SANTA ANA RIVER WATERMASTER

FOR

ORANGE COUNTY WATER DISTRICT

VS. CITY OF CHINO et al.

CASE NO. 117628 - COUNTY OF ORANGE

TWENTY-FOURTH ANNUAL REPORT OF THE SANTA ANA RIVER WATERMASTER

FOR WATER YEAR

OCTOBER 1, 1993 - SEPTEMBER 30, 1994

APRIL 30, 1995

SANTA ANA RIVER WATERMASTER

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

WATERMASTER
Harvey O. Banks
William J. Carroll
Donald L. Harriger
William R. Mills, Jr.
Robert L. Reiter

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April 30, 1995

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

Re: Watermaster Report for Water Year October 1, 1993 - September 30, 1994

Gentlemen:

We have the honor of submitting herewith the Twenty-fourth Annual Report of the Santa Ana River Watermaster. In developing the findings reported on in this report, a considerable amount of basic data was analyzed. Much of this basic data is not included in this report but is available for review at the office of the Secretary of the Watermaster upon request.

The principal findings of the Watermaster for the water year 1993-94 are as follows:

<u>At Prado</u>

1	Base Flow at Prado	111,186 acre-feet
2	Annual Weighted TDS in Base and Storm Flows	611 mg/L
3	Annual Adjusted Base Flow	119,432 acre-feet
4	Cumulative Adjusted Base Flow	2,353,840 acre-feet
5	Cumulative Entitlement of OCWD	1,008,000 acre-feet
6	Cumulative Credit	1,345,840 acre-feet
7	One-third of Cumulative Debit	0 acre-feet
8	Minimum Required Base Flow in 1994-95	34,000 acre-feet

At Riverside Narrows

1	Base Flow at Riverside Narrows	31,278 acre-feet
2	Annual Weighted TDS in Base Flow	681 mg/L
3	Annual Adjusted Base Flow	31,278 acre-feet
4	Cumulative Adjusted Base Flow	874,075 acre-feet
5	Cumulative Entitlement of CBMWD and WMWD	366,000 acre-feet
6	Cumulative Credit	508,075 acre-feet
7	One-third of Cumulative Debit	0 acre-feet
8	Minimum Required Base Flow in 1994-95	12,420 acre-feet

The above findings show that at the end of the 1993-94 water year, Chino Basin Municipal Water District and Western Municipal Water District have a cumulative credit of 1,345,840 acre-feet to their Base Flow obligation at Prado Dam. San Bernardino Valley Municipal Water District has a cumulative credit of 508,075 acre-feet to its Base Flow obligation at Riverside Narrows.

Based on these findings, the Watermaster concludes that there was full compliance with the provisions of the Stipulated Judgment in 1993-94.

The Watermaster continued to exercise surveillance over the many active and proposed projects within the watershed for their potential effect on Base Flow.

Sincerely yours,

Santa Ana River Watermaster

By: Harvey O. Banks
Harvey O. Banks

Donald L. Harriger
Donald L. Harriger

William J. Carroll
William J. Carroll

William R. Mills Jr.
William R. Mills Jr.

Robert L. Reiter
Robert L. Reiter

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CHAPTER I

WATERMASTER ACTIVITIES AND WATER CONDITIONS

This is the Twenty-fourth Annual Report of the Santa Ana River Watermaster required by the Stipulated Judgment for water year 1993-94 in the case of Orange County Water District vs. City of Chino et al., entered by the court on April 17, 1969 (Case No. 117628-County of Orange). 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 Upper 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 Basin, namely, the San Bernardino Valley Municipal Water District (SBVMWD), Western Municipal Water District (WMWD), Chino Basin Municipal Water District (CBMWD), and Orange County Water District (OCWD). The boundaries of these districts are shown on 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 Litigation and the Summary of Judgment are included as Appendices G and H of the Twentieth Annual Report.

In order to administer the provisions of the Judgment, the court appointed a Watermaster composed of five persons. Since August 15, 1985, the Santa Ana River Watermaster Committee has consisted of Harvey O. Banks, William J. Carroll, William R. Mills, Jr., Donald L. Harriger, and Robert L. Reiter. In 1993-94 Mr. Banks continued to serve as chairman, and Mr. Reiter continued to serve as secretary/treasurer.

The time for submission of the annual report is seven months after the end of the water year. 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 is shared by the parties to the Judgment. These costs are set forth in Table 1.

The USGS measured and computed the mean daily discharges of the Santa Ana River at the Metropolitan Water District of Southern California (MWDSC) Upper Feeder Crossing and below Prado Dam. Runoff data have also been provided for the Santa Ana River at E Street in San Bernardino and for several smaller streams tributary to Prado Reservoir; namely, Chino Creek at Schaefer Avenue, Cucamonga Creek near Mira Loma and Temescal Wash in the City of Corona.

TABLE 1

COST TO THE PARTIES AND USGS FOR MEASUREMENTS WHICH PROVIDE DATA USED BY THE SANTA ANA RIVER WATERMASTER

October 1, 1993 to September 30, 1994

	Agency Cost	USGS Cost
SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT		
At Riverside Narrows (MWD Crossing)		
Water Quality Monitoring/TDS Samples	$ 950	$ 2,850
Surface Water Gage	2,433	7,300
WESTERN MUNICIPAL WATER DISTRICT		
Same as SBVMWD	3,383	
Cucamonga Creek Discharge	2,600	5,200
Chino Creek Discharge	1,734	5,200
CHINO BASIN MUNICIPAL WATER DISTRICT		
Same as WMWD	7,717	
ORANGE COUNTY WATER DISTRICT		
At Prado Dam		
Water Quality Monitoring/TDS Samples		
Water Quality Sampling & Conductivity Programs	7,500	6,300
Chino Creek		
Surface Water Gage	1,733	
TOTAL FOR PARTIES	$28,050	
UNITED STATES GEOLOGICAL SURVEY		$26,850
GRAND TOTAL		$54,900

Precipitation during 1993-94 was below normal and totaled 11.62 inches at San Bernardino County Hospital, 65% of the 26-year base period (1934-35 through 1959-60) average of 17.98 inches. Plate 2 shows the annual precipitation from 1934-35 through 1993-94.

The 1993-94 discharge record for the USGS gaging station, "Santa Ana below Prado," is considered by the USGS to be a "good" record. Twenty-seven (27) direct discharge measurements, which ranged from about 5 to 684 cfs, were made during the year.

No State Water Project water was released by MWDSC from turnout OC-59 into San Antonio Creek.

The Arlington Desalter operated intermittently during the water year as shown on Plate 3 and described in Chapter II of this report. It discharged a total of 4,570 acre-feet of product water to the drainage tributary to the Santa Ana River below Riverside Narrows.

The overall 1993-94 discharge recorded for the USGS gaging station, "Santa Ana River at MWD Crossing", is considered by the USGS to be a "poor" record at both low and high stages because of the shifting channel and vegetative growth. The station was located at the MWDSC Upper Feeder Crossing for the entire year. Thirty-six (36) direct discharge measurements, which ranged from about 25 to 767 cfs, were made during the year.

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 Stipulated Judgment. 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 II and III.

Administration Costs

In accordance with Paragraph 7(d) of the Stipulated Judgment, the fees and expenses of each of the members of the Watermaster are borne by the district which nominated such member. All other Watermaster administrative costs and expenses are borne by the parties, with OCWD paying 40% of the cost and WMWD, SBVMWD, and CBMWD each paying 20% of the cost. The Stipulated 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 April 13, 1993, the Watermaster adopted a budget for the fiscal year 1993-94 in the amount of $16,000. Table 2 shows the items and amount included in said budget. The expenses for the fiscal year 1993-94 are also shown. The budget for fiscal year 1994-95 was adopted on March 31, 1994.

A financial review was performed by OCWD and is available for review at the office of the Secretary of the Watermaster upon request.

TABLE 2

SANTA ANA RIVER WATERMASTER BUDGET AND EXPENSES

Budget Item	July 1, 1993 to June 30, 1994 Budget	July 1, 1993 to June 30, 1994 Expenses	July 1, 1994 to June 30, 1995 Budget
Administration	$ 1,250.00	$ 1,250.00	$ 1,250.00
Support Engineering Services	9,000.00	8,363.42	9,000.00
Reproduction of Annual Report	5,750.00	1,840.54	5,750.00
TOTAL	$16,000.00	$11,453.96	$16,000.00

Summary of Findings

A summary of findings by the Watermaster for the period 1970-71 through 1993-94 is presented in Table 3. The Base Flow obligations at both Riverside Narrows and Prado Dam provided for in the Stipulated Judgment have been met and cumulative credits have been established.

