

**SANTA ANA RIVER WATERMASTER  
FOR  
ORANGE COUNTY WATER DISTRICT Vs. CITY OF CHINO, et al  
CASE No. 117628 – COUNTY OF ORANGE**

**TENTH  
ANNUAL REPORT  
OF THE  
SANTA ANA RIVER WATERMASTER**

**1979-80**

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**MARCH 30, 1981**

# SANTA ANA RIVER WATERMASTER

FOR  
ORANGE COUNTY WATER DISTRICT VS. CITY OF CHINO, ET AL  
CASE NO. 117628 - COUNTY OF ORANGE

WATERMASTER  
MAX BOOKMAN  
WILLIAM J. CARROLL  
JAMES C. HANSON  
DONALD L. HARRIGER  
WILLIAM R. MILLS, JR.

MAILING ADDRESS  
P. O. BOX 5367  
ORANGE, CALIFORNIA 92667  
TELEPHONE: (714) 835-4447

March 30, 1981

To: Clerk of Superior Court of Orange County  
and all Parties

Re: Watermaster Report for 1979-80

Gentlemen:

We have the honor of submitting herewith the Tenth Annual Report of the Santa Ana River Watermaster.

The principal findings of the Watermaster for the water year 1979-80 are as follows:

## At Prado

(1) Base Flow at Prado	82,685 acre-feet
(2) Annual Weighted TDS of Total Flow	353 ppm
(3) Annual Adjusted Base Flow	106,595 acre-feet
(4) Cumulative Adjusted Base Flow	582,553 acre-feet
(5) Cumulative Entitlement of OCWD	420,000 acre-feet
(6) Cumulative Credit	162,553 acre-feet
(7) One-third of Cumulative Debit	0 acre-feet
(8) Minimum Required Base Flow in 1980-81	34,000 acre-feet

## At Riverside Narrows

(1) Base Flow at Riverside Narrows	25,549 acre-feet
(2) Annual Weighted TDS of Base Flow	676 ppm
(3) Annual Adjusted Base Flow	25,549 acre-feet
(4) Cumulative Adjusted Base Flow	190,646 acre-feet
(5) Cumulative Entitlement of CBMWD and WMWD	152,500 acre-feet
(6) Cumulative Credit	38,146 acre-feet
(7) One-third of Cumulative Debit	0 acre-feet
(8) Minimum Required Base Flow in 1980-81	12,420 acre-feet

The above findings show that at the end of the 1979-80 water year Chino Basin Municipal Water District and Western Municipal Water District have a cumulative credit of 162,553 acre-feet to their Base Flow obligation at Prado Dam. During the 1980-81 water year the minimum required Base Flow at Prado Dam is 34,000 acre-feet. San Bernardino Valley Municipal Water District has a cumulative credit of 38,146 acre-feet to its Base Flow obligation at Riverside Narrows and its minimum Base Flow obligation during the 1980-81 water year is 12,420 acre-feet.

SANTA ANA RIVER WATERMASTER

Clerk of Superior Court of Orange County  
and All Parties

Page Two

The total flow at Prado for the 1979-80 water year, less Nontributary Flow established a new record amounting to 527,938 acre-feet. The previously recorded record flow (since 1894-95) occurred in 1968-69 when the discharge amounted to 375,500 acre-feet. This 527,938 acre-feet amount included an estimated 27,000 acre-feet of water released from Lake Elsinore into Temescal Creek during the period March 7, 1980 through June 13, 1980. Since water discharged to Temescal Creek from Lake Elsinore reached the Santa Ana River during a Storm Flow period, it was deemed to be Storm Flow. A discussion of the Lake Elsinore discharge is contained in Chapter II of this report.

From the latter part of November until the early part of January of the 1979-80 water year, a small amount of State water (Nontributary Flow) was purchased by Orange County Water District and released into San Antonio Creek near Upland from the Rialto Reach of the Foothill Feeder at OC-59. The Committee found that this small amount of water did not permit the completion of its study of methods to determine the quantity and quality of State water that actually passed Prado. Therefore, the Committee did not make a final determination but intends to continue its investigation of this matter and will make a final determination and adjustment at some subsequent time.

Sincerely yours,

SANTA ANA RIVER WATERMASTER

BY:



Max Bookman



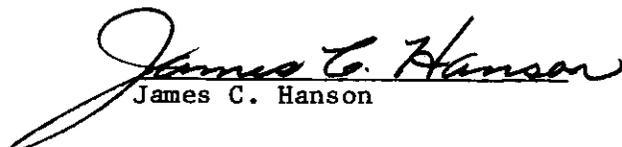
Donald L. Harriger



William J. Carroll



William R. Mills, Jr.



James C. Hanson

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## CHAPTER I WATERMASTER ACTIVITIES

This is the tenth annual report of the Santa Ana River Watermaster required by the stipulated Judgment in the case of Orange County Water District vs City of Chino, et al, entered by the court on April 17, 1969. This stipulated Judgment became effective on October 1, 1970 and contains a declaration of rights of the entities in the lower area of the Santa Ana River Basin downstream of Prado Dam as against those in the upstream area, and provides a physical solution to implement the provisions of the Judgment. The physical solution accomplishes, in general, a regional intrabasin allocation of the surface flow of the Santa Ana River System. All defendants and cross-defendants were dismissed except the four major public water districts within the Santa Ana River Watershed; namely, the San Bernardino Valley Municipal Water District, Western Municipal Water District of Riverside County, Chino Basin Municipal Water District and Orange County Water District (see Plate 1). This arrangement leaves to each of the major hydrologic units in the watershed the determination and regulation of individual rights therein and the development and implementation of its own basin management plan. The history of the litigation and the Summary of the Judgment were included in the annual report for the water year 1974-75.

In order to administer the provisions of the Judgment, the court appointed a Watermaster composed of five persons. During the 1979-80 water year the Santa Ana River Watermaster Committee consisted of Max Bookman, William J. Carroll, James C. Hanson, William R. Mills, Jr. and Donald L. Harriger. Mr. Bookman served as Chairman during the 1979-80 water year, and Mr. Mills served as Secretary. The office of the Santa Ana River Watermaster is located at 972 Town and Country Rd., P.O. Box 5367, Orange, California 92667.

Section 7(c) of the Judgment requires the Watermaster to report to the Court and to each party not more than five months after the end of each water year starting with 1970-71. Due to delays in obtaining the necessary basic data for this water year, a request for a 60-day extension in submitting this report was approved by the Court. The items to be reported upon are listed in the letter of transmittal of this report.

### **Stream Flow and Water Quality Measurements**

Stream flow measurements and water quality data required by the Watermaster are, for the most part, furnished by the U.S. Geological Survey (USGS). The financing of the cooperative monitoring program with the USGS was shared by the parties to the Judgment. Such costs are set forth in Table 1. The USGS measured and computed the mean daily discharge of the Santa Ana River at Mission Boulevard, MWD Crossing, Prado Park, and below Prado Dam as well as the daily discharge of the Riverside Water Quality Control Plant into the Santa Ana River. Discharge measurements were also provided for two smaller streams tributary to Prado Reservoir; Chino Creek at Schaefer Avenue and Cucamonga Creek near Mira Loma.

The 1979-80 discharge record for the USGS gaging station, Santa Ana River below Prado Dam, is considered by the USGS to be a "Good" record. Some twenty four direct discharge measurements were made during the water year to verify the new rating curve which was obtained after reconstruction of the control structure in 1979. Seven of the direct discharge measurements were for discharges in excess of 2,000 cubic feet per second. The maximum daily discharge, after regulation in Prado Reservoir, occurred following the February storms and amounted to 6,440 cubic feet per second. The mean annual discharge was approximately 740 cubic feet per second.

Additional data related to the operation of Prado Reservoir were obtained from the Corps of Engineers and water quality data were supplied to the Watermaster by the State Department of Water Resources, Riverside and Corona City Sanitation Departments and the Chino Basin Municipal Water District. Data regarding the discharge of State water into the Santa Ana River were provided by the Metropolitan Water District and the State Department of Water Resources. The Riverside County Flood Control and Water Conservation District furnished records pertaining to the releases from Lake Elsinore to Temescal Creek.

During the 1979-80 water year, collection of reliable discharge data at the USGS gaging station, Santa Ana River at MWD Crossing (Riverside Narrows) continued to be a difficult problem. The concrete low-flow control structure, submerged by sand during previous years remained inoperative and during the year the downstream movement of sand deposits seriously affected the stage-discharge relationship for the station. The bubbler gage orifice line was destroyed on

TABLE 1

**COSTS TO THE PARTIES AND USGS FOR MEASUREMENTS WHICH PROVIDE  
DATA USED BY THE SANTA ANA RIVER WATERMASTER  
July 1, 1979 to September 30, 1980<sup>(1)</sup>**

**SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT**

At Riverside Water Quality Control Plant		
Surface Water Gage	\$ 667.	
Water Quality Monitor/TDS Samples	1,383.	
At Riverside Narrows (MWD Crossing)		
Water Quality Monitor/TDS Samples	570.	
Dozer	584.	
At Prado Park		
Surface Water Gage	570.	
Dozer	120.	
At Mission Boulevard		
Surface Water Gage	440.	
Dozer	180.	\$ 4,514.

**WESTERN MUNICIPAL WATER DISTRICT**

Same as SBVMWD	\$ 4,513. (2)	
Cucamonga Creek Discharge	1,170.	
Chino Creek Discharge	780.	6,463.

**CHINO BASIN MUNICIPAL WATER DISTRICT**

Same as WMWD		6,463.
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**ORANGE COUNTY WATER DISTRICT**

At Prado Dam		
Water Quality Monitor/TDS Samples, Water Quality Sampling and Conductivity Programs	\$11,800.	
At Prado Park		
Surface Water Gage	1,140.	
Dozer	240.	
At Mission Boulevard		
Surface Water Gage	880.	
Dozer	360.	
Chino Creek		
Surface Water Gage	780.	
Cleaning Control Area	1,600.	16,800.

**TOTAL FOR PARTIES** \$34,240.

**UNITED STATES GEOLOGICAL SURVEY** 34,240.

**GRAND TOTAL** \$68,480.

- (1) Accounting and Billing period changed to coincide with new U.S.G.S. fiscal year.  
(2) Difference results from rounding.

January 29, 1980 and remained inoperative until April 25. Twenty direct discharge measurements were made during the season and these data together with discharge records obtained at Prado Park, Mission Blvd. and Mentone were utilized to develop the record. The USGS is of the opinion that the quality of the final record for this station should be considered "Poor."

The electrical conductivity equipment at MWD Crossing, a target of continuing vandalism, was removed during the 1978-79 water year. Data necessary for implementation of the water quality provisions of the Judgment were obtained by the analysis of grab samples taken during the year by the USGS, the City of Riverside, and the Department of Water Resources.

#### **Compilation and Analysis of Basic Data**

The Watermaster has established procedures for compiling and analyzing the basic data necessary to carry out the provisions of the Judgment. The records maintained by the Watermaster have been listed in prior annual reports. Based on these data, determinations were made of the Base Flow, Storm Flow, Nontributary Flow and relationships between electrical conductivity (EC) and total dissolved solids (TDS). These determinations are explained in detail in Chapters III and IV.

#### **Administration Costs**

In accordance with Paragraph 7(d) of the Judgment, the fees and expenses of each of the members of the Watermaster are to be borne by the district which nominated such member. All other Watermaster administrative costs and expenses are borne by the parties, with OCWD paying 40 percent of the cost and CBMWD, SBVMWD and WMWD each paying 20 percent of the cost. The Judgment further provides that the Watermaster may from time to time, at its discretion, require advances of operating capital from the parties.

At its meeting on June 1, 1979 the Watermaster adopted a budget for the fiscal year 1979-80 in the amount of \$10,000. At its meeting on April 22, 1980 the Watermaster adopted a budget for the fiscal year 1980-81 in the amount of \$10,000. Table 2 shows the items and amounts included in said budgets together with actual expenses for the fiscal year 1979-80.

**TABLE 2**  
**SANTA ANA RIVER WATERMASTER BUDGET AND EXPENSES**

	July 1, 1979 to June 30, 1980 Budget	July 1, 1979 to June 30, 1980 Expenses	July 1, 1980 to June 30, 1981 Budget
Administration	\$ 2,500.00	\$1,649.00	\$ 2,500.00
Support Engineering Services	6,000.00	4,061.00	6,000.00
Reproduction of Annual Report	<u>1,500.00</u>	<u>1,565.00</u>	<u>1,500.00</u>
Total	\$10,000.00	\$7,275.00	\$10,000.00

An audit prepared by Diehl, Evans and Company showing the details of income and expenses of the Santa Ana River Watermaster for the fiscal year 1979-80 is included herein as Appendix F.

#### Summary of Findings

Presented in Table 3, is a ten year summary of findings by the Watermaster for the period 1970-71 through 1979-80. This table will be updated in subsequent annual reports.

Note that at both Riverside Narrows and at Prado, the Base Flow obligations provided for in the Judgment have been met and cumulative credits have been established.

