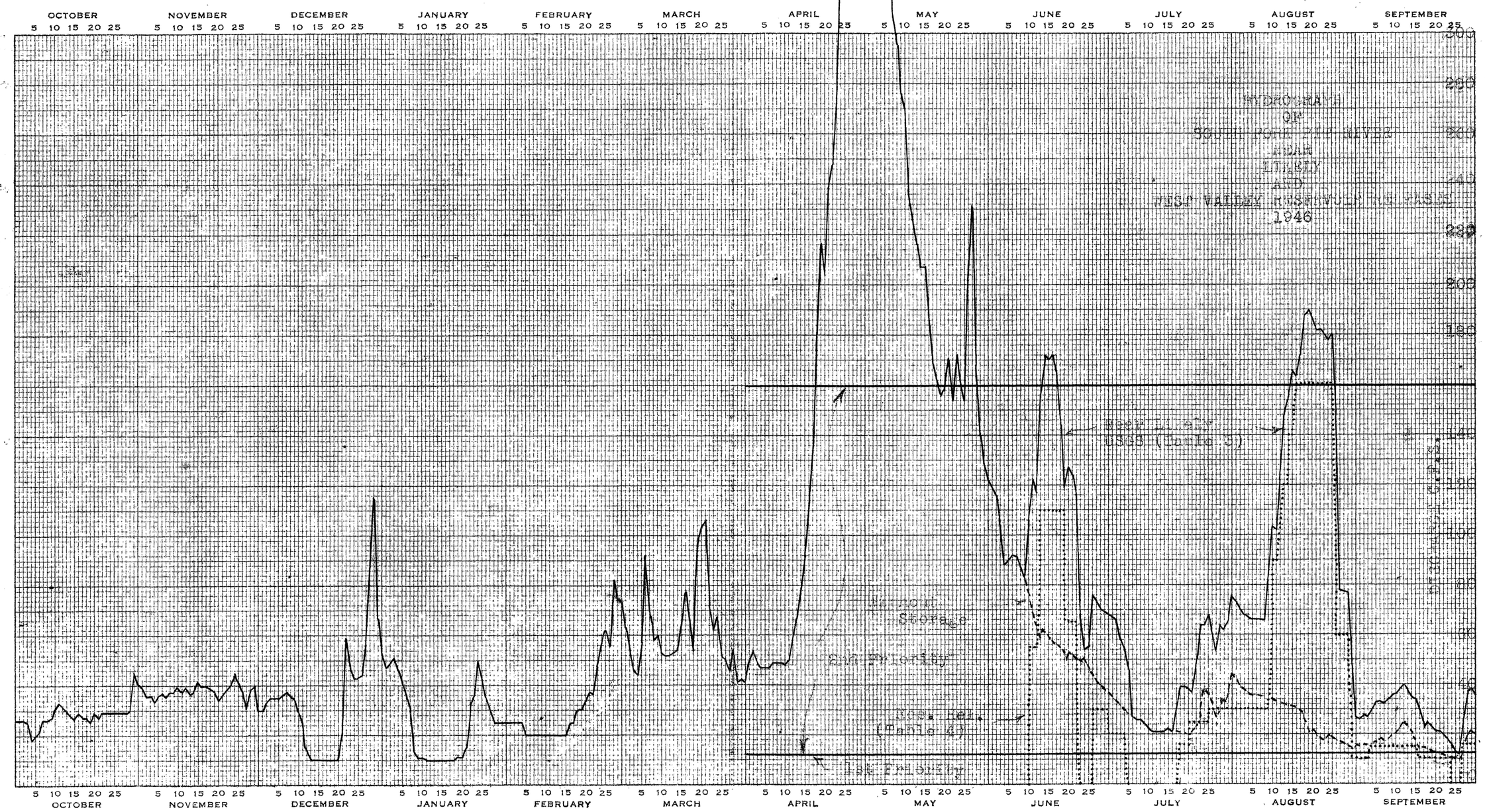
1940	1100 Ac. Ft.
1941	800 Ac. Ft.
1942	300 Ac. Ft.
1943	300 Ac. Ft.
1944	400 Ac. Ft.
1945	500 Ac. Ft.
1946	400 Ac. Ft.