TABLE 3

SUMMARY OF FINDINGS AT PRADO

Water Year	Rainfall (in)[1]	Total Flow (ac-ft)[2]	Base Flow (ac-ft)	Weighted TDS (mg/L)[3]	Adjusted Base Flow (ac-ft)	Cumulative Credit (ac-ft)
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	76,375	48,999	638	51,531	4,349
1973-74	12.72	63,620	43,106	633	45,513	7,862
1974-75	13.49	61,855	50,176	694	51,263	17,125
1975-76	15.86	59,209	45,627	635	48,098	23,223
1976-77	11.95	62,953	48,387	660	50,000	31,223
1977-78	30.47	252,837	58,501	383	73,955	63,178
1978-79	17.51	134,486	71,863	580	79,049	100,227
1979-80	30.93	527,760	82,509	351	106,505	164,732
1980-81	10.45	117,888[4]	74,875[5]	728	74,875[5]	205,652[6]
1981-82	18.34	143,367	81,548	584	89,431	253,083
1982-83	32.36	425,938[4]	111,692[5]	411	138,591[5]	353,036[6]
1983-84	10.81	178,395[4]	109,231[5]	627	115,876[5]	431,514[6]
1984-85	12.86	162,912	125,023[8]	617	133,670	523,184
1985-86	17.86	196,565	127,215[8]	567	141,315	622,499
1986-87	8.08	140,538	119,848	622	127,638	708,137
1987-88	13.78	170,279[9]	124,104[9]	582	136,308	802,445
1988-89	12.64	152,743[9]	119,572[9]	583	131,230	891,675
1989-90	8.53	144,483	119,149[10]	611	127,986	977,611
1990-91	15.48	191,321[11]	111,151[11]	514	128,379	1,064,040
1991-92	16.54	193,225[11]	106,948[11]	499	124,869	1,146,909
1992-93	30.92	568,677[11]	128,068[11]	368	163,499	1,268,408
1993-94	11.62	158,241[11]	111,186[11]	611	119,432	1,345,840

TABLE 3 (Continued)

SUMMARY OF FINDINGS
AT RIVERSIDE NARROWS

Water Year	Rainfall (in)[1]	Total Flow (ac-ft)[2]	Base Flow (ac-ft)	Weighted TDS (mg/L)[3]	Adjusted Base Flow (ac-ft)	Cumulative Credit (ac-ft)
1970-71	11.97	24,112	17,061	704	17,021	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	253,817	25,549[7]	676	25,549	38,146
1980-81	10.45	34,278	19,764	715	19,550	42,446
1981-82	18.34	82,708	32,778	678	32,778	59,974
1982-83	32.36	279,645	57,128	610	57,128	101,852
1983-84	10.81	82,745	56,948	647	56,948	143,550
1984-85	12.86	78,771	69,722[8]	633	69,772	198,072
1985-86	17.86	99,258	68,220[8]	624	68,220	251,042
1986-87	8.08	77,752	59,808	649	59,808	295,600
1987-88	13.78	79,706	55,324	620	55,324	335,674
1988-89	12.64	62,376	52,259	607	52,259	372,683
1989-90	8.53	58,159	53,199	590	53,583	411,016
1990-91	15.48	73,790[11]	45,041[11]	616	45,041	440,807
1991-92	16.54	71,427	40,306	620	40,306	465,863
1992-93	30.92	267,043	41,434	634	41,434	492,047
1993-94	11.62	45,006[11]	31,278[11]	677	31,278	508,075

TABLE 3 (Continued)

(1) Measured at San Bernardino County Hospital.
(2) Excludes Nontributary Flow and Exchange Waters.
(3) For Base and Storm Flow at Prado and Base Flow only at Riverside Narrows.
(4) Includes 16,090 acre-feet of water pumped from Lake Elsinore which passed Prado Dam in 1980-81; 7,720 acre-feet in 1982-83; and 12,550 acre-feet in 1983-84.
(5) Excludes water pumped from Lake Elsinore.
(6) Includes 8,045 acre-feet in 1980-81; 3,362 acre-feet in 1982-83; and 4,602 acre-feet in 1983-84 of Lake Elsinore discharge.
(7) Includes Rubidoux Wastewater in 1979-80 and subsequent years.
(8) Includes groundwater pumped from San Bernardino Basin and released to the river in accordance with Court Orders approving agreement and allowing temporary additional extractions of water from the San Bernardino Basin Area.
(9) Excludes Nontributary Flow released to San Antonio Creek by MWDSC under the Ontario/MWDSC Exchange Program.
(10) Excludes water discharged to Santa Ana River from Arlington Desalter in 1989-90 and subsequent years in accordance with an agreement between OCWD, WMWD, and Santa Ana Watershed Project Authority.
(11) Excludes groundwater pumped from San Bernardino, Colton, and Riverside Basins and discharged to Santa Ana River to flow to OCWD under the Exchange Water agreements.

Note: For the years 1973-74 through 1979-80, a correction has been made for different losses of State Water than assumed in reports published for these years. The values changed are Base Flow, weighted TDS, and Adjusted Base Flow. These changes, in turn, have changed the cumulative credit for these years. See Appendix C in the Twelfth Annual Report 1981-82.

CHAPTER II

BASE FLOW AT PRADO

This chapter deals with determinations of 1) the components of flow at Prado, which include Nontributary Flow, Arlington Desalter Flow, Exchange Water, Storm Flow and Base Flow and 2) the Adjusted Base Flow at Prado credited to CBMWD and WMWD.

Flow at Prado

The flow of the Santa Ana River amounted to 159,560 acre-feet, measured at the USGS gaging station below Prado. Storage behind Prado Dam at the beginning of the year was 863 acre-feet. There was no storage at the end of the water year. The inflow to the reservoir included 111,186 acre-feet of Base Flow and 41,622 acre-feet of Storm Flow. Nontributary Flow during 1993-94 due to the release of State Water Project water above Riverside Narrows during 1972-73 was 321 acre-feet. Other flows due to Arlington Desalter Project water releases to Temescal Creek and Exchange Water during 1993-94 were 4,570 acre-feet and 998 acre-feet, respectively. The Storm and Base Flow components of flow of the Santa Ana River at Prado Dam for each month in the 1993-94 water year are listed in Table 4 and are shown graphically on Plate 3. The components of flow of the Santa Ana River at Prado during the period 1934-35 through 1993-94 are presented on Plate 4.

Chino Basin Groundwater Storage Program

The Sixteenth Annual Report described a program proposed by MWDSC to store State Water Project water in the Chino Basin for its future use. The project was never implemented. In the 1991-92 water year, a small, modified project, now called the "Mini Conjunctive Use Project" was implemented. Through the Mini Conjunctive Use Project, MWDSC delivered 4,806 acre-feet of surface water to purveyors who normally pump groundwater in exchange for and in-lieu of their pumping the groundwater. MWDSC may at some future date remove this water from the basin. Storage of this quantity of water should have no impact on the rising groundwater and, therefore, has no impact on the base flow in the Santa Ana River. Should a larger scale project of this nature be implemented, the Watermaster will evaluate its effect at that time.

Discharge of Groundwater from San Bernardino Basin Area to Santa Ana River

This program was referenced in Table 3, footnote (8) and was also described in the Sixteenth Annual Report. No groundwater was pumped from San Bernardino Basin and discharged to the Santa Ana River in 1993-94 under this program.

Ontario/MWDSC Exchange Program

The Sixteenth Annual Report presented a description of this program and its implications with respect to the responsibilities and activities of the Watermaster. This program was also referenced in Table 3, footnote (9). During 1993-94 MWDSC did not deliver any Colorado River Exchange Water to the City of Ontario.

Nontributary Flow

Since May 1973, OCWD has from time to time purchased State Water Project water for the replenishment of the groundwater basin in Orange County. The water has been released at two locations: Santa Ana River above Riverside Narrows (1972-73 only) and San Antonio Creek near Upland.

Releases above Riverside Narrows

As fully discussed in Appendix F of the Fifth Annual Report, the Watermaster Committee determined a schedule of credits to OCWD for State Water Project water which was released above Riverside Narrows during 1972-73. A portion of this water, because it percolated in the basin above the Narrows, did not reach the Narrows in 1972-73. The schedule as developed in the Fifth Annual Report, is the best estimate of the amount that reaches Riverside Narrows each year. The 1993-94 credit of 321 acre-feet is assumed to be distributed uniformly throughout the year, as shown in Table 4. This amount fulfills the obligation for the water released, all as described above in the Fifth Annual Report.

Releases to San Antonio Creek

There were no releases from OC-59 into San Antonio Creek during the water year 1993-94.

Arlington Desalter

The underflow from the Arlington groundwater sub-basin has historically been a component of the Santa Ana River flow. These groundwaters have increasingly been degraded through agricultural and other uses. Two parties to the Stipulated Judgment, WMWD and OCWD, as members of the Santa Ana Watershed Project Authority, constructed a groundwater cleanup project which is designed to eliminate the poor quality underflow from the sub-basin. This project is known as the Arlington Desalter and consists of five extraction wells and a treatment facility which reduces salinity. The capacity of the facility is approximately 6 mgd. The facility began operations in July 1990, with OCWD buying the product water delivered through the Santa Ana River. During the 1993-94 water year, 4,570 acre-feet of water discharged from the Arlington Desalter was determined to have reached Prado Dam.