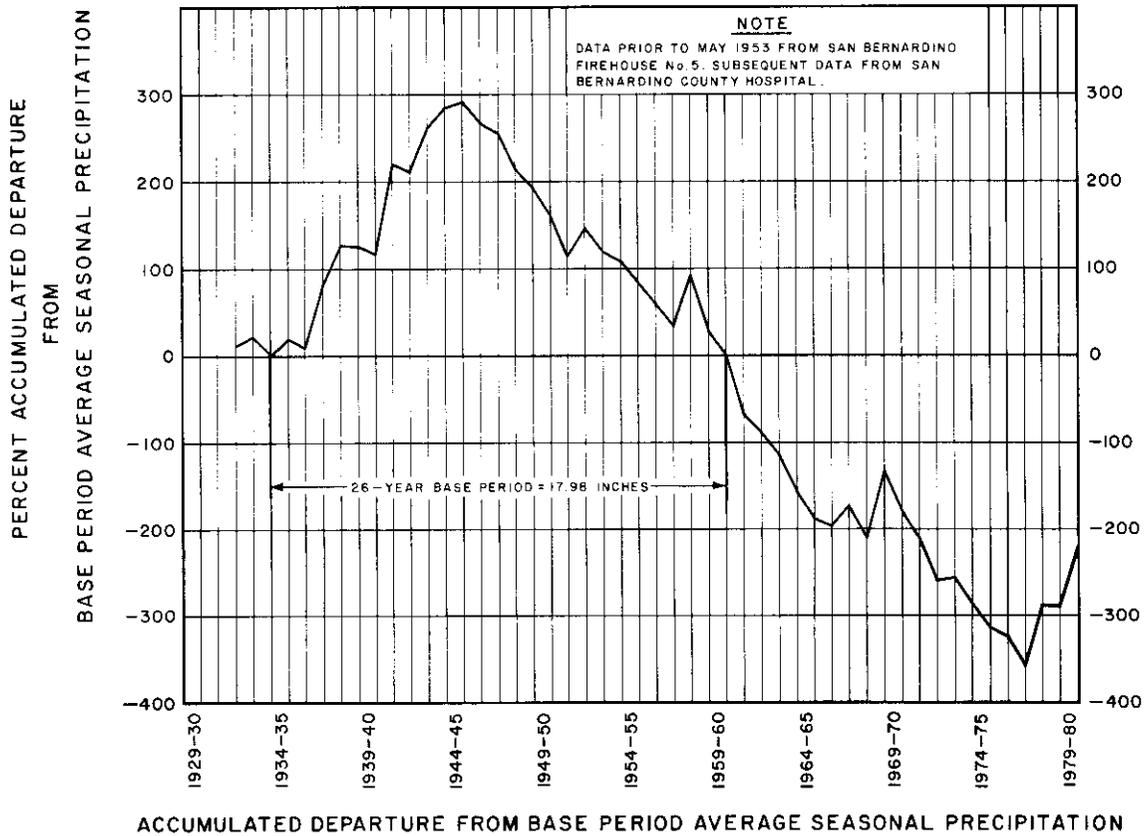
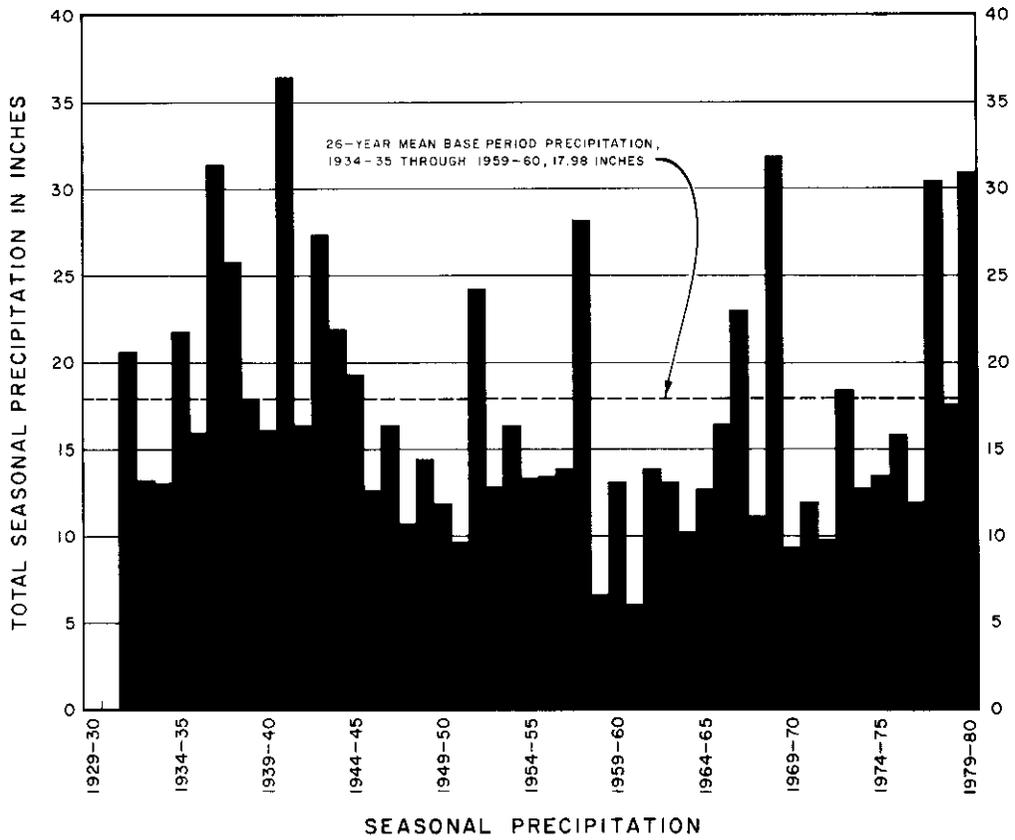
**TABLE 3**  
**SUMMARY OF FINDINGS AT PRADO**

Water Year	Rainfall inches <sup>(1)</sup>	Total <sup>(2)</sup> Flow A.F.	Base Flow A.F.	Weighted TDS <sup>(3)</sup> PPM	Adjusted Base Flow A.F.	Cumulative Credit A.F.
1970-71	11.97	51,864	38,402	727	38,402	(3,598)
1971-72	9.62	51,743	40,416	707	40,416	(5,182)
1972-73	18.46	77,484	48,999	638	51,531	4,349
1973-74	12.72	63,312	43,769	704	43,769	6,118
1974-75	13.49	64,159	52,504	687	53,073	17,191
1975-76	15.86	59,355	45,562	688	46,018	21,209
1976-77	11.95	63,053	48,378	668	49,668	28,877
1977-78	30.47	252,865	58,516	384	73,925	60,802
1978-79	17.51	134,715	72,069	582	79,156	97,958
1979-80	30.93	527,938	82,685	353	106,595	162,553

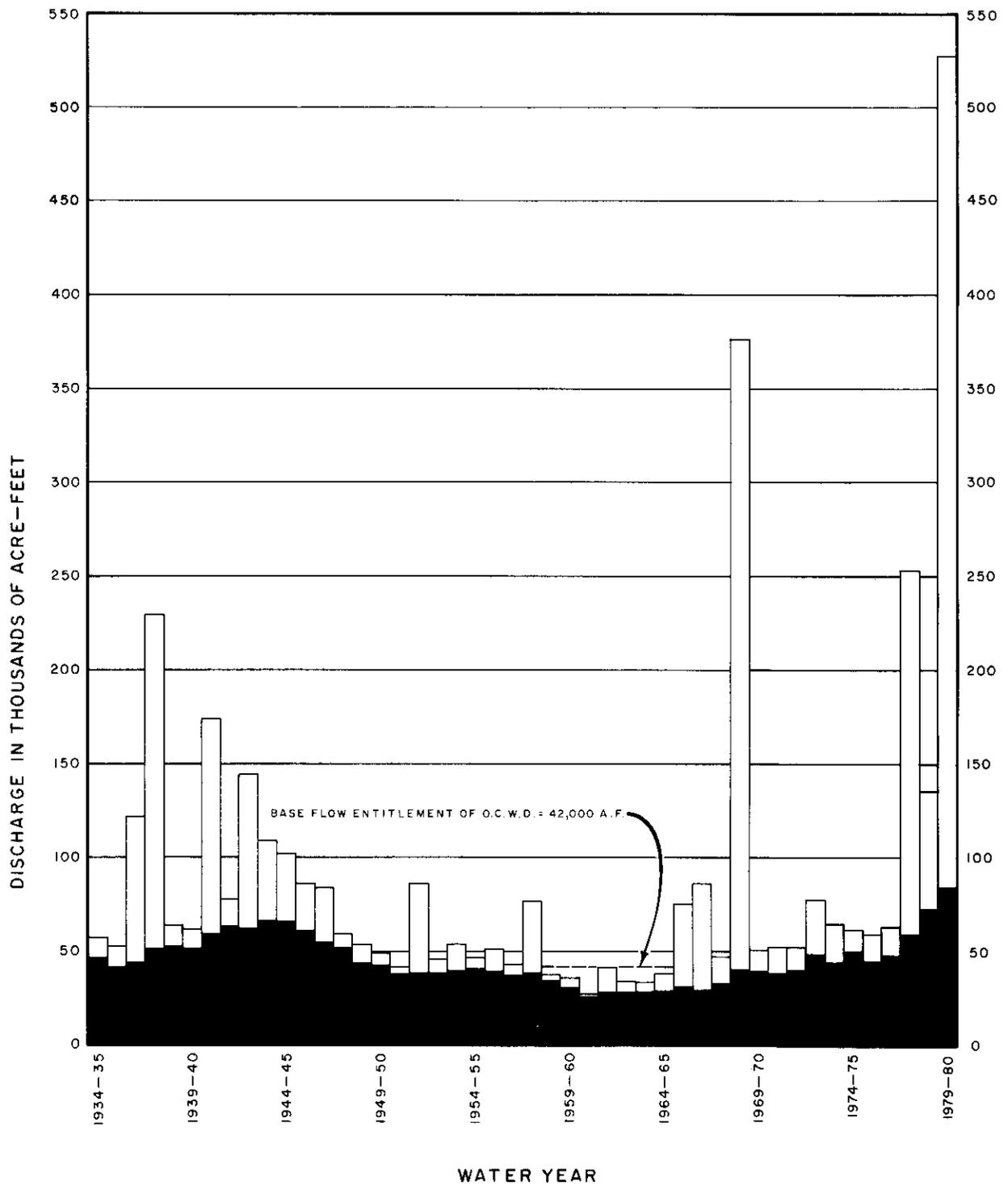
**AT RIVERSIDE NARROWS**

Water Year	Rainfall inches <sup>(1)</sup>	Total <sup>(2)</sup> Flow A.F.	Base Flow A.F.	Weighted TDS <sup>(3)</sup> PPM	Adjusted Base Flow A.F.	Cumulative Credit A.F.
1970-71	11.97	24,112	17,061	704	17,012	1,762
1971-72	9.62	22,253	16,157	712	16,017	2,529
1972-73	18.46	32,571	17,105	700	17,105	4,384
1973-74	12.72	24,494	16,203	700	16,203	5,337
1974-75	13.49	19,644	15,445	731	15,100	5,187
1975-76	15.86	26,540	17,263	723	16,977	6,914
1976-77	11.95	23,978	18,581	722	18,286	9,950
1977-78	30.47	181,760	22,360	726	21,941	16,641
1978-79	17.51	47,298	26,590	707	26,456	27,847
1979-80	30.93	254,077 <sup>(4)</sup>	25,549	676	25,549	38,146

- (1) Measured at San Bernardino County Hospital.
- (2) Does not include Nontributary Flow.
- (3) For Total Flow at Prado and Base Flow only at Riverside Narrows.
- (4) Excludes Nontributary Flow and includes Rubidoux Watermaster.



VARIATION IN PRECIPITATION AT SAN BERNARDINO



**NOTE**  
 DISCHARGE EXCLUDES IMPORTED M.W.D. COLORADO RIVER OR STATE WATER PROJECT WATER BEING TRANSPORTED IN THE SANTA ANA RIVER.

**LEGEND**  
 [White Box] STORM FLOW  
 [Black Box] BASE FLOW

**DISCHARGE OF SANTA ANA RIVER BELOW PRADO DAM**

## **CHAPTER II WATER SUPPLY CONDITIONS**

The precipitation in the Santa Ana River Watershed during 1979-80, as represented by rainfall measured at San Bernardino, was well above normal in terms of the Base Period average. As a result of this abundant rainfall the total flow of the Santa Ana River during the 1979-80 water year exceeded all previous records with the Base Flow at Prado showing a substantial increase over the 1978-79 amount.

### **Precipitation During 1979-80**

During the 1979-80 water year, the precipitation at the San Bernardino County Hospital amounted to 30.93 inches, which is 172 percent of the Base Period average. Most of the precipitation occurred during the months of January, February and March. The maximum monthly precipitation of 12.03 inches occurred over a 9 day period in February.

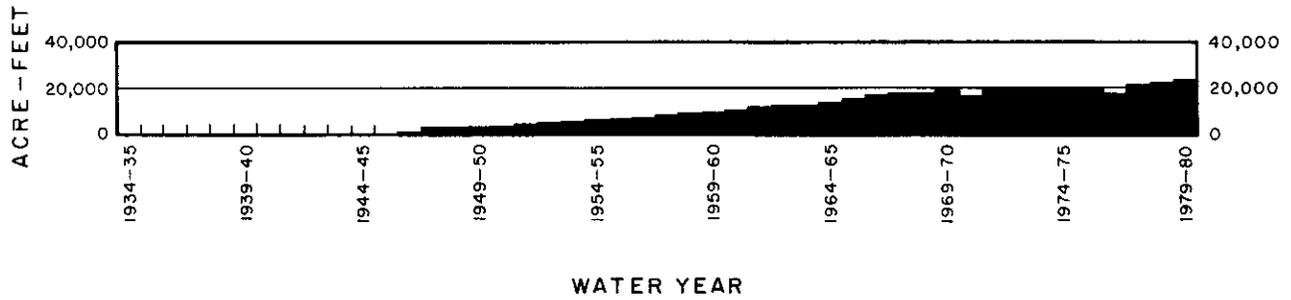
Figure 1 shows the seasonal precipitation from 1931-32 through 1979-80 and the accumulated departure from the 1934-35 through 1959-60 Base Period average.