TABLE 13
DAILY DISCHARGE IN CUBIC FEET PER SECOND
PIT RIVER NEAR CANBY
For Year Ending September 30, 1946

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	62	127	134	968	100	692	310	538	228	24	6.1	10
2	58	157	114	944	100	674	305	516	144	54	4.3	24
3	56	143	105	818	95	592	295	482	87	95	3.4	51
4	53	120	102	620	85	488	285	406	69	87	3.1	90
5	47	108	108	582	75	411	255	310	69	85	2.9	104
6	40	114	102	488	70	400	241	305	129	77	2.9	110
7	39	124	108	385	70	406	232	290	90	85	3.4	113
8	39	140	108	210	70	428	232	330	82	104	2.9	119
9	40	154	108	190	70	422	196	285	72	82	3.1	116
10	42	172	102	180	70	385	196	154	56	82	5.1	95
11	42	157	95	170	70	375	223	24	35	74	4.3	51
12	45	154	85	160	70	380	236	9.0	25	58	4.6	38
13	64	147	80	150	70	390	315	258	24	51	8.5	29
14	66	147	75	140	80	400	335	275	27	51	17	25
15	64	150	70	130	98	416	350	72	26	47	32	30
16	83	161	69	130	116	433	370	171	29	44	37	27
17	62	191	66	130	132	477	411	236	25	42	40	29
18	37	180	65	130	132	504	444	223	38	40	49	33
19	13	207	65	130	158	587	488	223	47	37	72	32
20	9.0	236	74	130	192	614	516	184	92	35	69	30
21	7.5	288	81	140	285	770	554	188	119	32	56	27
22	6.6	261	137	147	365	878	565	188	101	30	47	26
23	5.6	195	199	147	433	842	538	179	98	29	44	27
24	17	165	279	166	516	770	488	192	158	27	51	25
25	76	165	316	170	620	650	472	196	166	24	101	18
26	117	165	370	160	662	494	472	205	98	24	101	14
27	100	172	465	140	662	395	488	196	77	24	60	12
28	97	165	586	120	662	365	510	214	65	20	40	10
29	81	191	886	110	———	380	516	228	56	15	22	9.0
30	100	157	1140	100	———	360	532	270	26	8.5	12	8.0
31	111		1060	100		325		270		7.0	11	
Total	1679.7*	5013 *	7354 *	8285 *	6128 *	15703 *	11370 *	7617 *	2358 *	1494.5*	915.6*	1332.6*
Mean	54.2	167	237	267	219	507	379	246	78.6	48.2	29.5	44.4
Acre-Feet	3,330	9,940	14,590	16,430	12,150	31,150	22,550	15,110	4,680	2,960	1,820	2,640