All parties to the Stipulated Judgment agreed that the product water from this facility would be excluded from the computation of Santa Ana River Base Flow and Base Flow quality.

TABLE 4

COMPONENTS OF FLOW AT PRADO DAM

FOR WATER YEAR 1993-94
(acre-feet)

		USGS Measured Outflow	Storage Change(1)	Computed Inflow	Storm Flow	Nontributary Water Riverside Narrows (2)	Exchange Water (3)	Arlington Desalter	Base Flow
1993	October	9,673	-315	9,358	561	26	0	245	8,527
	November	11,443	155	11,598	2,116	27	0	434	9,021
	December	14,949	-703	14,246	3,594	27	0	450	10,175
1994	January	13,454	413	13,867	1,675	27	0	557	11,608
	February	28,568	208	28,776	18,090	27	0	142	10,518
	March	21,638	2,545	24,183	12,255	27	0	306	11,595
	April	12,797	1,219	14,016	2,619	27	483	561	10,327
	May	10,776	1,255	12,031	712	27	379	551	10,362
	June	9,882	-1,575	8,307	0	27	0	545	7,735
	July	11,585	-4,065	7,520	0	27	0	0	7,493
	August	7,133	0	7,133	0	26	0	232	6,875
	September	7,662	0	7,662	0	26	137	548	6,951
Total		159,560	-863	158,697	41,622	321	998	4,570	111,186

(1) The monthly change in storage is included in the monthly components of flow.

(2) That portion of State Water Project water released during 1972-73 upstream of Riverside Narrows, determined to have reached Prado in 1993-94.

(3) Exchange Water pumped from the San Bernardino, Colton, and Riverside groundwater basins and discharged into the Santa Ana River less an estimated loss of 5% for evapotranspiration.

Releases of Exchange Water from Riverside Canal

During water year 1993-94, Demonstration Local Storage (DLS) Program water was delivered to the Santa Ana River upstream of Prado Dam. No water under the Drought Emergency Exchange plan was delivered during water year 1993-94. This plan is more fully described in Chapter II of the Twenty-first Annual Report.

In 1993, OCWD and WMWD entered into an agreement to participate in MWDSC's DLS Program. The agreement provides for delivery of MWDSC water to WMWD, and WMWD would cause a like amount of groundwater, pumped from the basins above the Riverside Narrows, to be delivered to OCWD via the Santa Ana River. Because the mechanism is identical to the Drought Emergency Exchange Program, waters discharged to the river from these two programs are combined and termed Exchange Waters.

The amount of Exchange groundwater delivered by WMWD above and below Van Buren Boulevard during 1993-94 was 998 acre-feet. This amount reflects the agreed upon 5% decrease in flow to compensate for losses between the point of delivery and replenishment basins in Orange County.

Since the Exchange Waters are effectively Nontributary Water delivered upstream of Prado Dam for the benefit of OCWD, the amount of pumped Exchange groundwater reaching Prado Dam is excluded from the computation of Base Flow and Base Flow quality.

Storm Flow

Portions of storm flows are retained behind Prado Dam for regulation of downstream flows and for water conservation purposes. The U.S. Army Corps of Engineers (ACOE) owns Prado Dam and operates it according to a release schedule utilizing a debris pool elevation of 494 feet until March 1 of each year. In 1994 an agreement was signed by OCWD, ACOE, and the U.S. Fish and Wildlife Service (USFWS), which provides that between March 1 and August 30 the pool would be raised, given sufficient flows, to elevation 497 feet. This elevation would be increased year by year, as additional biological habitat mitigation by OCWD comes on line, to a maximum elevation of 505 feet. Storm flows captured within the reservoir are released following the storm to downstream groundwater recharge facilities. Monthly and annual quantities of Storm Flow are shown in Table 4.

During the 1993-94 water year, the amount of water stored in Prado Reservoir reached a maximum of 8,690 acre-feet on February 8, 1994, and the maximum daily flow released to the Santa Ana River was 1,334 cfs on the same day.

During the year, construction continued on elements of the Santa Ana River Mainstem flood control project, including the Seven Oaks Dam, located on the Santa Ana River

above the community of Mentone.

Base Flow

The Base Flow is affected by Nontributary Flow which had been released previously above Riverside Narrows. The general procedure used by the Watermaster to separate the 1993-94 flow components was the same as used for previous years and is fully described in the Fifth Annual Report and the Twelfth Annual Report. The monthly and annual quantities of Base Flow are shown in Table 4.

Lake Elsinore Project

Work on modifications to Lake Elsinore itself and construction of the outlet channel which would discharge to the headwaters of Temescal Creek have all been completed. The discharge of lake overflows to the Santa Ana River basin must be considered by the Watermaster as water contributing to Base Flow as it has in the past.

Wastewater Effluent Discharges

A portion of the Base Flow at Prado is made up of treated wastewater effluent discharged from a number of wastewater treatment plants located above Prado Dam. For the year 1993-94, about 132,790 acre-feet were discharged above Prado Dam by major agencies as shown in Table 5.

Water Quality

The weighted average total dissolved solids (TDS) for the total flow passing Prado Dam, including Nontributary Flow released above Riverside Narrows, Exchange Water and Arlington Desalter output, was found to be 604 mg/L. This determination was based on records from a continuous monitoring device, operated by the USGS for electrical conductivity (EC) of the Santa Ana River flow below Prado, supplemented by grab samples for EC and TDS determination, and a statistical correlation of EC and TDS.

The EC of the outflow at Prado was recorded hourly on a punched tape by the USGS. The USGS collected a total of 24 grab samples and performed laboratory analyses for TDS. Daily flow-weighted EC values were calculated from the hourly EC data. A correlation between TDS and EC was developed using the TDS data from the grab samples and the field EC recorded by the technician at the times when the samples were collected. Data used for the statistical analysis are available for review at the office of the Secretary of the Watermaster upon request. The statistical analysis yields the best fit equation shown as follows:

$$TDS = EC \times 0.608645$$

(where the units of TDS and EC are mg/L and microsiemens/cm, respectively)

TABLE 5

WASTEWATER EFFLUENT DISCHARGED ABOVE PRADO BY MAJOR AGENCIES (acre-feet)

Year	Redlands	San Bernardino	Colton	Rialto	Riverside	Corona	CBMWD #1	CBMWD #2	CBMWD CCWRF*	Total
1970-71	2,650	17,860	2,520	2,270	18,620	3,190	--	--	--	47,110
1971-72	2,830	16,020	2,230	2,400	19,010	3,230	6,740	--	--	52,460
1972-73	2,810	18,670	2,530	2,260	19,060	3,340	10,380	--	--	59,050
1973-74	2,770	17,680	2,530	2,320	19,560	3,510	11,440	2,320	--	61,950
1974-75	2,540	16,750	1,980	2,320	19,340	4,020	14,960	2,280	--	64,190
1975-76	2,450	17,250	2,540	2,240	19,580	4,700	15,450	2,950	--	67,160
1976-77	3,170	17,650	3,260	2,330	18,770	5,010	14,640	3,380	--	68,210
1977-78	3,280	18,590	3,810	2,380	20,310	5,200	14,650	4,060	--	72,280
1978-79	3,740	19,040	3,850	3,050	21,070	5,390	15,040	5,070	--	76,250
1979-80	4,190	20,360	4,190	2,990	22,910	5,360	14,410	5,520	--	79,930
1980-81	4,410	20,550	3,930	3,370	24,180	5,590	17,270	5,260	--	84,560
1981-82	4,420	23,340	3,780	3,470	25,640	5,410	19,580	5,360	--	91,000
1982-83	4,530	24,160	3,600	3,620	25,020	5,860	20,790	4,290	--	91,870
1983-84	5,150	22,080	3,700	3,830	26,090	6,200	20,950	3,950	--	91,950
1984-85	4,990	23,270	3,830	4,070	27,750	6,250	25,160	4,280	--	99,600
1985-86	5,200	24,720	4,010	4,720	28,820	5,900	28,240	2,660	--	104,270
1986-87	5,780	26,810	4,170	5,350	30,340	6,170	27,160	5,000	--	110,780
1987-88	6,060	27,880	5,240	6,040	34,660	6,050	31,290	5,500	--	122,720
1988-89	5,250	27,640	5,550	6,280	35,490	8,080	35,510	6,180	--	129,980
1989-90	6,360	28,350	5,810	6,260	33,210	9,140	34,760	5,730	--	129,620
1990-91	6,690	27,570	5,670	6,290	32,180	9,110	36,840	6,100	--	130,450
1991-92	6,230	25,060	5,660	6,360	32,660	9,010	40,360	5,780	1,550	132,670
1992-93	6,880	25,550	6,210	6,460	34,100	9,600	41,510	5,640	4,720	140,670
1993-94	6,440	23,800	5,830	6,540	32,640	7,790	37,310	5,430	7,010	132,790

* CCWRF = Carbon Canyon Water Reclamation Facility

The amounts shown in this table were determined from data provided by the agencies.