### **Runoff During 1979-80**

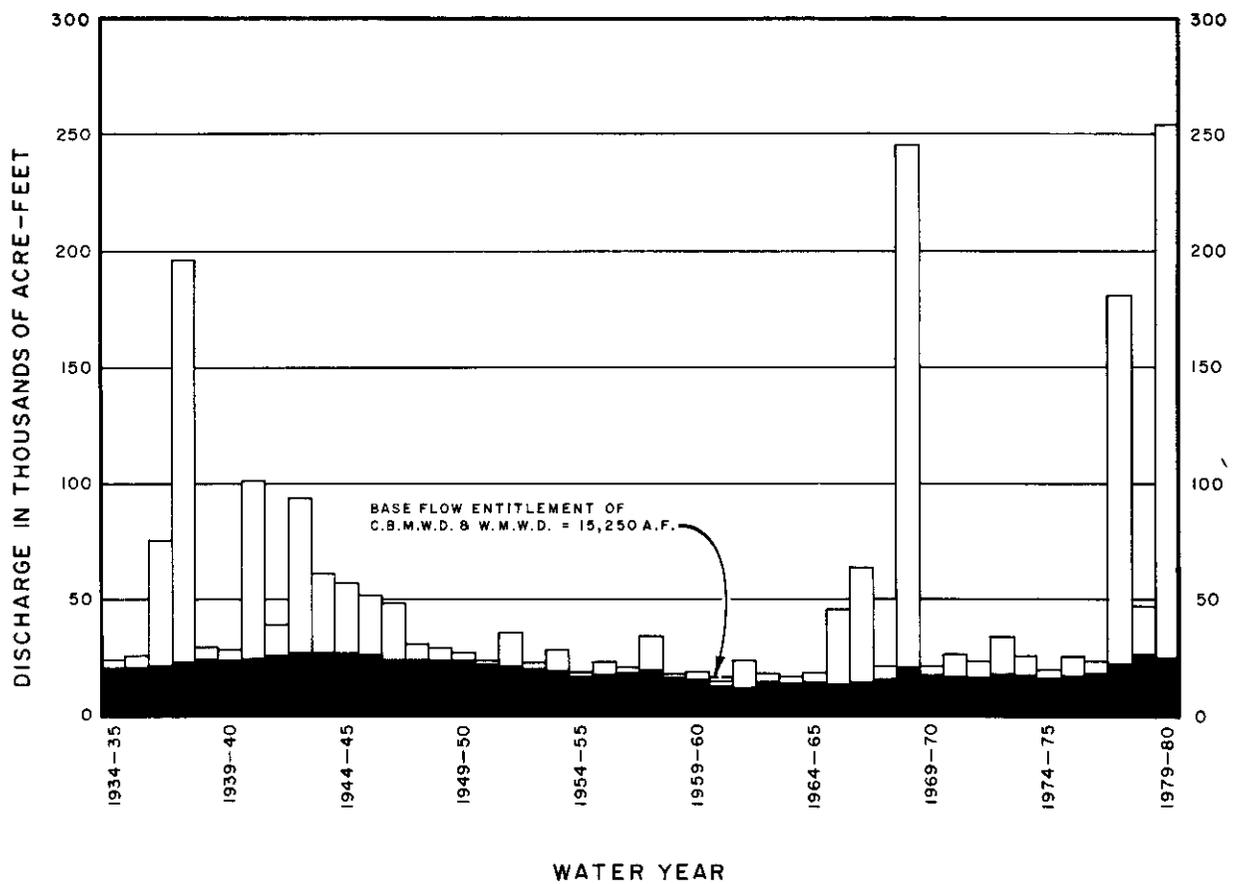
#### **Below Prado Dam**

The total seasonal flow at Prado for the 1979-80 water year less Nontributary Flow but including Lake Elsinore releases established a new record amounting to 527,938 acre-feet. Prior years of high flow, namely 1906-07, 1915-16, 1921-22, 1937-38, 1968-69 and 1977-78 amounted to 247,500, 302,700, 305,200, 229,700, 375,500 and 252,800 acre-feet respectively. This 1979-80 record flow is well above the 26-year Base Period (1934-35 through 1959-60) average of 78,780 acre-feet per year.

Since 1943-44, the Base Flow at Prado Dam progressively decreased and reached a low in 1960-61 of 26,190 acre-feet. Since that year, the Base Flow has



### SEWAGE EFFLUENT FROM RIVERSIDE WATER QUALITY CONTROL PLANTS



**NOTE**

DISCHARGE EXCLUDES SEWAGE EFFLUENT FROM THE RIVERSIDE WATER QUALITY CONTROL PLANTS AND IMPORTED M.W.D. COLORADO RIVER OR STATE WATER PROJECT WATER BEING TRANSPORTED IN THE SANTA ANA RIVER.

**LEGEND**



### DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS

generally increased. During the ten-year period (1970-71 through 1979-80) since the Judgment went into effect, the Base Flow, unadjusted for quality, has averaged 53,130 acre-feet per year. This compares to the 26-year Base Period average of 47,470 acre-feet and the Base Flow requirements under the Judgment of 42,000 acre-feet. The 1979-80 Base Flow amounted to 82,685 acre-feet, an increase of 29,555 acre-feet over the ten-year average.

The calculated inflow to Prado Reservoir during the month of February amounted to 207,846 acre-feet or 39 percent of the seasonal total. The maximum storage in Prado Reservoir occurred on February 21 when 111,080 acre-feet (about 56 percent of the reservoir capacity at spillway level) was in storage. This resulted in releases of over 6,000 cfs from Prado Reservoir. Storage of water in Prado Reservoir occurred during most of the year and the reservoir was not empty until August 18, 1980.

Figure 2 shows the Storm and Base Flow components of the Total Flow in the Santa Ana River below Prado Dam during the period 1934-35 through 1979-80.

#### **At Riverside Narrows**

The Total Flow less Nontributary Flow of the Santa Ana River at Riverside Narrows for the 1979-80 water year was 253,817 acre-feet.

The Base Flow at Riverside Narrows decreased from 27,120 acre-feet in 1943-44 to an all-time low of 13,450 acre-feet in 1965-66. Since that time, the Base Flow at Riverside Narrows has gradually increased. During the ten-year period 1970-71 through 1979-80 the Base Flow has averaged 19,231 acre-feet per year. The 1979-80 Base Flow amounted to 25,549 acre-feet, an increase of 6,318 acre-feet over the ten-year average.

Figure 3 shows the components of Total Flow in the Santa Ana River at Riverside Narrows for the period from 1934-35 through 1979-80.

#### **Sewage Discharges**

A portion of the Base Flow at Prado is made up of treated sewage effluent discharged from the Riverside Water Quality Control Plant, the Chino Basin Municipal Water District's Regional Plants No. 1 and 2 and the City of Corona Treatment Plant.

Since the late 1940's, the sewage effluent from the Riverside Water Quality Control Plant, which is discharged at the Riverside Narrows between Pedley

Bridge and the MWD Crossing, has been increasing in amount. In 1949-50, the amount of treated effluent discharged was 3,960 acre-feet. By 1959-60, the discharge had increased to 9,900 acre-feet. By 1969-70, the discharge of sewage effluent from the treatment plant was 18,657 acre-feet. The wastewater discharge of the Riverside Water Quality Control Plant during 1979-80 was 22,910 acre-feet.

CBMWD's Regional Plants No. 1 and 2 began discharging to the Santa Ana River in 1971-72 and 1973-74 respectively and in 1979-80 discharged 19,936 acre-feet of effluent to the Santa Ana River.

The City of Corona Sewage Treatment Plant discharged 3,192 acre-feet of treated sewage effluent to the River in 1970-71. This discharge has increased to 5,364 acre-feet in 1979-80.

Table 4 sets forth the amount of treated sewage effluent discharged to the Santa Ana River between Riverside Narrows and Prado Dam during the period 1970-71 through 1979-80. The values show that over the last 10 years, the amount of treated wastewater discharged to the river between these two points has more than doubled.

#### **LAKE ELSINORE RELEASES**

During 1979-80, water originating in Lake Elsinore was caused to be discharged to the Santa Ana River via Temescal Creek. Until 1979-80, Lake Elsinore had not overflowed since 1916-17. During this 63 year period, the overflow channel was filled with debris and was occupied for other uses on the premise that the lake would never again overflow. For these reasons Lake Elsinore and its tributary drainage area was not included in the Santa Ana River Watershed as shown on Exhibit A of the Orange Co. Settlement.

During 1979-80 inflow to the lake raised the lake level above the overflow crest of the original outflow channel but due to constrictions noted above, discharge through the outflow channel could not take place.

The result was extensive flooding of improvements surrounding the lake causing damages estimated in the millions of dollars. In February 1980, the area surrounding the lake was designated as a disaster area. The U.S. Corps of Engineers undertook emergency relief work to clear the natural channel so as to lower the extraordinarily high lake level and provide relief to the flood area. The excavation of the channel was completed on March 7, 1980 allowing outflow to occur until the lake level was lowered to elevation 1261.5. Since the water

**TABLE 4**  
**TREATED SEWAGE EFFLUENT DISCHARGED TO THE SANTA ANA RIVER**  
**RIVERSIDE NARROWS TO PRADO DAM**  
**(AC.FT/YEAR)**

Year	Riverside	Corona	CBMWD #1	CBMWD #2	Total
1970-71	18,619	3,192	0	0	21,811
1971-72	19,006	3,227	6,742	0	28,975
1972-73	19,061	3,342	10,384	0	32,878
1973-74	19,561	3,507	11,435	2,322	36,825
1974-75	19,343	4,015	14,960	2,282	40,600
1975-76	19,579	4,699	15,448	2,947	42,673
1976-77	18,766	5,012	14,638	3,381	41,797
1977-78	20,314	5,201	14,651	4,061	44,227
1978-79	21,068	5,393	15,035	5,069	46,565
1979-80	22,910	5,364	14,413	5,523	48,210

discharged to Temescal Creek from Lake Elsinore reached the Santa Ana River during a Storm Flow period, it was deemed by the Watermaster to be Storm Flow.

In order to protect against a further flooding should the 1980-81 rainy season again result in unusually high inflow to the lake, a project was undertaken to lower the water surface to elevation 1,255 by installing pumps and discharging water into the outflow channel. That discharge commenced on October 18, 1980. Since that discharge occurred during the water year 1980-81, the data of that operation will be considered and reported in next year's annual report.

### **CHAPTER III**

#### **BASE FLOW AT PRADO**

This chapter deals with determinations of: 1) the components of flow at Prado Dam, which include Nontributary Flow; Storm Flow, and Base Flow; and 2) the adjusted Base Flow at Prado credited to CBMWD and WMWD.

#### **Total Flow at Prado**

The total flow of the Santa Ana River at Prado amounted to 536,174 acre-feet, measured at the USGS gaging station below Prado Dam. Separated into its components, Base Flow was 82,685 acre-feet, Storm Flow, which included flows from Lake Elsinore, was 445,253 acre-feet, Nontributary Flow during 1979-80 due to the release of State water above Riverside Narrows during 1972-73 was 506 acre-feet, and Nontributary Flow due to State water that passed Prado Dam was assumed to be 7,730 acre-feet. The above determination of Nontributary Flow resulting from releases at San Antonio Creek is based on the assumption that 98 percent of the State water released at OC-59 has passed the Montclair Spreading Basin, and through Prado. The assumption is subject to review and the above amounts are subject to revision in subsequent years. The components of flow of the Santa Ana River at Prado Dam for each month in the 1979-80 water year are listed in Table 5, and are shown graphically on Plate 2.

#### **Nontributary Flow**

Since May 1973, OCWD has purchased State water for the replenishment of the groundwater basins in Orange County. The water has been released at two locations: Santa Ana River above Riverside Narrows and San Antonio Creek near Upland.

#### **Releases Above Riverside Narrows**

As fully discussed in Appendix F, the Fifth Annual Report, the Watermaster Committee made a determination of a schedule of credits to OCWD for State Water released above Riverside Narrows during 1972-73. For 1979-80, the credit

TABLE 5

COMPONENTS OF FLOW AT PRADO DAM FOR WATER YEAR 1979/1980 (acre-feet)

Month	USGS Measured Outflow	Change in Storage(1)	Computed Inflow	Storm Flow	Base Flow	Nontributary Water	
						San Antonio Creek(2)	Riverside Narrows(3)
October	6,409	22	6,431	575	5,813	-0-	43
November	7,547	(18)	7,529	204	6,521	761	43
December	12,621	-0-	12,621	-0-	7,114	5,465	42
January	29,332	25,598	54,930	45,667	7,717	1,504	42
February	154,223	53,623	207,846	199,735	8,069	-0-	42
March	157,186	(51,185)	106,001	97,028	8,931	-0-	42
April	65,502	(13,015)	52,487	44,373	8,072	-0-	42
May	39,439	1,851	41,290	33,785	7,463	-0-	42
June	23,583	(376)	23,207	16,935	6,230	-0-	42
July	22,489	(10,116)	12,373	6,779	5,552	-0-	42
August	12,307	(6,384)	5,923	172	5,709	-0-	42
September	5,536	-0-	5,536	-0-	5,494	-0-	42
Total	536,174	-0-	536,174	445,253	82,685	7,730	506

- (1) The monthly change in storage included in the monthly components of flow.
- (2) State water released into San Antonio Creek during 1979-80 assumed to have reached Prado Dam in 1979-80.
- (3) That portion of State water released during 1972-73 upstream of Riverside Narrows, determined to have reached Prado Dam in 1979-80.

is 506 acre-feet, assumed to be distributed uniformly throughout the year, as shown in Table 5.

#### **Releases to San Antonio Creek**

During water year 1979-80, 8,001 acre-feet of State water were purchased by OCWD and released from the Rialto Reach of the Foothill Feeder at OC-59 into San Antonio Creek near Upland. The measured flows at OC-59 are set forth in Appendix A. The Watermaster determined that additional testing and sampling programs should be made to quantify the extent of losses between OC-59 and the Prado Dam gage, however, due to the very limited releases, this program could not be continued in water year 1979-80. The Committee did not make a final determination and intends to continue investigation of the disposition of State water released into San Antonio Creek since the water year 1973-74, and to make a final determination and adjustment for each of these years at some subsequent time. For the purpose of arriving at findings in this report, the Committee utilized the following procedures:

1. Since State water was being discharged at the beginning of the water year, and because the travel time between OC-59 and the Below Prado Gage was assumed for computation purposes, to be 12 hours, a total of 8,001 acre-feet of State water was assumed to be the actual amount available during the year 1978-79 before losses.
2. An amount of 111 acre-feet was deducted from the 8,001 acre-feet because of a loss in the Montclair Spreading Basins due to a leaking gate (leakage rate of 1.3 cfs).
3. A second loss of 2% of the remainder ( $8,001 - 113 = 7,888$  acre-feet) was deducted to arrive at the final figure of 7,730 acre-feet passing the Below Prado Gage.

#### **Storm Flow**

Generally during storms, the U.S. Army Corps of Engineers operates the Prado gates so that some of the storm runoff is temporarily held in storage behind the dam. As the storm ends, Prado Reservoir storage is gradually reduced by the

controlled releases to the downstream water conservation facilities operated by Orange County Water District. Monthly and annual quantities of Storm Flow are shown in Table 5.

The U.S. Army Corps of Engineers has an established operations guideline schedule with respect to required reservoir releases for specific water surface elevations. Flood releases would not be made below the debris pool elevation of 490 feet. With water elevations above 490 feet, water is released at a progressive increase in flowrate to a maximum of 5,000 cfs. This flowrate is maintained until the water surface elevation reaches the spillway crest elevation at 543 feet. (The original reservoir operation plan, although never officially changed, was modified during water year 1977-78 by an Executive Order from President Carter which requested all government agencies to make every effort to maximize water conservation.) During the last water-year, the maximum 5,000 cfs flowrate was exceeded on 6 days during February 1980, when water surface elevations were between 525 to 528 feet; and on 7 days during March 1980, when water surface elevations were between 511 to 519 feet.

During water-year 1979-80, the Corps of Engineers initiated a study to reevaluate its operations schedule to increase the water conservation potential of Prado Reservoir while maintaining flood control protection in downstream areas. When finalized, the selected plan will consist of a combination of one of six alternative flood control plans and one of four alternative water conservation plans under elevation by the study. Each of the water conservation alternatives, including the current plan, require an empty reservoir in August and September to allow for annual maintenance.