Year Mean - 190 Acre-Feet - 137,400

PLATE 1



K & E CO., N. Y.
38573

PLATE 2

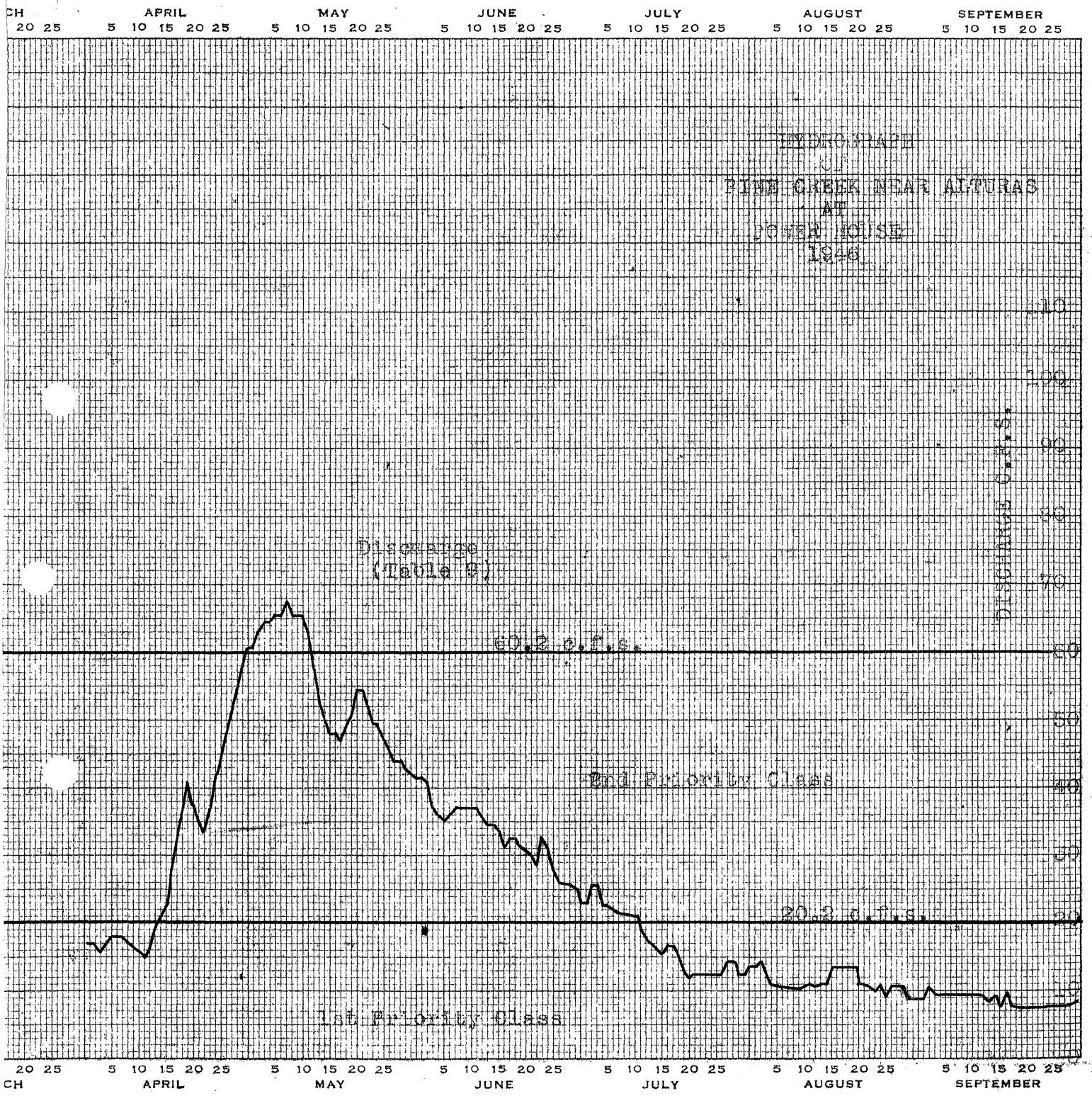
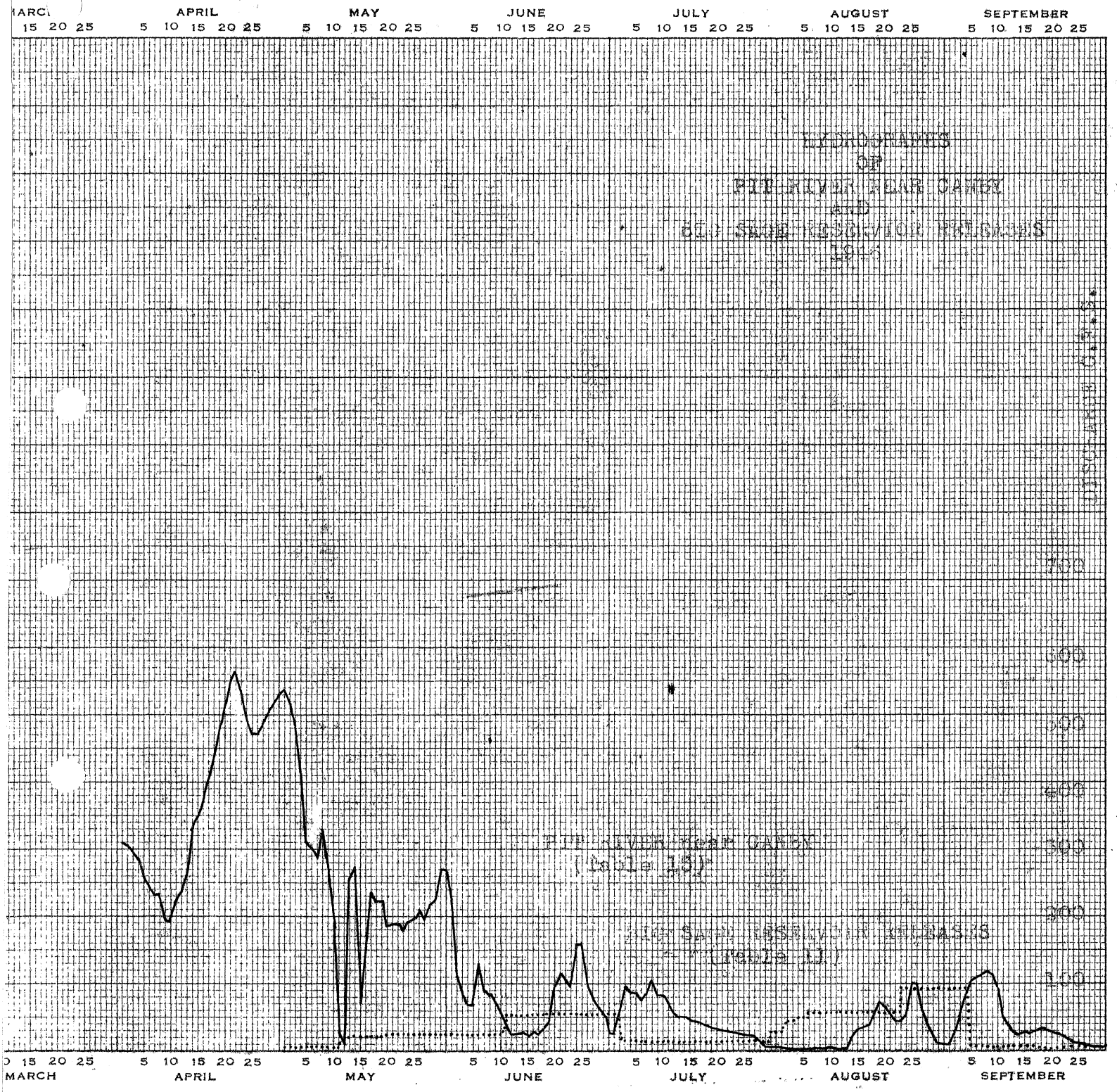

HYDROGRAPH
OF
PINE CREEK NEAR ALTURAS
AT
POWER HOUSE
1946
Discharge
(Table 9)
60.2 c.f.s.
2nd Priority Class
20.2 c.f.s.
1st Priority Class
DISCHARGE C.F.S.
110
100
90
80
70
60
50
40
30
20
10
0
CH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
20 25
5 10 15 20 25

PLATE 3



MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
15 20 25
5 10 15 20 25
HYDROGRAPHS
OF
PIT RIVER NEAR CANBY
AND
BIG SAME RESERVOIR RELEASES
700
600
500
400
300
200
100
PIT RIVER near CANBY
(Table 15)
BIG SAME RESERVOIR RELEASES
(Table 11)