Using the daily EC data, flow-weighted average daily values for TDS were calculated using the above equation. The plot of TDS on Plate 5 shows the daily average TDS concentration of the Santa Ana River flow passing Prado Dam.

Water Quality Adjustment for Nontributary Flow

The weighted average annual TDS value of 604 mg/L represents the quality of the total flow including Nontributary Flow released to the Santa Ana River above Riverside Narrows, Exchange Water, and Arlington Desalter output. The Stipulated Judgment requires that Base Flow shall be subject to adjustment based on the TDS of Base Flow and Storm Flow only. Hence a determination of the TDS of Base Flow plus Storm Flow only, is detailed in the following paragraphs.

The flow-weighted average TDS of State Water Project water released above Riverside Narrows during 1972-73 was 235 mg/L and was adjusted to 242 mg/L to reflect a 3% evapotranspiration loss of the water released.

Water Quality Adjustment for Arlington Desalter

During the 1989-90 water year, Arlington Desalter began to discharge product water into a storm channel tributary to the Santa Ana River. The amount of product water discharged to the Santa Ana River during the 1993-94 water year totaled 4,570 acre-feet at an average TDS of 446 mg/L. This flow-weighted average TDS of 446 mg/L was estimated from periodic TDS and EC measurements of product water discharged into the channel.

Water Quality Adjustment for Exchange Water

The City of Riverside continued to pump groundwater which was discharged into the Riverside Canal for delivery to OCWD. The amount of water discharged to the Santa Ana River during the 1993-94 water year was 998 acre-feet at an average TDS of 349 mg/L. This flow-weighted average TDS of 349 mg/L was estimated from periodic grab samples taken at the Riverside Canal gaging station near Jefferson Street and at the Tava Lanes turnout.

Flow Component	Annual Flow (acre-feet)	Average TDS (mg/L)	Annual Flow x Average TDS (acre-feet x mg/L)
1. Measured Outflow	159,560	604	96,374,240
2. Less Nontributary Flow Riverside Narrows	321	242	76,682
3. Less Arlington Desalter	4,570	446	2,038,220
4. Less Exchange Water	998	349	348,302
5. Measured Outflow less lines 2, 3, and 4	153,671	611*	93,910,036
*Average TDS in total Base and Storm Flows			93,910,036 ÷ 153,671 = 611 mg/L

After adjusting for Nontributary Flow of State Water Project water from above Riverside Narrows, Exchange Water and the Arlington Desalter flows, the weighted average annual TDS of Storm Flow and Base Flow for 1993-94 was 611 mg/L, as shown above.

Adjusted Base Flow at Prado

The Stipulated Judgment provides that the amount of Base Flow at Prado received during any year shall be subjected to adjustment based on weighted average annual TDS of the 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 mg/L	$Q - \frac{35}{42,000} Q(TDS-800)$
700 mg/L to 800 mg/L	Q
Less than 700 mg/L	$Q + \frac{35}{42,000} Q(700-TDS)$

Where: Q = Base Flow actually received.

The weighted average annual TDS of 611 mg/L is less than 700 mg/L. Therefore, the

Base Flow must be adjusted by the above equation for TDS less than 700 mg/L. Thus the Adjusted Base Flow is as follows:

$$(111{,}186 \text{ ac-ft}) + \frac{35}{42{,}000} (111{,}186 \text{ ac-ft}) (700 - 611) = 119{,}432 \text{ ac-ft}$$

Entitlement and Credit or Debit

Paragraph 5(c) of the Stipulated Judgment states that "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 concerning flow at Prado for 1993-94 required under the Stipulated Judgment are as follows:

1.	Measured Outflow at Prado	159,560 acre-feet
2.	Base Flow at Prado	111,186 acre-feet
3.	Annual Weighted TDS of Base and Storm Flow	611 mg/L
4.	Annual Adjusted Base Flow	119,432 acre-feet
5.	Cumulative Adjusted Base Flow	2,353,840 acre-feet
6.	Cumulative Entitlement of OCWD	1,008,000 acre-feet
7.	Cumulative Credit	1,345,840 acre-feet
8.	One-Third of Cumulative Debit	0 acre-feet
9.	Minimum Required Base Flow in 1994-95	34,000 acre-feet

CHAPTER III

BASE FLOW AT RIVERSIDE NARROWS

This chapter deals with determinations 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.

Flow at Riverside Narrows

The flow of the Santa Ana River at Riverside Narrows amounted to 45,477 acre-feet, measured at the USGS gaging station near the MWDSC Upper Feeder Crossing. Separated into its components, Base Flow was 31,278 acre-feet, Storm Flow was 15,838 acre-feet, Nontributary Flow due to a prior release of State Water Project water above Riverside Narrows was 327 acre-feet and 144 acre-feet of Exchange Water. Included in Base Flow are 2,110 acre-feet of wastewater from Rubidoux Community Services District which now bypasses the USGS gaging station. The Storm and Base Flow components of the flow of the Santa Ana River at Riverside Narrows for each month in the 1993-94 water year are listed in Table 6 and graphically shown on Plate 6. The components of flow of the Santa Ana River at Riverside Narrows during the period 1934-35 through 1993-94 are presented on Plate 7.

Nontributary Flow

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

The Watermaster's determination of the effect of these releases was discussed in the Fifth Annual Report of the Watermaster. For the water year 1993-94 the amount of State Water Project water reaching Riverside Narrows was agreed upon as 327 acre-feet. This amount fulfills the obligation for the water released, all as described above in the Fifth Annual Report.

Release of Exchange Water

During water year 1993-94, 144 acre-feet of Exchange Water was delivered to the Santa Ana River upstream of the Riverside Narrows.

Base Flow

Based on the hydrograph shown on Plate 6 and utilizing in general the procedures reflected in the Work Papers of the engineers (as referenced in Paragraph 2 of the Engineering Appendix of the Stipulated 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 1993-94
(acre-feet)

		USGS Measured Flow	Storm Flow	Non-tributary Flow	Exchange Water (1)	Rubidoux Waste-water	Base Flow (2)
1993	October	2,404	0	27	0	174	2,551
	November	2,132	280	27	0	171	1,996
	December	3,354	1,122	27	0	172	2,377
1994	January	3,792	689	27	0	180	3,256
	February	9,142	6,335	28	0	154	2,933
	March	8,995	5,981	28	0	180	3,166
	April	3,769	786	28	0	170	3,125
	May	3,304	645	27	0	182	2,814
	June	2,216	0	27	0	176	2,365
	July	2,208	0	27	0	184	2,364
	August	2,132	0	27	0	185	2,290
	September	2,029	0	27	144	183	2,041
Total		45,477	15,838	327	144	2,110	31,278

(1) Exchange Water pumped from the San Bernardino, Colton, and Riverside groundwater basins and discharged into the Santa Ana River above Riverside Narrows.

(2) Base Flow includes Rubidoux wastewater discharged below Riverside Narrows.

Nontributary Flow was assumed to be equally distributed throughout the year (327 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 treatment plant at Riverside. Prior to that time, Rubidoux had discharged to the river upstream of the Riverside Narrows Gaging Station. Wastewater from Rubidoux during water year 1993-94, in the amount of 2,110 acre-feet, has been added to the streamflow as measured at the gaging station.

Water Quality

The determination of water quality at the Riverside Narrows Gaging Station was made using periodic grab samples taken and analyzed for TDS by the USGS, DWR, and the City of Riverside. Water quality data based on samples taken during storm flow periods were not used in the calculations.

The flow-weighted quality of wastewater from Rubidoux was 678 mg/L. The Base Flow quality resulting from exclusion of the Nontributary Flow and inclusion of the Rubidoux wastewater is shown in the following table as 681 mg/L.

Flow Component	Annual Flow (acre-feet)	Average TDS (mg/L)	Annual Flow x Average TDS (ac-ft x mg/L)
1. Base Flow including Nontributary Flow	31,278	677	21,175,206
2. Less Nontributary Flow	327	237	77,499
3. Plus Rubidoux Wastewater	2,110	678	1,430,580
4. Base Flow less line 2 plus line 3	33,061	681*	22,528,287
*Average TDS in Base Flow		22,528,287 ÷ 33,061 = 681 mg/L	

Adjusted Base Flow at Riverside Narrows

The Stipulated 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 the Base Flow as follows:

If the Weighted Average TDS in Base Flow at Riverside Narrows is:	Then the Adjusted Base shall be determined by the formula:
Greater than 700 mg/L	$Q - \frac{11}{15,250} Q(TDS-700)$
600 mg/L to 700 mg/L	Q
Less than 600 mg/L	$Q + \frac{11}{15,250} Q(600-TDS)$

Where: Q = Base Flow actually received.