During the 1979-80 water year, water was stored behind Prado Dam during the periods October 19 to October 29; and January 9 to August 17. During these periods, the water stored in Prado Reservoir varied up to a maximum of 111,080 acre-feet and the maximum mean daily flow released to the Santa Ana River was 6,440 cfs.

#### **Base Flow**

The determination of Base Flow was affected, as in the previous four years, by the State water which was released upstream of Prado Dam.

The general procedure used by the members of the Watermaster to separate the 1979-80 flow components was the same as used for previous years and is fully

described in the Fifth Annual Report. The monthly and annual amounts are shown in Table 5.

### **Water Quality**

The weighted average total dissolved solids (TDS) for the total flow passing Prado, including Nontributary Flow, was found to be 352 ppm. This determination was based on continuous measurements of electrical conductivity (EC) by the USGS at the Santa Ana River below Prado and a statistical correlation of EC and TDS.

The EC of the river was recorded hourly on a punched tape by USGS. The USGS also collected 14 samples and performed laboratory analyses for EC and TDS. Results of these analyses, listed in Table B-1, Appendix B, were used to develop the correlation between EC and TDS as shown on Figure 4.

Application of the equation relating EC to TDS provided hourly TDS values. Using hourly data, flow weighted average daily values for TDS were computed and are listed in Table B-2, Appendix B.

The plot of TDS on Plate 3 shows the effects of the State water. In general, the TDS fluctuated in the 502 to 637 ppm range when State water was being released during November 26, 1979 to January 8, 1980. After the releases of State water the TDS ranged from 190 to 895 ppm.

### **Water Quality Adjustment for Nontributary Flow**

The weighted average annual TDS value of 352 ppm, shown in Table B-3, Appendix B, represents the quality of Total Flow which includes Nontributary Flow from release of State water to San Antonio Creek and Santa Ana River above Riverside Narrows. The Judgment requires that Base Flow shall be subject to adjustment based on the TDS of Base Flow and Storm Flow only. Hence the following determination of Base Flow plus Storm Flow TDS has been made.

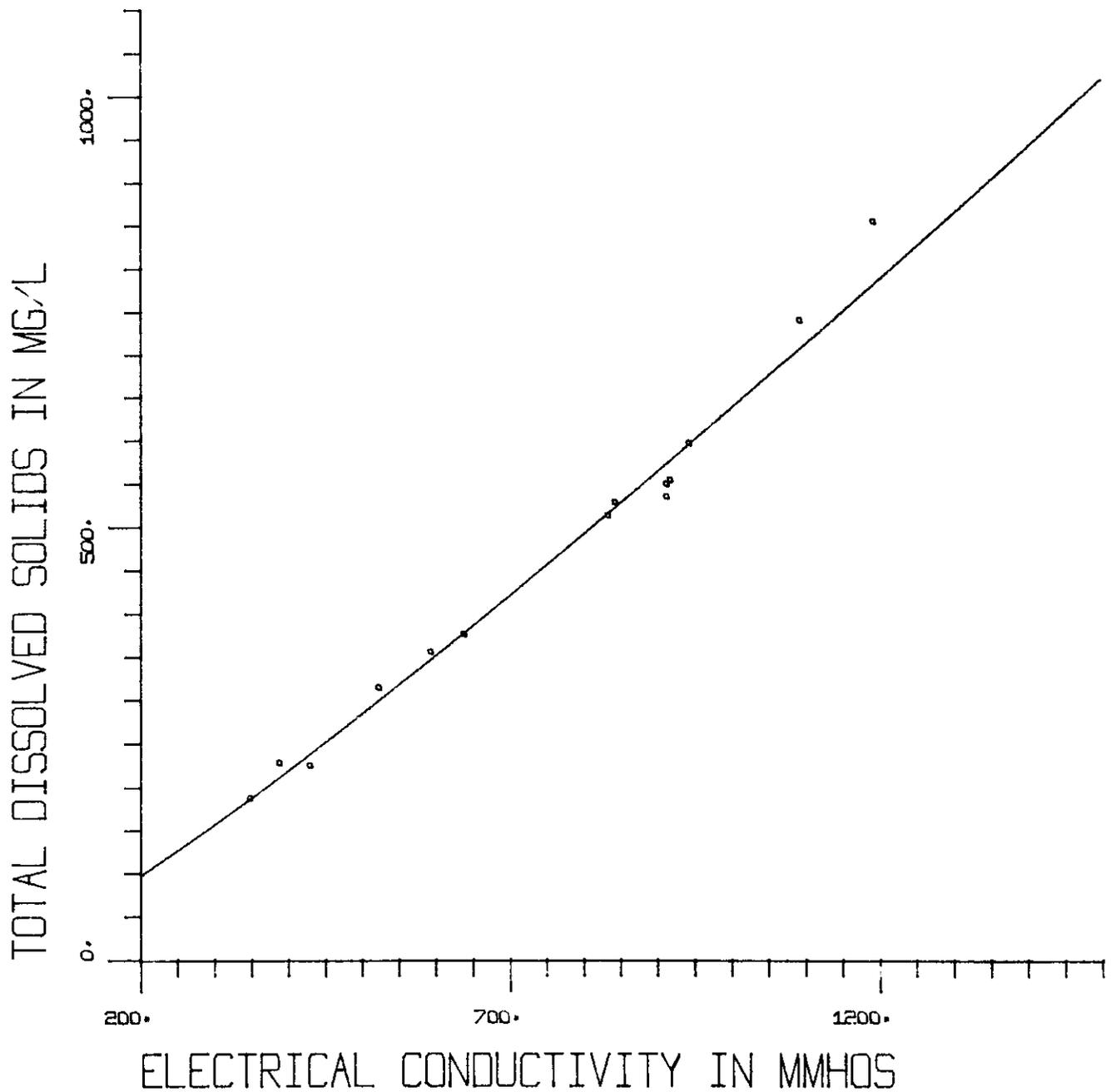
The flow weighted average TDS of the State water released to San Antonio Creek in 1979-80 was 290 ppm as shown in Table C-1, Appendix C. This was adjusted to 296 ppm for use in the above calculation to reflect the evapotranspiration associated with the assumption that 2 percent of the water released was lost. The flow weighted average TDS of State water released above Riverside Narrows during 1972-73 was 235 ppm and was similarly adjusted to 242 ppm to reflect a 3 percent evapotranspiration loss.

# TDS AS A FUNCTION OF E.C. BELOW PRADO DAM

$$Y=A \cdot X^B$$

$$A= 0.2112569E 00$$

$$B= 0.1159712E 01$$



	Annual Flow	Avg. TDS	(Annual Flow) x (Avg. TDS)
1. Total Flow	536,174 A.F.	352 ppm	188,733,000 A.F.-ppm
2. Nontributary Flow Riverside Narrows	506 A.F.	242 ppm	122,452 A.F.-ppm
3. Nontributary Flow San Antonio Creek	7,730 A.F.	296 ppm	2,288,080 A.F.-ppm
4. Total Flow less Nontributary Flow	527,938 A.F.		186,322,000 A.F.-ppm
5. Avg. TDS of Total Flow less Nontri- butary Flow	186,322,000 divided by 527,938 = 353 ppm		

After adjusting for releases of State water, the weighted average annual TDS of Storm Flow and Base Flow for 1979-80 was 353 ppm. It is understood that the water quality adjustment will be changed for years subsequent to 1973-74 at the same time the final determination of the disposition of State water released into San Antonio Creek is made.

#### Adjusted Base Flow

According to the Judgment, "The amount of Base Flow at Prado received during any year shall be subjected to adjustment based on weighted average annual TDS in Base Flow and Storm Flow at Prado as follows:

If the Weighted Average TDS  
in Base Flow and Storm Flow  
at Prado is:

Then the Adjusted Base Flow  
shall be determined by the  
formula:

Greater than 800 ppm

$$Q - \frac{35}{42,000} Q \text{ (TDS-800)}$$

700 ppm - 800 ppm

Q

Less than 700 ppm

$$Q + \frac{35}{42,000} Q \text{ (700-TDS)}$$

Where: Q = Base Flow actually received.

The weighted average annual TDS of 353 ppm is less than 700 ppm. Therefore, the Base Flow of 82,685 acre-feet must be adjusted by the equation above for TDS less than 700 ppm. Thus the Adjusted Base Flow is as follows:

$$(82,685 \text{ A.F.}) + \frac{35}{42,000} (82,685 \text{ A.F.}) (700-353) = 106,595 \text{ A.F.}$$

#### Entitlement and Credit or Debit

From pages 12 and 13 of the Judgment, the following obligation of the CBMWD and WMWD is given: "CBMWD and WMWD shall be responsible for an average annual Adjusted Base Flow of 42,000 acre-feet at Prado..... CBMWD and WMWD each year shall be responsible for not less than 37,000 acre-feet of Base Flow at Prado, plus one-third of any cumulative debit; provided, however, that for any year commencing on or after October 1, 1986, when there is not cumulative debit, or for any year prior to 1986 whenever the cumulative credit exceeds 30,000 acre-feet, said minimum shall be 34,000 acre-feet."

The Watermaster's findings at Prado for 1979-80 required under the Judgment are as follows:

1.	Total Flow at Prado	536,174 acre-feet
2.	Base Flow at Prado	82,685 acre-feet
3.	Annual Weighted TDS of Total Flow	353 ppm
4.	Annual Adjusted Base Flow	106,595 acre-feet
5.	Cumulative Adjusted Base Flow	582,553 acre-feet
6.	Cumulative Entitlement of OCWD	420,000 acre-feet
7.	Cumulative Credit	162,553 acre-feet
8.	One-Third of Cumulative Debit	0 acre-feet
9.	Minimum Required Base Flow in 1980-81	34,000 acre-feet

## **CHAPTER IV**

### **BASE FLOW AT RIVERSIDE NARROWS**

This chapter deals with determination of 1) the components of flow at Riverside Narrows, which include Nontributary Flow, Storm Flow, and Base Flow; and 2) the adjusted Base Flow at Riverside Narrows credited to SBVMWD.

#### **Total Flow at Riverside Narrows**

The total flow of the Santa Ana River at Riverside Narrows amounted to 254,333 acre-feet, measured at the USGS gaging station just upstream of the MWD Upper Feeder Crossing. Separated into its components, Base Flow was 25,549 acre-feet, Storm Flow was 228,528 acre-feet, and Nontributary Flow due to the release of State water above Riverside Narrows was 516 acre-feet. The components of flow of the Santa Ana River at Riverside Narrows for each month in the 1979-80 water year are listed in Table 6 and graphically shown on Plate 4.

#### **Nontributary Flow**

During the period May through September, 1973, 11,617 acre-feet of State water from the East Branch of the California Aqueduct was purchased by the Orange County Water District and released into the Santa Ana River in the vicinity of Colton.

The Watermaster's determination of the effect of these releases has been discussed in the Fifth Annual Report of the Watermaster. For the water year 1979-80 the amount of State water reaching Riverside Narrows has been agreed upon as 516 acre-feet.

#### **Base Flow**

Based on the hydrograph shown on Plate 4 and utilizing in general the same procedures reflected in the Work Papers of the engineers (as referenced in Paragraph 2 of the Engineering Appendix of the Judgment), a separation was made between Storm Flow and the sum of Base Flow and Nontributary Flow.

**TABLE 6**  
**COMPONENTS OF FLOW AT RIVERSIDE NARROWS FOR WATER YEAR 1979-80**  
**(Quantities in Acre-Feet)**

		Total Flow USGS Measurement	Storm Flow	Non- tributary Flow	Rubidoux Wastewater	Base <sup>(1)</sup> Flow
1979	October	3,031	702	43	0	2,286
	November	2,117	0	43	0	2,074
	December	2,045	0	43	0	2,002
1980	January	23,449	21,394	43	0	2,012
	February	81,151	78,802	43	0	2,306
	March	67,756	64,829	43	0	2,884
	April	31,559	28,546	43	2	2,972
	May	23,106	20,288	43	15	2,790
	June	12,617	10,532	43	35	2,077
	July	4,881	3,435	43	50	1,453
	August	1,264	0	43	62	1,283
	September	1,357	0	43	96	1,410
<b>Total Acre-Feet</b>		<b>254,333</b>	<b>228,528</b>	<b>516</b>	<b>260</b>	<b>25,549</b>

(1) Base Flow includes Rubidoux wastewater.

Nontributary Flow was assumed to be equally distributed throughout the year (516 acre-feet divided by 12 months) and subtracted from the sum of the Base Flow and Nontributary Flow as shown on Table 6.

In April 1980, Rubidoux Community Services District made the first delivery of wastewater to the regional waste treatment plant at Riverside. Prior to that time, Rubidoux had discharged to the river upstream of the Riverside Narrows Gaging Station. Therefore, wastewater from Rubidoux in the amount of 260 acre-feet, as shown on Table E-1, Appendix E, has been added to the streamflow as measured at the gaging station. The Base Flow was determined to be 25,549 acre-feet, as shown on Table 6.

#### Water Quality

The determination of quality of water at the Riverside Narrows Gaging Station was made using periodic grab samples taken and analyzed for TDS by the

USGS, the City of Riverside and the Department of Water Resources. The results are summarized in Appendix D, Table D-1. Table D-2 shows the flow weighted quality of the flow including the Nontributary Flow and excluding the Rubidoux wastewater. The Base Flow quality resulting from exclusion of the Nontributary Flow and inclusion of the Rubidoux wastewater is shown in the following table as 676 ppm.

	Annual Flow	Avg. TDS	(Annual Flow) x (Avg. TDS)
Base Flow including Nontributary Flow and excluding Rubidoux Wastewater	25,805 A.F.	666 ppm	17,186,130 A.F.-ppm
Nontributary Flow	-516 A.F.	237 ppm	-122,292 A.F.-ppm
Rubidoux Wastewater	260 A.F.	771 ppm	200,460 A.F.-ppm
<b>Base Flow</b>	<b>25,549 A.F.</b>	<b>676 ppm</b>	<b>17,264,298 A.F.-ppm</b>

#### Adjusted Base Flow at Riverside Narrows

The Judgment provides that the amount of Base Flow at Riverside Narrows received during any year shall be subject to adjustment based on the weighted average annual TDS in such Base Flow as follows:

If the Weighted Average TDS  
in Base Flow at Riverside  
Narrow is:

Then the Adjusted Base Flow  
shall be determined by the  
formula:

Greater than 700 ppm

$$Q - \frac{11}{15,250} Q (\text{TDS}-700)$$

600 ppm - 700 ppm

Q

Less than 600 ppm

$$Q + \frac{11}{15,250} Q (600-\text{TDS})$$

Where: Q = Base Flow actually received.

From the previous subsection, the weighted average annual TDS in the Base Flow at Riverside Narrows for the water year 1979-80 was 676 ppm. Therefore, no adjustment is necessary, and the Adjusted Base Flow for 1979-80 is 25,549 acre-feet.

#### **Entitlement and Credit or Debit**

Paragraph 5(b) of the Judgment states that "SBVMWD shall be responsible for an average annual Adjusted Base Flow of 15,250 acre-feet at Riverside Narrows... SBVMWD each year shall be responsible at Riverside Narrows for not less than 13,420 acre-feet of Base Flow plus one-third of any cumulative debit, provided, however, that for any year commencing on or after October 1, 1986, when there is no cumulative debit, or for any year prior to 1986 whenever the cumulative credit exceeds 10,000 acre-feet, said minimum shall be 12,420 acre-feet."

The Watermaster's findings at Riverside Narrows for 1979-80 required under the Judgment are as follows:

1. Base Flow at Riverside Narrows	25,549 acre-feet
2. Annual Weighted TDS of Base Flow	676 ppm
3. Annual Adjusted Base Flow	25,549 acre-feet
4. Cumulative Adjusted Base Flow	190,646 acre-feet
5. Cumulative Entitlement of CBMWD and WMWD	152,500 acre-feet
6. Cumulative Credit	38,146 acre-feet
7. One-Third of Cumulative Debit	0 acre-feet
8. Minimum Required Base Flow in 1980-81	12,420 acre-feet

**APPENDIX A**

**STATE WATER RELEASED BY MWD  
TO SAN ANTONIO CREEK NEAR UPLAND**

**CONNECTION OC-59**

**1979-80**

**PREPARED BY  
DONALD L. HARRIGER**

TABLE A-1

NONTRIBUTARY WATER FROM OC-59

MONTHLY TOTALS

(Acre Feet)

WATER YEAR 1979-80

<u>Month</u>	<u>Released</u>	<u>Delayed</u> <sup>1/</sup>
October	0	0
November	888	789
December	5,657	5,657
January	1,456	1,555
February	0	0
March	0	0
April	0	0
May	0	0
June	0	0
July	0	0
August	0	0
September	<u>0</u>	<u>0</u>
Total	8,001 A.F.	8,001 A.F.

<sup>1/</sup> Released Nontributary Water delayed 12 hours to reflect the estimated travel time between OC-59 and Prado.

NONTRIBUTARY WATER FROM OC-59  
NOVEMBER 1979  
(CFS Days)

<u>Day</u>	<u>Released at OC-59</u>	<u>Delayed <sup>1/</sup></u>
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	50	3
27	97	94
28	100	100
29	101	99
30	100	102
31	-	-
	448 CFS Days 888 A.F.	398 CFS Days 789 A.F.

<sup>1/</sup> See Footnote to TABLE A-1.

NONTRIBUTARY WATER FROM OC-59  
DECEMBER 1979  
(CFS Days)

<u>Day</u>	<u>Released at OC-59</u>	<u>Delayed <sup>1/</sup></u>
1	102	101
2	103	102
3	99	102
4	99	98
5	99	99
6	100	99
7	99	100
8	103	102
9	103	103
10	100	101
11	99	100
12	99	99
13	99	99
14	100	99
15	101	100
16	105	104
17	104	105
18	102	102
19	101	103
20	102	101
21	102	102
22	104	102
23	62	105
24	0	9
25	0	0
26	63	12
27	101	101
28	100	101
29	101	101
30	101	100
31	99	100
	2,852 CFS Days 5,657 A.F.	2,852 CFS Days 5,657 A.F.

<sup>1/</sup> See Footnote to TABLE A-1

NONTRIBUTARY WATER FROM OC-59JANUARY 1980

(CFS Days)

<u>Day</u>	<u>Released at OC-59</u>	<u>Delayed <sup>1/</sup></u>
1	101	100
2	101	101
3	97	100
4	101	97
5	102	102
6	103	103
7	100	102
8	29	79
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
25	0	0
26	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
	<hr/> 734 CFS Days 1,456 A.F.	<hr/> 784 CFS Days 1,555 A.F.

<sup>1/</sup> See Footnote to TABLE A-1

**APPENDIX B**

**WATER QUALITY-  
SANTA ANA RIVER BELOW PRADO DAM**

**1979-80**

**PREPARED BY  
WILLIAM R. MILLS, JR.**

## METHOD OF ANALYZING WATER QUALITY DATA

Utilizing the USGS water quality records, the following analyses were performed by the Watermaster to determine the annual weighted TDS:

1. Mean daily flow weighted specific conductivity was calculated using the punched tape from the Prado water quality recorder, processed by a newly developed computer program designated by USGS. Input to the program included hourly specific conductivity data from the recorder tape, which was flow weighted using hourly discharge measurements from the water stage recorder.
2. Laboratory analyses of the 14 grab samples taken by the USGS below Prado Dam during the 1979-80 season were run to determine both specific conductance and TDS. Data from the grab samples are given in Table B-1. Results of these analyses were used to prepare a correlation between specific conductance and the corresponding TDS. A detailed discussion of this statistical analysis is presented in the Fifth Annual Watermaster Report. The resulting graph of plotted data points and equation of the best fit line are shown in Chapter III of this report.
3. The equation from the curve fitting operation was then used to determine the mean daily TDS corresponding to the mean daily specific conductance values for each day of the year. These data are given in Table B-2.
4. The mean daily TDS values were then multiplied by the mean daily flow as shown in Table B-2. These products were then summed and divided by the total flow for the year to determine the weighted average TDS value for the water year. This value for TDS for the total flow including nontributary water was 352 ppm of TDS for the 1979-80 water year. The weighted TDS calculation for the water year 1979-80 is shown in Table B-3.

**TABLE B-1**  
**USGS WATER QUALITY SAMPLES**  
**BELOW PRADO DAM WATER YEAR 1979-80**

Date	EC	TDS	Date	EC	TDS
Oct. 10, 1979	1,100	740	Mar. 3, 1980	436	228
Dec. 18, 1979	920	539	Apr. 29, 1980	840	514
Dec. 18, 1979	920	553	May 23, 1980	950	597
Jan. 14, 1980	530	318	Jun. 30, 1980	850	531
Jan. 23, 1980	645	379	Jun. 30, 1980	850	531
Jan. 21, 1980	395	248	Jul. 24, 1980	925	557
Feb. 8, 1980	600	358	Aug. 19, 1980	1,200	855
Feb. 20, 1980	355	191			

TABLE B-2

P R C TOUPS  
WEIGHTED T.D.S. CALCULATION SHEET

BELOW PRADO DAM      WATER YEAR 1979-1980      TDS=      1.15971LN(EC)\*      0.21125

MONTH-DAY		U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.
OCT	01	75.0	1130	734	55050.
OCT	02	84.0	1110	719	60396.
OCT	03	81.0	1140	741	60021.
OCT	04	79.0	1160	756	59724.
OCT	05	79.0	1160	756	59724.
OCT	06	78.0	1140	741	57798.
OCT	07	80.0	1090	704	56320.
OCT	08	85.0	1090	704	59840.
OCT	09	86.0	1080	696	59856.
OCT	10	89.0	1090	704	62656.
OCT	11	91.0	1070	689	62699.
OCT	12	90.0	1030	659	59310.
OCT	13	80.0	1080	696	55680.
OCT	14	79.0	1090	704	55616.
OCT	15	81.0	1050	674	54594.
OCT	16	89.0	1030	659	58651.
OCT	17	93.0	1030	659	61287.
OCT	18	92.0	1020	652	59984.
OCT	19	95.0	1010	644	61180.
OCT	20	40.0	1050	674	26960.
OCT	21	8.7	1080 *	696	6055.
OCT	22	8.7	1080 **	696	6055.
OCT	23	154.0	1080 **	696	107184.
OCT	24	197.0	1010	644	126868.
OCT	25	192.0	984	625	120000.
OCT	26	187.0	988	628	117436.
OCT	27	182.0	1010	644	117208.
OCT	28	177.0	1100	711	125847.
OCT	29	170.0	1110	719	122230.
OCT	30	161.0	1120	726	116886.
OCT	31	148.0	1140	741	109668.
TOTAL		3231.		688	2222783.
MONTHLY WEIGHTED T.D.S.					

\*Estimated Mean Daily E.C.

TABLE B-2 (CONTINUED)

BELOW PRAUO DAM		P R C TOUPS WEIGHTED T.D.S. CALCULATION SHEET			
		WATER YEAR 1979-1980	TDS=	1.15971LM(EC)*	0.21125
MONTH-DAY	U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.	
NOV 01	122.0	1130	734	89548.	
NOV 02	114.0	1120	726	82764.	
NOV 03	113.0	1120	726	82038.	
NOV 04	111.0	1110	719	79809.	
NOV 05	109.0	1110	719	78371.	
NOV 06	113.0	1120	726	82038.	
NOV 07	113.0	1110	719	81247.	
NOV 08	129.0	1080	696	89784.	
NOV 09	124.0	1080	696	86304.	
NOV 10	118.0	1100	711	83898.	
NOV 11	115.0	1110	719	82685.	
NOV 12	114.0	1090	704	80256.	
NOV 13	115.0	1070	689	79235.	
NOV 14	115.0	1160	756	86940.	
NOV 15	114.0	1210	794	90516.	
NOV 16	111.0	1210	794	88134.	
NOV 17	107.0	1200	787	84209.	
NOV 18	118.0	1160	756	89208.	
NOV 19	115.0	1180	771	88665.	
NOV 20	111.0	1180	771	85581.	
NOV 21	106.0	1180	771	81726.	
NOV 22	109.0	1190	779	84911.	
NOV 23	113.0	1170	764	86332.	
NOV 24	112.0	1170	764	85568.	
NOV 25	114.0	1150	749	85386.	
NOV 26	122.0	1130	734	89548.	
NOV 27	198.0	1000	637	126126.	
NOV 28	213.0	932	587	125031.	
NOV 29	206.0	911	571	117626.	
NOV 30	211.0	902	565	119215.	
TOTAL	3805.		708	2692699.	
MONTHLY WEIGHTED T.D.S.					

B-4

TABLE B-2 (CONTINUED)

BELOW PRAUD DAM		P R C TOUJPS WEIGHTED T.D.S. CALCULATION SHEET			
		WATER YEAR 1979-1980	TDS=	1.15971LN(EC)*	0.21125
MONTH-DAY	U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.	
DEC 01	203.0	901	564	114492.	
DEC 02	209.0	928	584	122056.	
DEC 03	212.0	957	605	128260.	
DEC 04	212.0	962	609	129108.	
DEC 05	215.0	970	615	132225.	
DEC 06	208.0	961	608	126464.	
DEC 07	209.0	952	601	125609.	
DEC 08	207.0	936	590	122130.	
DEC 09	207.0	919	577	119439.	
DEC 10	215.0	923	580	124700.	
DEC 11	220.0	935	589	129580.	
DEC 12	209.0	941	593	123937.	
DEC 13	199.0	938	591	117609.	
DEC 14	198.0	930	585	115830.	
DEC 15	207.0	928	584	120888.	
DEC 16	211.0	920	578	121958.	
DEC 17	212.0	910	571	121052.	
DEC 18	214.0	919	577	123478.	
DEC 19	220.0	937	590	129800.	
DEC 20	218.0	943	595	129710.	
DEC 21	244.0	926	582	142008.	
DEC 22	243.0	952	601	146043.	
DEC 23	218.0	948	598	130364.	
DEC 24	148.0	1100	711	105228.	
DEC 25	130.0	1130	734	95420.	
DEC 26	127.0	1090	704	89408.	
DEC 27	213.0	897	561	113493.	
DEC 28	213.0	899	563	119919.	
DEC 29	214.0	915	574	122836.	
DEC 30	210.0	919	577	121170.	
DEC 31	208.0	920	578	120224.	
TOTAL	6373.		595	3790438.	
MONTHLY WEIGHTED T.D.S.					

B-5

TABLE B-2 (CONTINUED)

BELOW PRAVO DAM		P R C TOUIPS WEIGHTED T.D.S. CALCULATION SHEET			
MONTH-DAY		WATER YEAR 1979-1980	TDS=	0.21125	
		U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	
				MEAN DAILY FLOW TIMES ADJUSTED T.D.S.	
JAN	01	211.0	919	577	121747.
JAN	02	208.0	919	577	120016.
JAN	03	201.0	911	571	114771.
JAN	04	200.0	902	565	113000.
JAN	05	209.0	866	539	112651.
JAN	06	214.0	843	522	111708.
JAN	07	234.0	818	504	117936.
JAN	08	241.0	858	533	128453.
JAN	09	158.0	872	543	85794.
JAN	10	123.0	617	364	44772.
JAN	11	410.0	615	362	148420.
JAN	12	613.0	495	282	172866.
JAN	13	604.0	487	276	166704.
JAN	14	606.0	531	306	185436.
JAN	15	620.0	647	384	238080.
JAN	16	624.0	563	327	204048.
JAN	17	617.0	553	320	197440.
JAN	18	526.0	646	384	201984.
JAN	19	465.0	664	396	184140.
JAN	20	464.0	594	348	161472.
JAN	21	319.0	606	356	113564.
JAN	22	221.0	722	436	96356.
JAN	23	220.0	706	425	93500.
JAN	24	219.0	717	433	94827.
JAN	25	264.0	762	465	122760.
JAN	26	296.0	755	460	136160.
JAN	27	296.0	780	477	141192.
JAN	28	245.0	836	517	126665.
JAN	29	1250.0	592	347	433750.
JAN	30	2010.0	427	237	476370.
JAN	31	1900.0	400	220	418000.
TOTAL		14788.		351	5184582.
MONTHLY WEIGHTED T.D.S.					