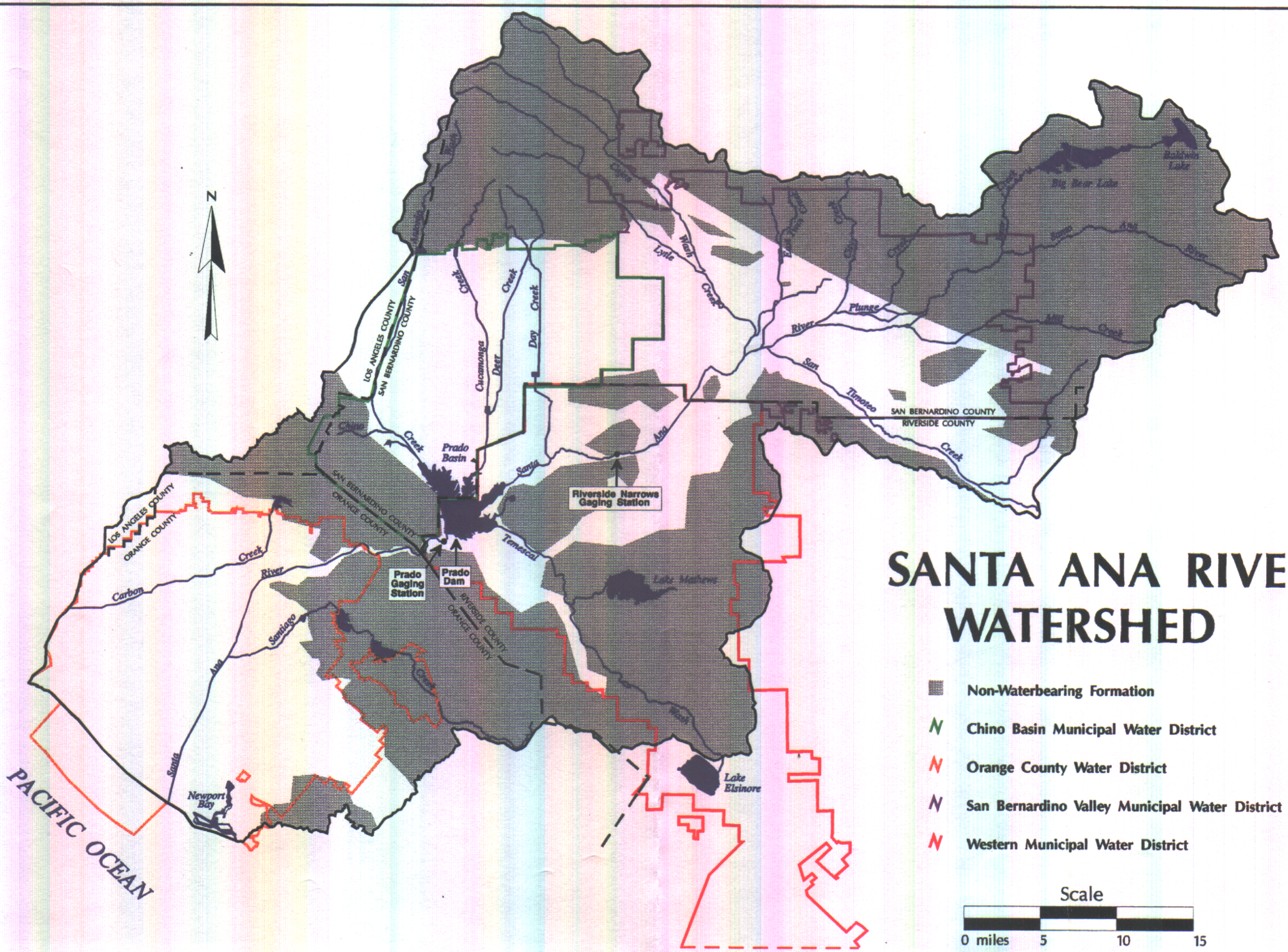
From the previous subsection, the weighted average annual TDS in the Base Flow at Riverside Narrows for the water year 1993-94 was 681 mg/L. Therefore, no adjustment is necessary, and the Adjusted Base Flow for 1993-94 is 31,278 acre-feet.

Entitlement and Credit or Debit

Paragraph 5(b) of the Stipulated 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 1993-94 required under the Stipulated Judgment are as follows:

1. Base Flow at Riverside Narrows	31,278 acre-feet
2. Annual Weighted TDS of Base Flow	681 mg/L
3. Annual Adjusted Base Flow	31,278 acre-feet
4. Cumulative Adjusted Base Flow	874,075 acre-feet
5. Cumulative Entitlement of CBMWD and WMWD	366,000 acre-feet
6. Cumulative Credit	508,075 acre-feet
7. One-Third of Cumulative Debit	0 acre-feet
8. Minimum Required Base Flow in 1994-95	12,420 acre-feet



SANTA ANA RIVER WATERSHED

- Non-Waterbearing Formation
- N Chino Basin Municipal Water District
- N Orange County Water District
- N San Bernardino Valley Municipal Water District
- N Western Municipal Water District