B-6

TABLE B-2 (CONTINUED)

BELOW PRAVO DAM		P R C IOUPS WEIGHTED T.D.S. CALCULATION SHEET			
MONTH-DAY		WATER YEAR 1979-1980	TDS=	1.15971LN(EC)*	0.21125
		U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.
FEB	01	2020.0	599	219	442380.
FEB	02	1990.0	408	225	447750.
FEB	03	1960.0	420	233	456680.
FEB	04	2050.0	441	246	504300.
FEB	05	1710.0	457	257	439470.
FEB	06	462.0	521	299	138138.
FEB	07	247.0	613	361	89167.
FEB	08	241.0	643	382	92062.
FEB	09	242.0	780	477	115434.
FEB	10	240.0	890	556	133440.
FEB	11	238.0	927	583	138754.
FEB	12	236.0	904	566	133576.
FEB	13	308.0	805	495	152460.
FEB	14	1200.0	601	353	423600.
FEB	15	2010.0	479	271	544710.
FEB	16	2250.0	494	281	632250.
FEB	17	2870.0	427	237	680190.
FEB	18	4520.0	374	204	922080.
FEB	19	5590.0	369	200	1118000.
FEB	20	5720.0	361	195	1115400.
FEB	21	6220.0	353	190	1181800.
FEB	22	6146.0	375	204	1253784.
FEB	23	6440.0	390	214	1378160.
FEB	24	6370.0	391	214	1363180.
FEB	25	4920.0	362	196	964320.
FEB	26	1940.0	356	192	372480.
FEB	27	4720.0	369	200	944000.
FEB	28	3530.0	385	210	741300.
FEB	29	1370.0	401	221	302770.
TOTAL		77760.		221	17221635.
MONTHLY WEIGHTED T.D.S.					

TABLE B-2 (CONTINUED)

BELOW PRAUD DAM		P R C IOUPS WEIGHTED T.D.S. CALCULATION SHEET			0.21125
		WATER YEAR 1979-1980	TDS=	1.15971LN(EC)*	
MONTH-DAY	U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.	
MAK 01	3080.0	417	231	711480.	
MAK 02	5450.0	426	237	1291650.	
MAK 03	5150.0	434	242	1246300.	
MAK 04	4620.0	425	236	1090320.	
MAK 05	5130.0	418	232	1190160.	
MAK 06	5120.0	404	223	1141760.	
MAK 07	5190.0	386	211	1095090.	
MAK 08	5160.0	387	212	1093920.	
MAK 09	5040.0	380	207	1043280.	
MAK 10	3690.0	372	202	745380.	
MAK 11	3060.0	362	196	599760.	
MAK 12	3020.0	359	194	585880.	
MAK 13	3040.0	357	193	586720.	
MAK 14	3050.0	358	193	588650.	
MAK 15	3000.0	359	194	582000.	
MAK 16	2940.0	362	196	576240.	
MAK 17	1720.0	371	202	347440.	
MAK 18	17.0	829	512	8704.	
MAK 19	17.0	1200	787	13379.	
MAK 20	17.0	1180	771	13107.	
MAK 21	17.0	1140	741	12597.	
MAK 22	260.0	898	562	146120.	
MAK 23	1620.0	723	437	707940.	
MAK 24	460.0	746	453	208380.	
MAK 25	290.0	965	611	177190.	
MAK 26	890.0	774	473	420970.	
MAK 27	1450.0	775	474	687300.	
MAK 28	1720.0	772	472	811840.	
MAK 29	1710.0	693	416	711360.	
MAK 30	1680.0	681	408	685440.	
MAK 31	1640.0	697	419	687160.	
TOTAL	79248.		250	19807517.	
MONTHLY WEIGHTED T.D.S.					

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TABLE B-2 (CONTINUED)

BELOW PRADO DAM		P R C TOUPS WEIGHTED T.D.S. CALCULATION SHEET			0.21125
		WATER YEAR 1979-1980	TDS=	1.15971LN(EC)*	
MONTH-DAY	U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.	
APR 01	1630.0	709	427	696010.	
APR 02	1610.0	71A	434	698740.	
APR 03	1630.0	738	448	730240.	
APR 04	1660.0	740	449	745340.	
APR 05	1680.0	734	445	747600.	
APR 06	1670.0	732	443	739810.	
APR 07	1650.0	727	440	726000.	
APR 08	1640.0	726	439	719960.	
APR 09	1620.0	733	444	719280.	
APR 10	1610.0	743	451	726110.	
APR 11	1580.0	745	453	715740.	
APR 12	1560.0	756	460	717600.	
APR 13	1150.0	780	477	548550.	
APR 14	1160.0	814	502	582320.	
APR 15	1710.0	777	475	812250.	
APR 16	1690.0	766	467	789230.	
APR 17	1680.0	759	462	776160.	
APR 18	1070.0	792	486	520020.	
APR 19	308.0	874	545	167860.	
APR 20	312.0	915	574	179088.	
APR 21	315.0	953	602	189630.	
APR 22	316.0	952	601	189916.	
APR 23	309.0	970	615	190035.	
APR 24	308.0	1000	637	196196.	
APR 25	459.0	991	630	289170.	
APR 26	765.0	841	521	398565.	
APR 27	765.0	803	494	377910.	
APR 28	556.0	799	491	272996.	
APR 29	307.0	833	515	158105.	
APR 30	304.0	865	538	163552.	
TOTAL	33024.		469	15483983.	
MONTHLY WEIGHTED T.D.S.					

B-9

TABLE B-2 (CONTINUED)

MONTH-DAY		U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.
P R C 10UPS					
WEIGHTED T.D.S. CALCULATION SHEET					
BELOW PRAVO DAM		WATER YEAR 1979-1980	TDS=	1.15971LN(EC)*	0.21125
U.S.G.S. MEAN DAILY FLOW (CFS-DAY)      U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)      MEAN DAILY ADJUSTED T.D.S. (PPM)      MEAN DAILY FLOW TIMES ADJUSTED T.D.S.					
MAY	01	452.0	884	552	249504.
MAY	02	399.0	844	523	208677.
MAY	03	1350.0	725	439	592650.
MAY	04	1340.0	646	384	514560.
MAY	05	625.0	694	417	260625.
MAY	06	603.0	678	406	244818.
MAY	07	665.0	710	428	284620.
MAY	08	902.0	707	426	384252.
MAY	09	1570.0	648	385	604450.
MAY	10	1750.0	631	373	652750.
MAY	11	1700.0	610	359	610300.
MAY	12	1670.0	619	365	609550.
MAY	13	679.0	711	429	291291.
MAY	14	232.0	864	537	124584.
MAY	15	294.0	823	508	149352.
MAY	16	340.0	835	517	175780.
MAY	17	346.0	798	490	169540.
MAY	18	356.0	781	478	170168.
MAY	19	366.0	778	476	174216.
MAY	20	373.0	792	486	181278.
MAY	21	384.0	809	498	191232.
MAY	22	391.0	850	527	206057.
MAY	23	362.0	924	581	210322.
MAY	24	315.0	921	579	182385.
MAY	25	312.0	939	592	184704.
MAY	26	315.0	962	609	191835.
MAY	27	312.0	933	588	183456.
MAY	28	312.0	919	577	180024.
MAY	29	365.0	903	566	206590.
MAY	30	401.0	892	558	223758.
MAY	31	403.0	886	553	222859.
TOTAL		19884.		444	8836187.
MONTHLY WEIGHTED T.D.S.					

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TABLE B-2 (CONTINUED)

MONTH-DAY		U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.
TOTAL		11890.		557	6626200.
MONTHLY WEIGHTED T.D.S.					
BELOW PRADO DAM					
		WATER YEAR 1979-1980	TDS=	1.15971LN(EC)*	0.21125
JUN	01	404.0	864	537	216948.
JUN	02	411.0	894	559	229749.
JUN	03	415.0	904	566	234890.
JUN	04	419.0	883	551	230869.
JUN	05	425.0	854	530	225250.
JUN	06	389.0	857	532	206948.
JUN	07	363.0	881	550	199650.
JUN	08	369.0	881	550	202950.
JUN	09	412.0	871	542	233304.
JUN	10	440.0	848	526	231440.
JUN	11	442.0	835	517	228514.
JUN	12	440.0	830	513	225720.
JUN	13	413.0	839	519	214347.
JUN	14	372.0	874	545	202740.
JUN	15	365.0	908	569	206547.
JUN	16	372.0	914	574	213528.
JUN	17	375.0	900	563	211125.
JUN	18	365.0	897	561	204765.
JUN	19	328.0	901	564	184992.
JUN	20	366.0	918	577	211182.
JUN	21	353.0	921	579	210177.
JUN	22	365.0	928	584	213744.
JUN	23	378.0	930	585	211130.
JUN	24	422.0	925	582	245604.
JUN	25	438.0	917	576	252288.
JUN	26	442.0	915	574	253708.
JUN	27	420.0	923	580	243600.
JUN	28	393.0	923	580	227940.
JUN	29	393.0	916	575	225975.
JUN	30	392.0	920	578	226576.

B-11

TABLE B-2 (CONTINUED)

BELOW PRAUD DAM		P R C TOUPS WEIGHTED T.D.S. CALCULATION SHEET			0.21125
		WATER YEAR 1979-1980	TDS=	1.15971LN(EC)*	
MONTH-DAY	U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.	
JUL 01	412.0	913	573		236076.
JUL 02	427.0	915	574		245098.
JUL 03	437.0	904	566		247342.
JUL 04	446.0	897	561		250206.
JUL 05	447.0	904	566		253002.
JUL 06	452.0	904	566		255832.
JUL 07	440.0	906	568		249920.
JUL 08	430.0	904	566		243380.
JUL 09	430.0	907	569		244670.
JUL 10	428.0	909	570		243960.
JUL 11	372.0	918	577		214644.
JUL 12	327.0	933	588		192276.
JUL 13	320.0	930	585		187200.
JUL 14	317.0	933	588		186396.
JUL 15	314.0	937	590		185260.
JUL 16	314.0	944	596		187144.
JUL 17	316.0	943	595		188020.
JUL 18	312.0	939	592		184704.
JUL 19	311.0	933	588		182868.
JUL 20	311.0	937	590		183490.
JUL 21	312.0	935	589		183768.
JUL 22	317.0	940	593		187981.
JUL 23	353.0	939	592		208976.
JUL 24	359.0	938	591		212169.
JUL 25	356.0	934	588		209328.
JUL 26	355.0	935	589		209095.
JUL 27	354.0	941	593		209922.
JUL 28	349.0	946	597		208353.
JUL 29	344.0	961	608		209152.
JUL 30	340.0	975	617		209780.
JUL 31	336.0	979	621		208656.
TOTAL	11338.		584		6618668.
MONTHLY WEIGHTED T.D.S.					

B-12

TABLE B-2 (CONTINUED)

BELOW PRAUD DAM		P R C TOUPS WEIGHTED T.D.S. CALCULATION SHEET			0.21125
		WATER YEAR 1979-1980	TDS=	1.15971LN(EC)*	
MONTH-DAY	U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.	
AUG 01	332.0	990	629	208828.	
AUG 02	327.0	1010	644	210588.	
AUG 03	322.0	1010	644	207368.	
AUG 04	306.0	1030	659	201654.	
AUG 05	295.0	1060	681	200895.	
AUG 06	287.0	1070	689	197743.	
AUG 07	282.0	1080	696	196272.	
AUG 08	277.0	1090	704	195008.	
AUG 09	271.0	1110	719	194849.	
AUG 10	264.0	1140	741	195624.	
AUG 11	273.0	1180	771	210483.	
AUG 12	273.0	1200	787	214851.	
AUG 13	286.0	1220	802	229372.	
AUG 14	286.0	1240	817	233662.	
AUG 15	272.0	1260	832	226304.	
AUG 16	244.0	1320	879	214476.	
AUG 17	217.0	1170	764	165788.	
AUG 18	177.0	1340	894	158238.	
AUG 19	110.0	1330	886	97460.	
AUG 20	103.0	1290	855	88065.	
AUG 21	72.0	1280	848	61056.	
AUG 22	89.0	1230	809	72001.	
AUG 23	110.0	1200	787	86570.	
AUG 24	97.0	1190	779	75563.	
AUG 25	96.0	1170	764	73344.	
AUG 26	98.0	1160	756	74088.	
AUG 27	91.0	1150	749	68159.	
AUG 28	88.0	1150	749	65912.	
AUG 29	86.0	1140	741	63726.	
AUG 30	85.0	1130	734	62390.	
AUG 31	89.0	1110	719	63991.	
TOTAL	6205.		744	4614328.	
MONTHLY WEIGHTED T.D.S.					

B-13

TABLE B-2 (CONTINUED)

BELOW PRAUC DAM		P R C IOUPS WEIGHTED T.D.S. CALCULATION SHEET			
		WATER YEAR 1979-1980	TDS=	1.15971LN(EC)*	0.21125
MONTH-DAY	U.S.G.S. MEAN DAILY FLOW (CFS-DAY)	U.S.G.S. MEAN DAILY SPECIFIC CONDUCTANCE (E.C.) (MICROMHOS)	MEAN DAILY ADJUSTED T.D.S. (PPM)	MEAN DAILY FLOW TIMES ADJUSTED T.D.S.	
SEP 01	89.0	1090	704	62656.	
SEP 02	89.0	1070	689	61321.	
SEP 03	89.0	1060	681	60609.	
SEP 04	83.0	1100	711	59013.	
SEP 05	81.0	1240	817	66177.	
SEP 06	80.0	1290	855	68400.	
SEP 07	86.0	1320	879	75594.	
SEP 08	90.0	1340	894	80460.	
SEP 09	92.0	1290	855	78660.	
SEP 10	97.0	1270	840	81480.	
SEP 11	96.0	1250	825	79200.	
SEP 12	95.0	1220	802	76190.	
SEP 13	98.0	1220	802	78596.	
SEP 14	95.0	1210	794	76224.	
SEP 15	101.0	1160	756	76356.	
SEP 16	98.0	1140	741	72618.	
SEP 17	95.0	1130	734	69730.	
SEP 18	93.0	1130	734	68262.	
SEP 19	86.0	1130	734	63124.	
SEP 20	85.0	1120	726	62436.	
SEP 21	91.0	1100	711	64701.	
SEP 22	95.0	1070	689	65455.	
SEP 23	98.0	1110	719	70462.	
SEP 24	100.0	1170	764	76400.	
SEP 25	99.0	1170	764	75636.	
SEP 26	95.0	1200	787	74765.	
SEP 27	98.0	1180	771	75558.	
SEP 28	97.0	1230	809	78473.	
SEP 29	100.0	1170	764	76400.	
SEP 30	98.0	1150	749	73402.	
TOTAL	2791.		770	2148358.	
MONTHLY WEIGHTED T.D.S.					

B-14

**TABLE B-3**  
**SUMMARY OF WEIGHTED TDS**  
**BELOW PRADO DAM WATER YEAR 1979-80**

	Monthly Flow cfs-day	Monthly Flow Times TDS	Monthly Weighted TDS
October	3,231	2,222,783	688
November	3,805	2,692,699	708
December	6,373	3,790,438	595
January	14,788	5,184,582	351
February	77,760	17,221,635	221
March	79,248	19,807,517	250
April	33,024	15,483,983	469
May	19,884	8,836,187	444
June	11,890	6,626,200	557
July	11,338	6,618,668	584
August	6,205	4,614,328	744
September	2,791	2,148,358	770
Total	270,321	95,247,378	
Yearly Weighted TDS			352

**APPENDIX C**

**WATER QUALITY -  
STATE WATER RELEASED  
AT OC-59**

**1979-80**

**PREPARED BY  
WILLIAMS R. MILLS, JR.**

**TABLE C-1**  
**SUMMARY OF WEIGHTED TDS OF NONTRIBUTARY**  
**WATER RELEASED FROM OC-59**  
**FOR WATER YEAR 1979-1980**

	Monthly Flow (acre-feet)(1)	Monthly Flow Times TDS	TDS(2)
October	-0-	-0-	-0-
November	888	284,160	320
December	5,657	1,646,187	291
January	1,456	387,296	266
February	-0-	-0-	-0-
March	-0-	-0-	-0-
April	-0-	-0-	-0-
May	-0-	-0-	-0-
June	-0-	-0-	-0-
July	-0-	-0-	-0-
August	-0-	-0-	-0-
September	-0-	-0-	-0-
<b>Total</b>	<b>8,001</b>	<b>2,317,643</b>	
<b>Yearly Weighted TDS</b>			<b>290</b>

- (1) It was estimated that 113 acre-feet of this flow entered the Montclair Spreading Basin through gate leakage.
- (2) Water quality measured at Devil Canyon Afterbay by DWR. Based on laboratory analysis of monthly samples. State Water Project Report of Operations. State of California. The Resources Agency. November and December 1979, and January 1980.

**APPENDIX D**

**WATER QUALITY - SANTA ANA  
RIVER AT RIVERSIDE NARROWS**

**1979-80**

**PREPARED BY  
DONALD L. HARRIGER**

TABLE D-1

WATER QUALITY ANALYSES  
SANTA ANA RIVER AT RIVERSIDE NARROWS  
WATER YEAR 1979-80

<u>Date</u>	<u>EC at 25°C</u>	<u>TDS mg/l</u>	<u>Agency</u>
1979			
Oct. 01	800	461	USGS
Oct. 02	1105	653	C of R
Oct. 11	1090	626	C of R
Oct. 16	1080	648	C of R
Oct. 18	1110	720	DWR
Oct. 22	1100	672	USGS
Oct. 25	1040	643	C of R
Oct. 30	1090	645	C of R
Nov. 08	1150	657	USGS
Nov. 08	1040	638	C of R
Nov. 13	1060	615	C of R
Nov. 21	1040	684	USGS
Nov. 22	1060	626	C of R
Nov. 27	1060	665	DWR
Nov. 27	940	521	C of R
Dec. 06	1020	620	C of R
Dec. 10	1080	693	DWR
Dec. 11	1030	646	C of R
Dec. 20	1020	623	C of R
Dec. 25	1020	624	C of R
1980			
Jan. 03	1020	649	C of R
Jan. 08	1070	601	C of R
Jan. 17	380	326	C of R
Jan. 22	930	633	C of R
Jan. 31	326	196	DWR
Jan. 31	300	330	C of R
Feb. 05	1080	946	USGS
Feb. 05	950	652	C of R
Feb. 14	260	260	C of R
Feb. 19	208	225	C of R
Feb. 27	399	273	DWR
Feb. 28	380	268	C of R

TABLE D-1 (Continued)

<u>Date</u>	<u>EC at 25°C</u>	<u>TDS mg/l</u>	<u>Agency</u>
1980 con't			
Mar. 04	280	217	C of R
Mar. 13	380	286	C of R
Mar. 18	370	282	C of R
Mar. 25	515	281	C of R
Mar. 27	430	280	C of R
Apr. 01	480	303	C of R
Apr. 10	520	337	C of R
Apr. 15	477	320	C of R
Apr. 15	450	300	C of R
Apr. 24	420	299	C of R
Apr. 25	440	263	USGS
Apr. 27	390	306	C of R
May 08	460	328	C of R
May 12	420	272	DWR
May 13	440	284	C of R
May 18	430	279	USGS
May 22	490	329	C of R
May 27	420	271	C of R
May 30	440	338	USGS
June 05	540	364	C of R
June 10	570	359	C of R
June 17	425	311	USGS
June 19	525	299	DWR
June 19	500	363	C of R
June 24	560	350	C of R
June 30	490	335	USGS
July 03	620	388	C of R
July 08	670	423	C of R
July 15	660	432	USGS
July 17	685	438	C of R
July 22	740	554	C of R
July 31	1020	666	C of R
July 31	880	691	USGS
Aug. 05	810	671	C of R
Aug. 14	1120	704	C of R
Aug. 19	1070	680	C of R
Aug. 26	1180	726	DWR
Aug. 28	1080	699	C of R
Sep. 02	1090	706	C of R
Sep. 04	1100	729	USGS
Sep. 11	960	886	C of R
Sep. 11	1110	777	USGS
Sep. 16	1040	661	C of R
Sep. 25	960	688	C of R
Sep. 30	1040	696	C of R

TABLE D-2

FLOW WEIGHTED TDS OF  
FLOW AT RIVERSIDE NARROWS

(Including Nontributary Flow and  
Excluding Rubidoux Wastewater)

WATER YEAR 1979-80

<u>Month</u>	<u>Acre Feet (1)</u>	<u>TDS (2)</u>	<u>Acre Feet Times TDS</u>
October	2,329	664	1,546,456
November	2,117	647	1,369,699
December	2,045	641	1,310,845
January	2,055	647	1,329,585
February	2,349	654	1,536,246
March	2,927	661	1,934,747
April	3,013	668	2,012,684
May	2,818	675	1,902,150
June	2,085	682	1,421,970
July	1,446	689	996,294
August	1,264	696	879,744
September	<u>1,357</u>	<u>696</u>	<u>944,472</u>
Total	25,805		17,184,892

$$\text{Flow Weighted TDS} = \frac{17,184,892}{25,805} = 666 \text{ ppm}$$

- 1) Total Flow minus Storm Flow from TABLE 4
- 2) Estimated average TDS based on water quality data from TABLE D-1

**APPENDIX E**

**QUANTITY AND QUALITY OF  
WASTEWATER FROM RUBIDOUX  
COMMUNITY SERVICES DISTRICT**

**1979-80**

**PREPARED BY  
DONALD L. HARRIGER**

TABLE E-1

QUANTITY AND QUALITY OF  
WASTEWATER FROM RUBIDOUX  
DISCHARGED BELOW THE  
RIVERSIDE NARROWS GAGING STATION  
WATER YEAR 1979-80

<u>Month</u>	<u>Flow</u> <u>A.F.</u>	<u>Quality</u> <u>mg/l</u>	<u>Acre Feet</u> <u>Times TDS</u>
April	2	770	1,540
May	15	770	11,550
June	35	745	26,075
July	50	775	38,750
August	62	770	47,740
September	96	780	74,880
Total	260		200,535

$$\frac{200,535}{260} = 771 \text{ mg/l}$$

Average Flow Weighted Quality of Base Flow = 771 mg/l

Basic Data Provided by City of Riverside

**APPENDIX F**

**SANTA ANA RIVER WATERMASTER  
FINANCIAL STATEMENTS WITH REPORT  
ON  
EXAMINATION BY CERTIFIED PUBLIC ACCOUNTANTS**

SANTA ANA RIVER WATERMASTER  
FINANCIAL STATEMENTS  
WITH REPORT ON EXAMINATION BY CERTIFIED PUBLIC ACCOUNTANTS

JUNE 30, 1980

DIEHL, EVANS AND COMPANY  
CERTIFIED PUBLIC ACCOUNTANTS  
1910 NORTH BUSH STREET  
SANTA ANA, CALIFORNIA 92706

SANTA ANA RIVER WATERMASTER

FINANCIAL STATEMENTS

WITH REPORT ON EXAMINATION BY CERTIFIED PUBLIC ACCOUNTANTS

JUNE 30, 1980

DIEHL, EVANS AND COMPANY  
A PARTNERSHIP OF ACCOUNTANCY CORPORATIONS

CERTIFIED PUBLIC ACCOUNTANTS

1910 NORTH BUSH STREET

SANTA ANA, CALIFORNIA 92706

(714) 542-4453

OTHER OFFICES AT:  
2965 ROOSEVELT STREET  
CARLSBAD, CALIFORNIA 92008

(714) 729-2343

120 WEST WOODWARD AVENUE  
ESCONDIDO, CALIFORNIA 92025

(714) 74-1341

ELLIS C. DIEHL, C.P.A. (1925-1956)  
BRYN B. EVANS, C.P.A.  
W. G. PETERS, C.P.A.  
DONALD M. PETERSON, C.P.A.  
DONALD E. CALLAHAN, C.P.A.  
L. PETER SCHERER, C.P.A.  
PHILIP H. HOLTkamp, C.P.A.  
RODNEY K. MCDANIEL, C.P.A.  
RALPH H. WEINTRAUB, C.P.A.

September 15, 1980

ACCOUNTANTS' REPORT

Santa Ana River Watermaster  
Orange, California

We have examined the statement of assets and liabilities arising from cash transactions of the Santa Ana River Watermaster as of June 30, 1980 and the related statement of revenue collected, expenses paid and changes in fund balance for the year then ended. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

As described in Note 1, the Watermaster's policy is to prepare its financial statements on the basis of cash receipts and disbursements; consequently, certain revenue and the related assets are recognized when received rather than when earned and certain expenses are recognized when paid rather than when the obligation is incurred. Accordingly, the accompanying financial statements are not intended to present financial position and results of operations in conformity with generally accepted accounting principles.

In our opinion, the aforementioned financial statements present fairly the assets and liabilities arising from cash transactions of the Santa Ana River Watermaster at June 30, 1980, and the revenue collected and expenses paid for the year then ended, on the basis of accounting described in Note 1, which basis has been applied in a manner consistent with that of the preceding year.

*Diehl, Evans and Company*

SANTA ANA RIVER WATERMASTER  
NOTES TO FINANCIAL STATEMENTS

June 30, 1980

1. SIGNIFICANT ACCOUNTING POLICIES:

The Watermaster uses the cash receipts and disbursements method of accounting for all of its financial activity.

2. ORGANIZATION AND HISTORY:

The Santa Ana River Watermaster is composed of a committee of five representatives of four water districts. Two representatives serve from Orange County Water district and one representative each serves from Chino Basin Municipal Water District, Western Municipal Water District and San Bernardino Valley Municipal Water District. The committee was established on April 23, 1969 by order of the Superior Court of California in Orange County as part of a judgement resulting from a lawsuit by Orange County Water District as plaintiff vs. City of Chino, et al, as defendants.

Costs and expenses incurred by the individual representatives are reimbursed directly from the water districts. Collective Watermaster costs and expenses are budgeted and paid for by the Watermaster after receiving contributions from the water districts. Water district contributions are made in the following ratios:

Orange County Water District	40%
Chino Basin Municipal Water District	20
Western Municipal Water District	20
San Bernardino Valley Municipal Water District	<u>20</u>
Total	<u>100%</u>

The Watermaster issues a report each year to satisfy its obligation to monitor and test water flows from the Upper Area to the Lower Area of the Santa Ana River.

See accountants' report.

SANTA ANA RIVER WATERMASTER

STATEMENT OF REVENUE COLLECTED, EXPENSES  
PAID AND CHANGES IN FUND BALANCE

For the year ended June 30, 1980

	<u>Actual</u>	<u>Budget</u>	<u>Over (Under) Budget</u>
REVENUE COLLECTED:			
Water district contributions:			
Orange County Water District	\$ 4,000	\$ 4,000	\$ -
Chino Basin Municipal Water District	2,000	2,000	-
San Bernardino Valley Municipal Water District	2,000	2,000	-
Western Municipal Water District	2,000	2,000	-
Interest from savings account	<u>403</u>	<u>-</u>	<u>403</u>
TOTAL REVENUE COLLECTED	<u>10,403</u>	<u>10,000</u>	<u>403</u>
EXPENSES PAID:			
Professional engineering services	4,061	6,000	(1,939)
Administrative expenses:			
Office and secretarial expense	\$ 1,259		
Auditing services	<u>390</u>	2,500	(851)
Annual reports	<u>1,565</u>	<u>1,500</u>	<u>65</u>
TOTAL EXPENSES PAID	<u>7,275</u>	<u>10,000</u>	<u>(2,725)</u>
EXCESS OF REVENUE COLLECTED OVER EXPENSES PAID	3,128	<u>\$ -</u>	<u>\$(3,128)</u>
FUND BALANCE AT JULY 1, 1979	<u>7,578</u>		
FUND BALANCE AT JUNE 30, 1980	<u>\$ 10,706</u>		

See accountants' report and notes to financial statements.