Scale

0 miles 5 10 15

PRECIPITATION AT SAN BERNARDINO SINCE 1934-35

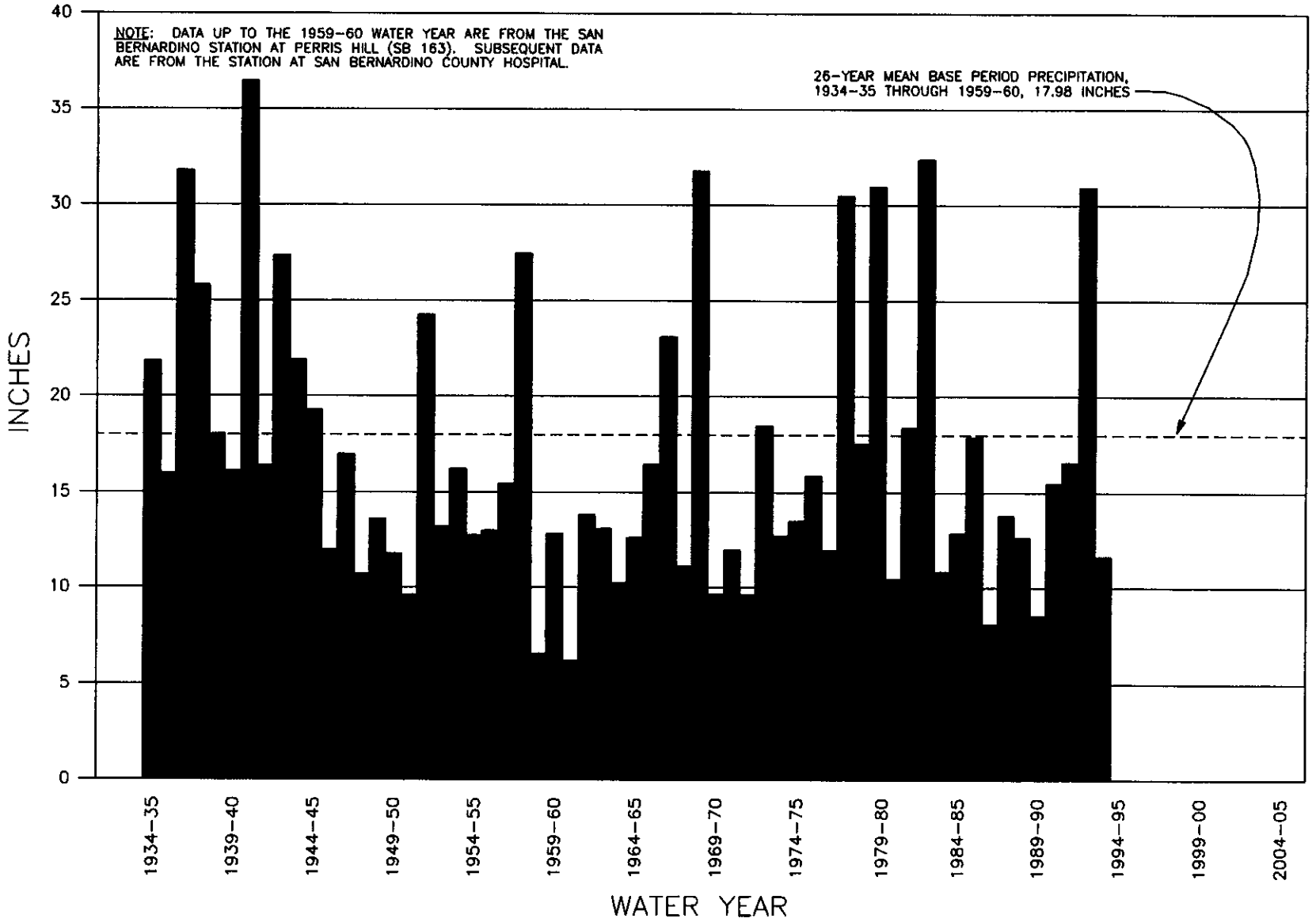
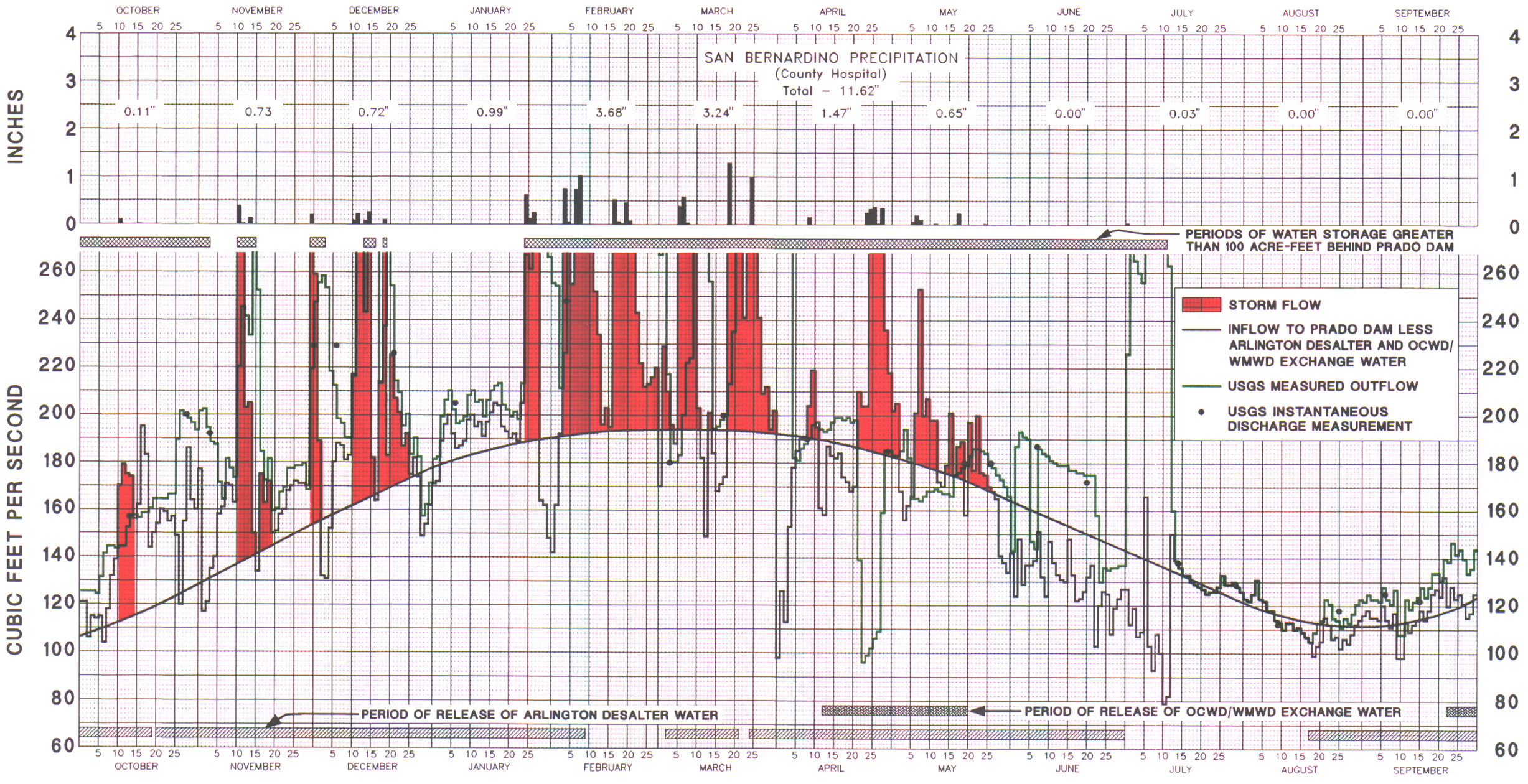


PLATE 2



DISCHARGE OF SANTA ANA RIVER AT PRADO DAM & SAN BERNARDINO PRECIPITATION
WATER YEAR 1993-94

PLATE 3

DISCHARGE OF SANTA ANA RIVER AT PRADO SINCE 1934-35

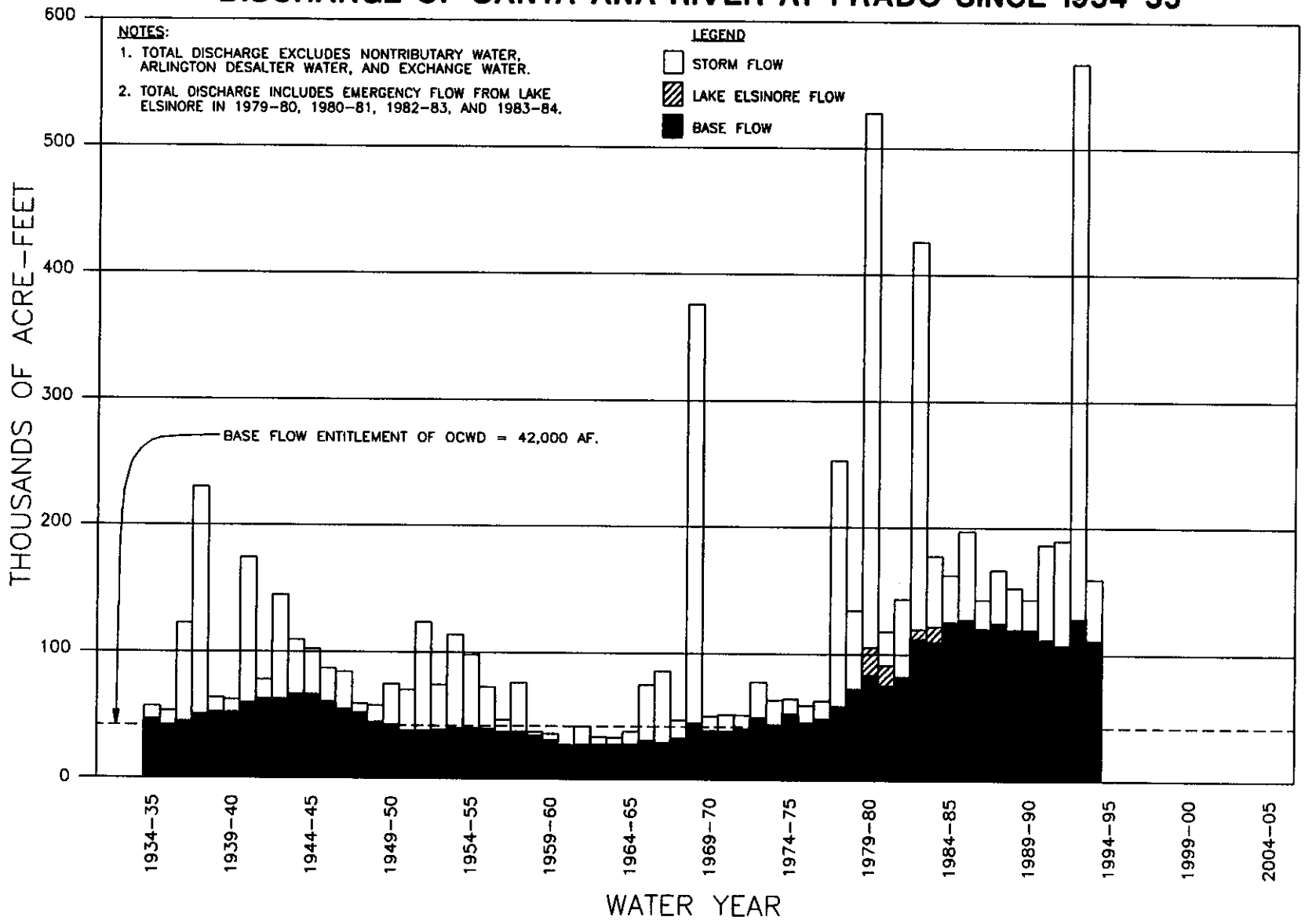
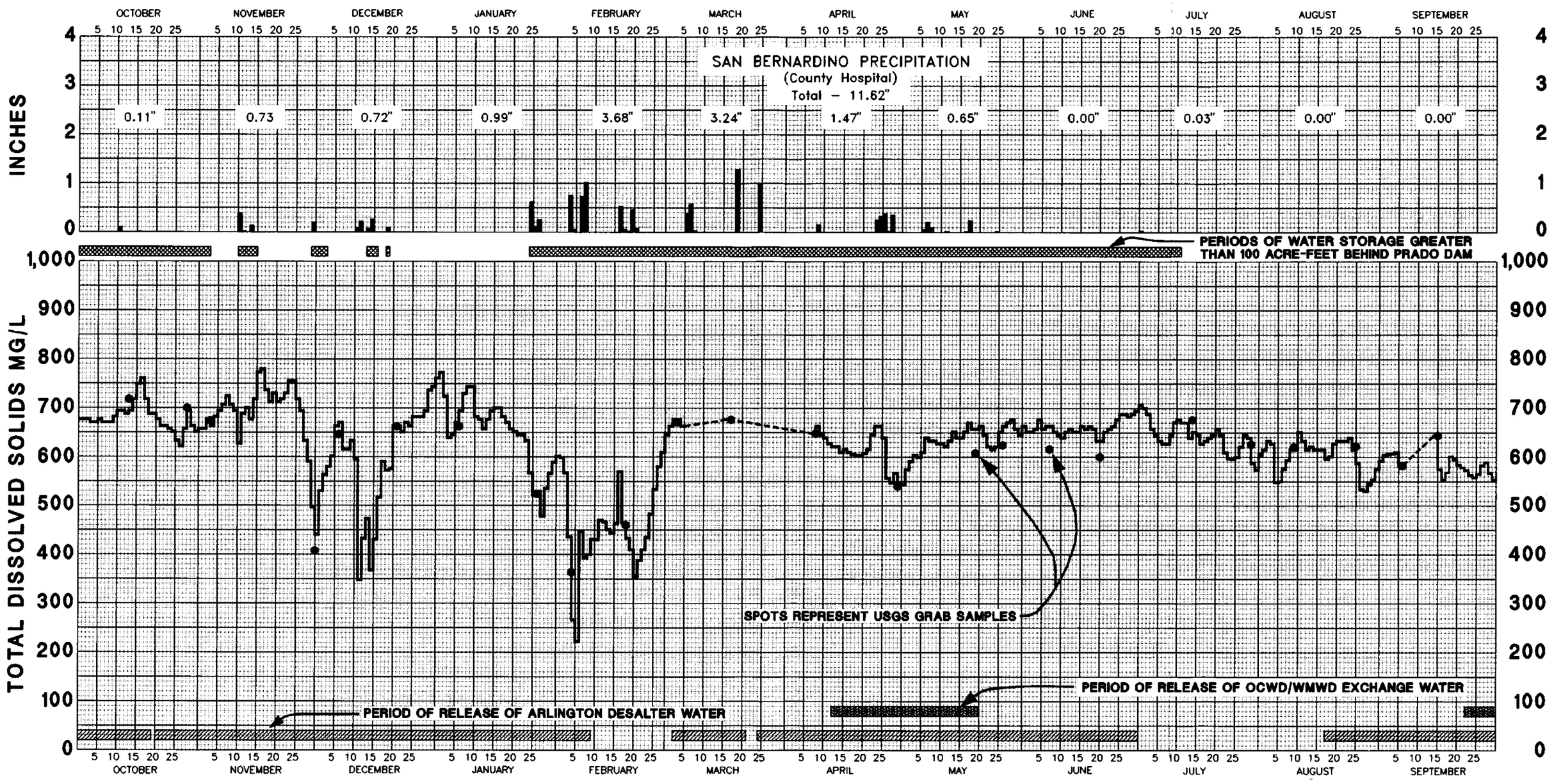
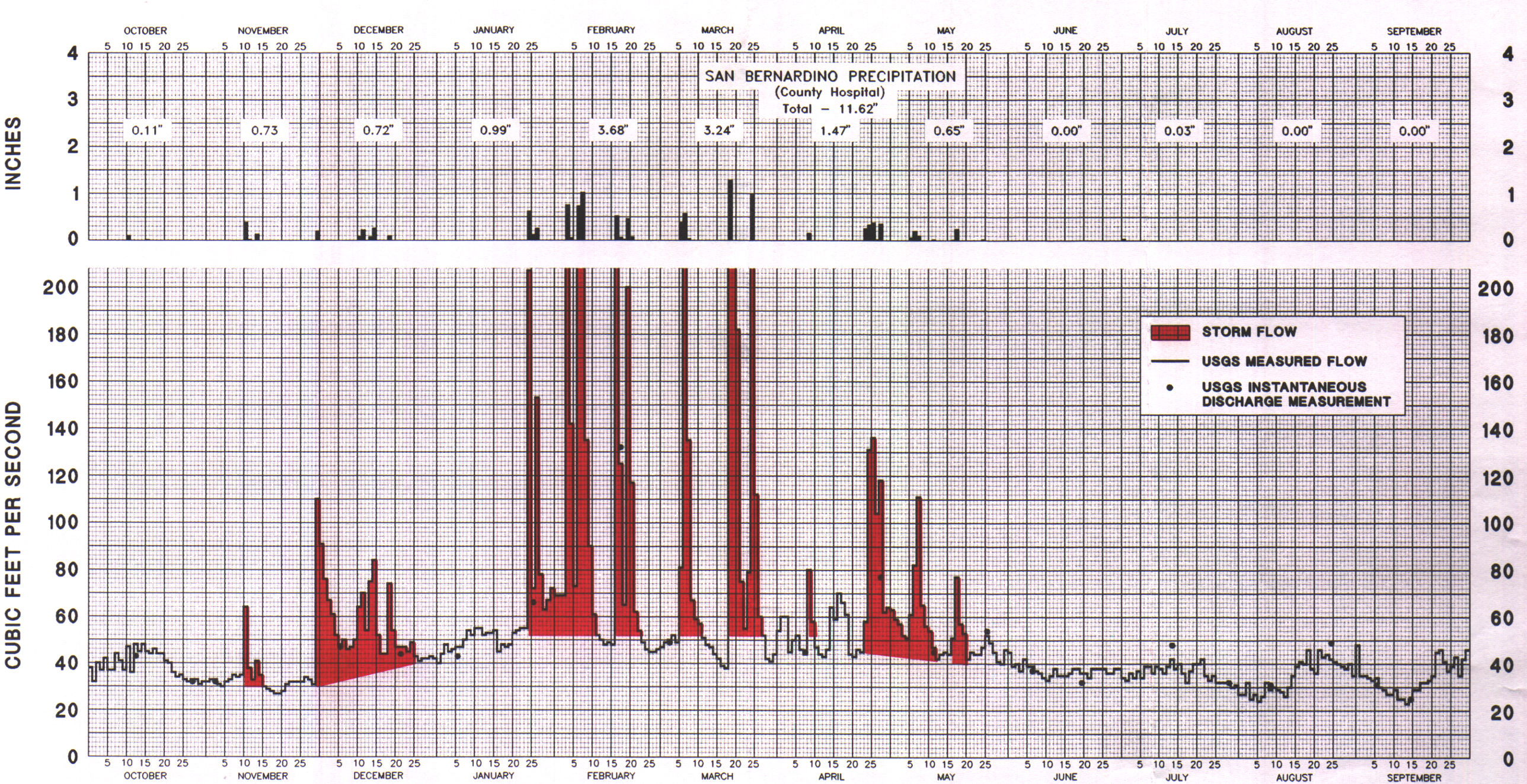