SANTA ANA RIVER WATERMASTER  
STATEMENT OF ASSETS AND LIABILITIES  
ARISING FROM CASH TRANSACTIONS

June 30, 1980

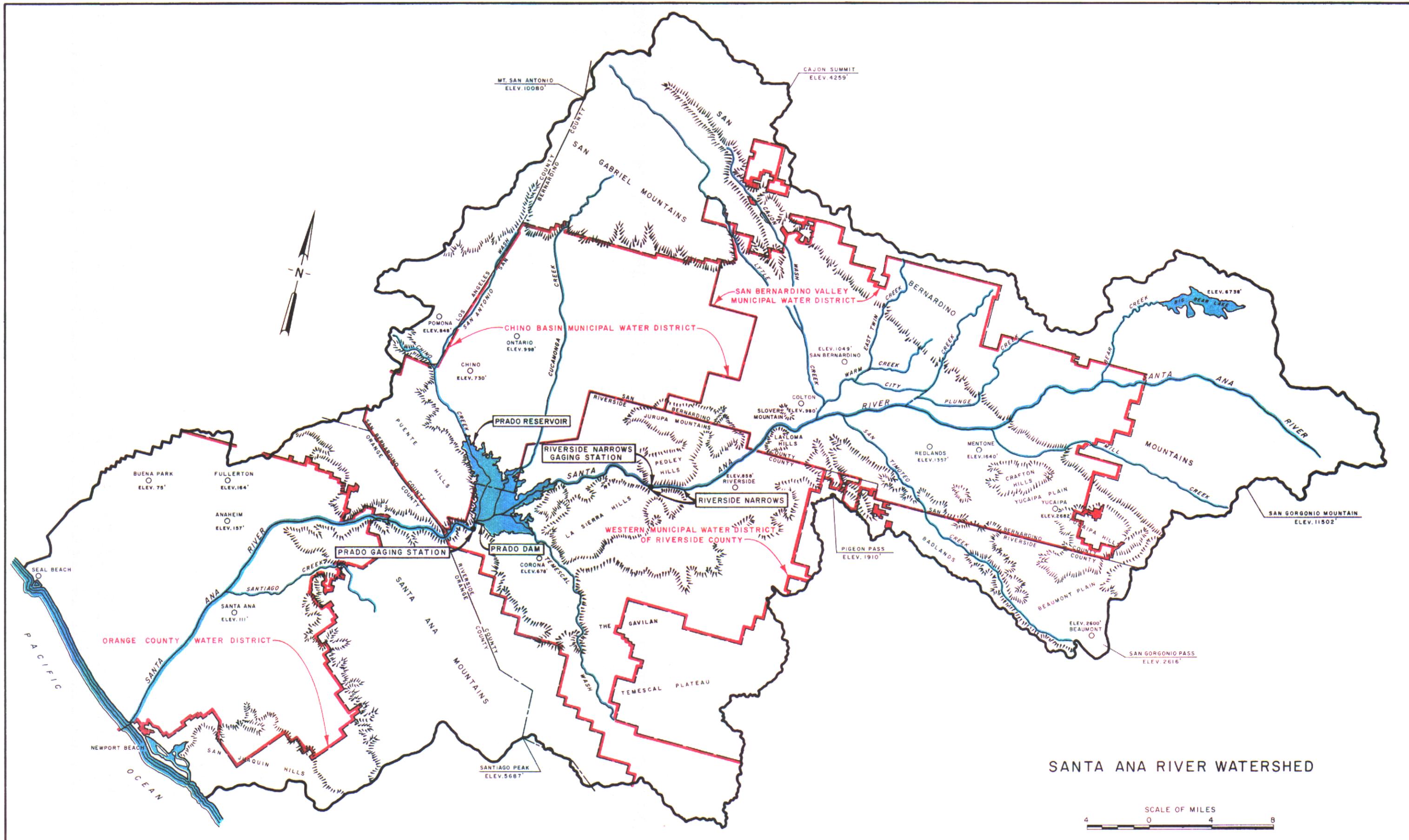
ASSETS

Cash in checking account	\$ 500
Cash in savings account	<u>10,206</u>
TOTAL ASSETS	<u>\$ 10,706</u>

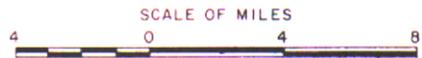
LIABILITIES AND FUND BALANCE

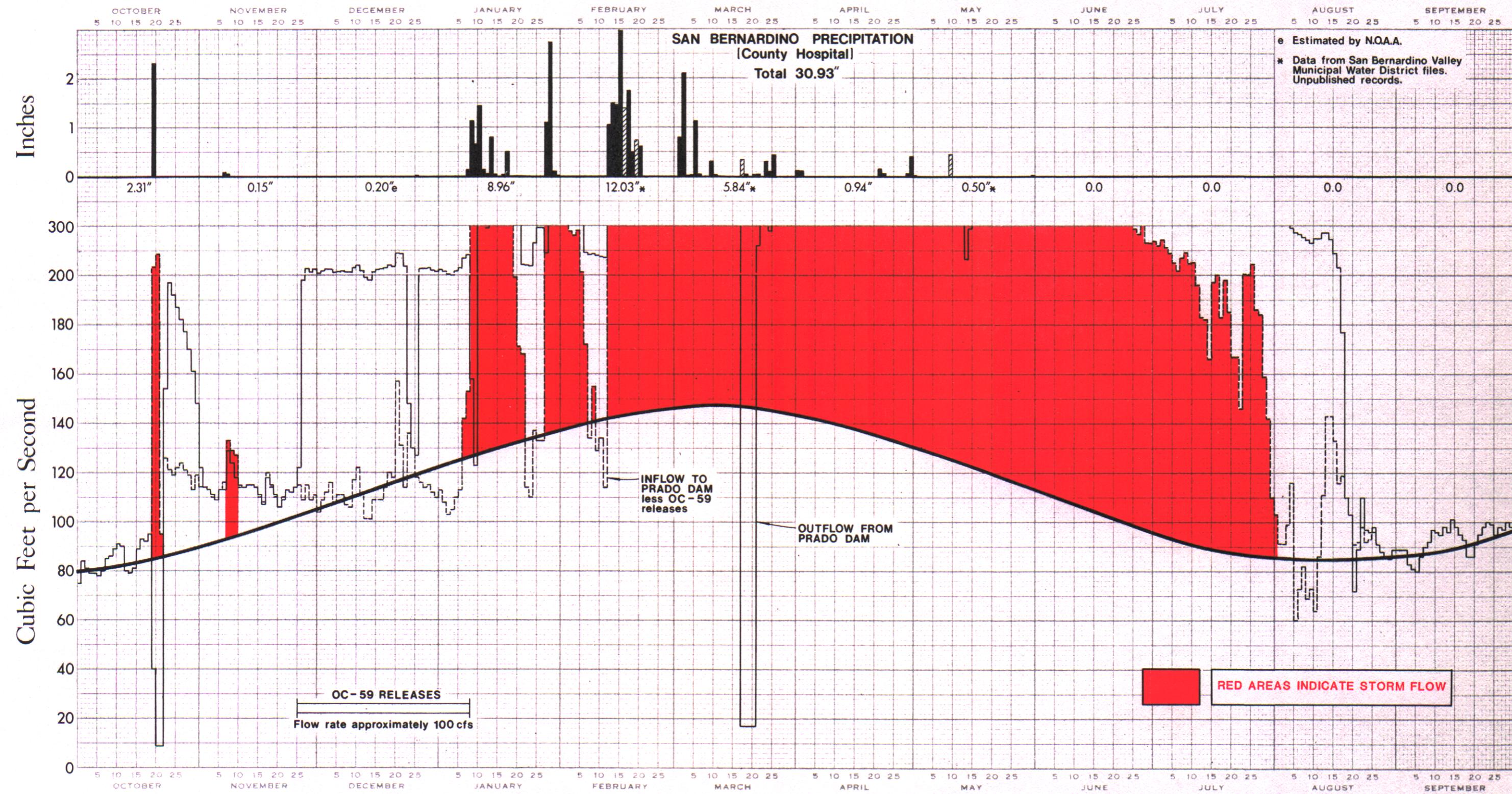
Liabilities	\$ -
Fund balance	<u>10,706</u>
TOTAL LIABILITIES AND FUND BALANCE	<u>\$ 10,706</u>

See accountants' report and notes to financial statements.

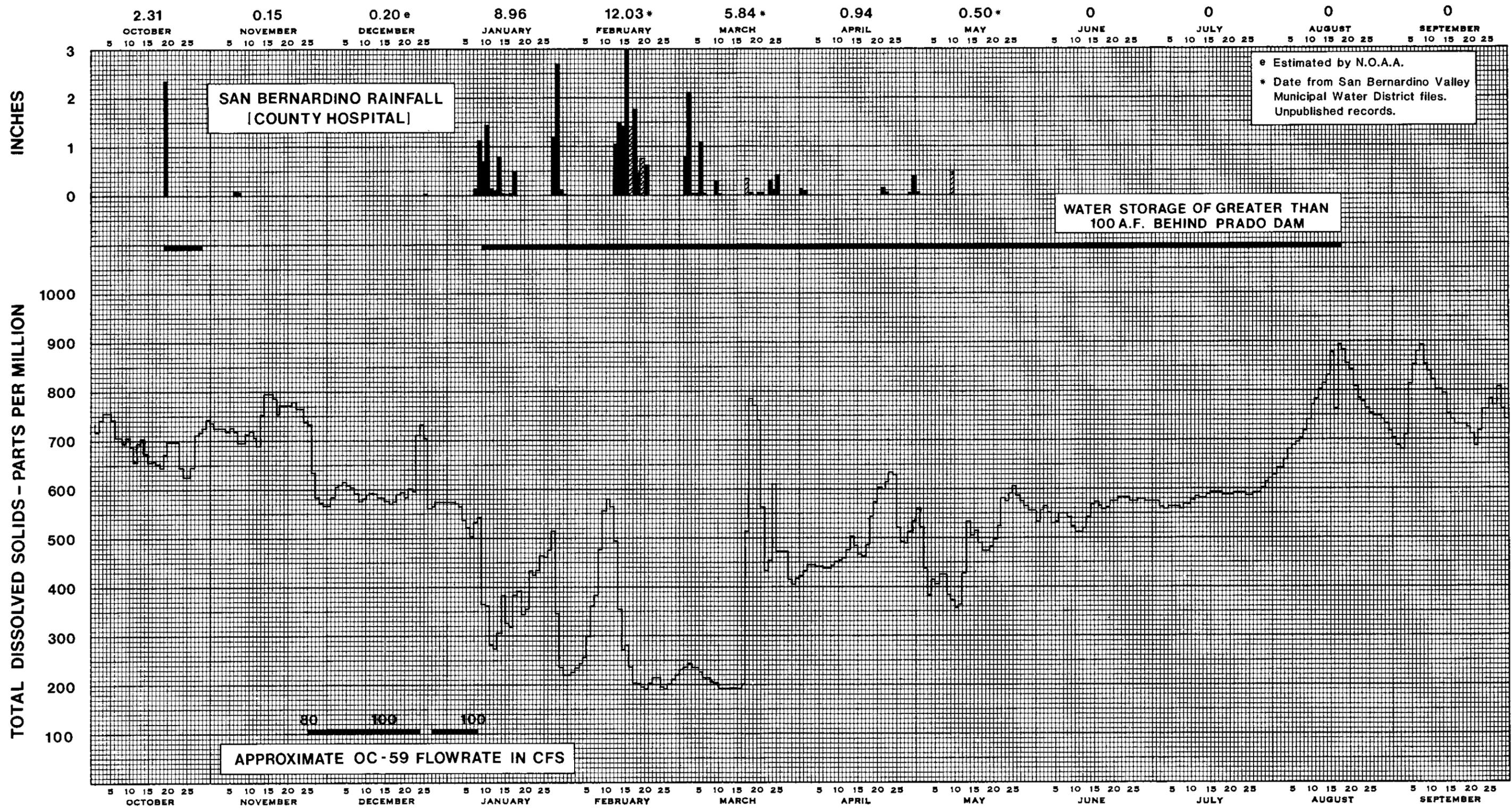


SANTA ANA RIVER WATERSHED

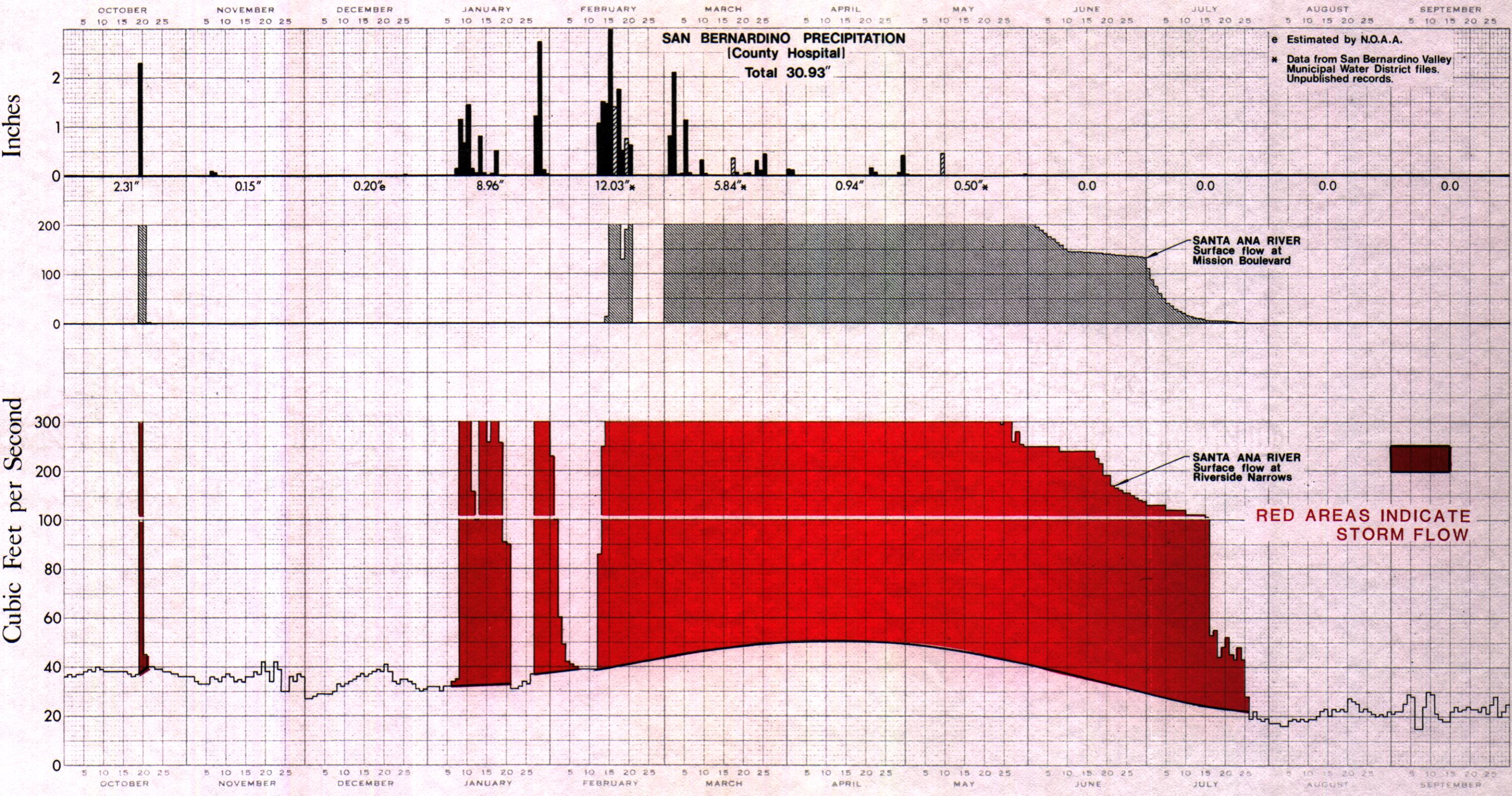




DISCHARGE OF SANTA ANA RIVER BELOW PRADO DAM & SAN BERNARDINO PRECIPITATION  
 WATER YEAR 1979 - 80



DISSOLVED SOLIDS IN SANTA ANA RIVER BELOW PRADO DAM



DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS & SAN BERNARDINO PRECIPITATION  
 WATER YEAR 1979 - 80  
 PLATE 4