PLATE 4



DISSOLVED SOLIDS IN SANTA ANA RIVER BELOW PRADO DAM
WATER YEAR 1993-94

PLATE 5



DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS & SAN BERNARDINO PRECIPITATION
WATER YEAR 1993-94

PLATE 6

DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS SINCE 1934-35

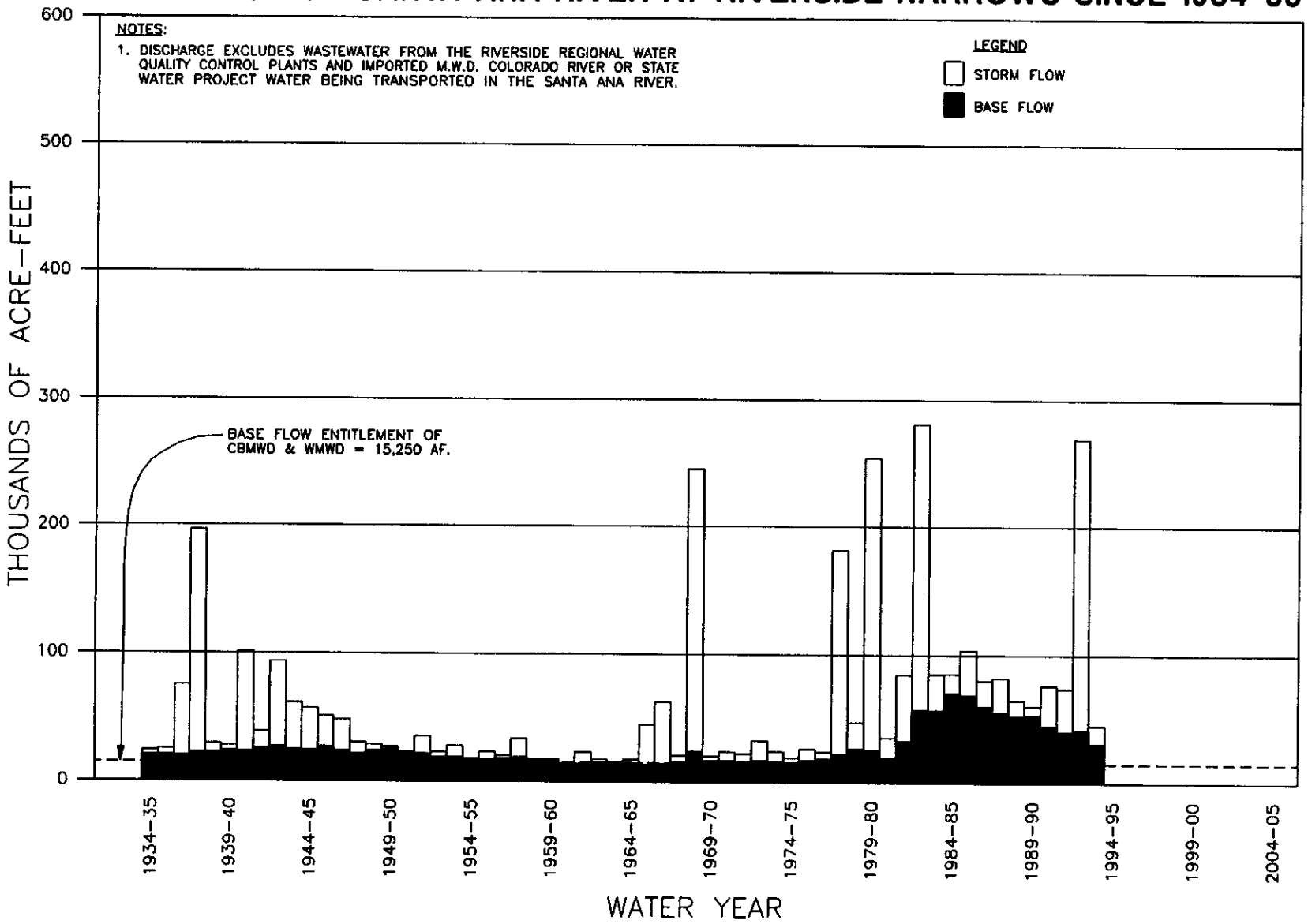


PLATE 7

SANTA ANA RIVER WATERMASTER

FOR

ORANGE COUNTY WATER DISTRICT

VS. CITY OF CHINO et al.

CASE NO. 117628 - COUNTY OF ORANGE

BASIC DATA

FOR THE

TWENTY-FOURTH ANNUAL REPORT

OF THE

SANTA ANA RIVER WATERMASTER

FOR WATER YEAR

OCTOBER 1, 1993 - SEPTEMBER 30, 1994

APRIL 30, 1995

TABLE OF CONTENTS

Appendix

APPENDIX A

NONTRIBUTARY WATER RELEASED BY MWDSC TO SAN ANTONIO CREEK NEAR UPLAND

CONNECTION OC-59

WATER YEAR 1993-94

PREPARED BY

DONALD L. HARRIGER

TABLE A-1

NONTRIBUTARY WATER FROM OC-59
MONTHLY TOTALS
(Acre-Feet)

WATER YEAR WATER YEAR 1993-94

No water released during Water Year 1993-94 for the Orange County Water District.

APPENDIX B

WATER QUALITY
SANTA ANA RIVER BELOW PRADO DAM

WATER YEAR 1993-94

PREPARED BY

WILLIAM R. MILLS, JR.

TABLE B-1

USGS WATER QUALITY SAMPLES BELOW PRADO DAM

WATER YEAR 1993-94

DATE	EC (µsiemens/cm)	TDS (mg/L)	SOURCE
10/13	1150	718	USGS
10/28	1130	700	USGS
11/03	1100	674	USGS
11/30	670	408	USGS
12/06	1060	646	USGS
12/21	1080	662	USGS
01/06	1080	662	USGS
01/26	855	524	USGS
02/04	615	364	USGS
02/18	775	460	USGS
03/03	1100	670	USGS
03/17	1110	676	USGS
04/08	1090	648	USGS
04/29	885	540	USGS
05/19	1020	608	USGS
05/26	1000	624	USGS
06/07	1040	616	USGS
06/20	995	600	USGS
07/14	1090	676	USGS
07/29	1040	626	USGS
08/09	1010	620	USGS
08/25	1030	622	USGS
09/06	1010	582	USGS
09/15	1020	644	USGS

TABLE B-2

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

OCTOBER 1993

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1) (mg/L)	OUTFLOW x TDS
1	125	1,110	676	84,449
2	125	1,110	676	84,449
3	125	1,110	676	84,449
4	125	1,100	670	83,689
5	124	1,100	670	83,019
6	131	1,110	676	88,503
7	141	1,100	670	94,401
8	144	1,100	670	96,409
9	144	1,100	670	96,409
10	143	1,120	682	97,481
11	144	1,140	694	99,915
12	144	1,140	694	99,915
13	152	1,130	688	104,541
14	157	1,140	694	108,935
15	157	1,180	718	112,758
16	156	1,230	749	116,787
17	158	1,250	761	120,207
18	158	1,180	718	113,476
19	160	1,130	688	110,043
20	164	1,130	688	112,794
21	164	1,110	676	110,798
22	164	1,090	663	108,801
23	164	1,090	663	108,801
24	166	1,080	657	109,118
25	166	1,070	651	108,108
26	189	1,040	633	119,635
27	201	1,020	621	124,784
28	199	1,080	657	130,810
29	198	1,140	694	137,383
30	196	1,090	663	130,031
31	193	1,070	651	125,691
TOTAL	4,877			3,306,592
MONTHLY FLOW WEIGHTED TDS			678	

1. TDS = EC x 0.608645

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

NOVEMBER 1993

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1) (mg/L)	OUTFLOW x TDS
1	201	1,080	657	132,125
2	202	1,080	657	132,782
3	194	1,110	676	131,066
4	188	1,090	663	124,724
5	187	1,120	682	127,475
6	171	1,140	694	118,649
7	164	1,160	706	115,789
8	181	1,190	724	131,096
9	177	1,160	706	124,967
10	173	1,140	694	120,037
11	220	1,030	627	137,919
12	245	1,130	688	168,503
13	241	1,150	700	168,686
14	233	1,110	676	157,414
15	272	1,180	718	195,351
16	252	1,270	773	194,791
17	184	1,280	779	143,348
18	172	1,210	736	126,671
19	181	1,170	712	128,893
20	159	1,200	730	116,129
21	160	1,170	712	113,938
22	167	1,180	718	119,940
23	169	1,200	730	123,433
24	177	1,240	755	133,585
25	177	1,240	755	133,585
26	178	1,180	718	127,840
27	178	1,140	694	123,506
28	179	1,040	633	113,305
29	168	970	590	99,185
30	219	816	497	108,767
TOTAL	5,769			3,993,499
MONTHLY FLOW WEIGHTED TDS			692	

1. TDS = EC x 0.608645

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

DECEMBER 1993

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1) (mg/L)	OUTFLOW x TDS
1	247	725	441	108,993
2	255	870	530	135,028
3	258	925	563	145,253
4	253	953	580	146,750
5	218	988	601	131,092
6	212	1,090	663	140,646
7	198	1,100	670	132,563
8	196	1,010	615	120,487
9	190	1,010	615	116,799
10	190	1,040	633	120,268
11	216	977	595	128,444
12	407	572	348	141,695
13	304	711	433	131,555
14	243	777	473	114,919
15	333	605	368	122,621
16	432	708	431	186,158
17	416	849	517	214,964
18	213	970	590	125,752
19	237	939	572	135,450
20	402	944	575	230,973
21	254	1,090	663	168,509
22	214	1,090	663	141,973
23	209	1,070	651	136,111
24	195	1,100	670	130,554
25	200	1,090	663	132,685
26	183	1,120	682	124,748
27	190	1,120	682	129,520
28	182	1,120	682	124,066
29	157	1,140	694	108,935
30	162	1,210	736	119,307
31	171	1,220	743	126,976
TOTAL	7,537			4,273,793
MONTHLY FLOW WEIGHTED TDS			567	

1. TDS = EC x 0.608645

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

JANUARY 1994

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1) (mg/L)	OUTFLOW x TDS
1	181	1,250	761	137,706
2	182	1,270	773	140,682
3	199	1,190	724	144,133
4	206	1,050	639	131,650
5	210	1,060	645	135,484
6	202	1,100	670	135,241
7	196	1,140	694	135,996
8	197	1,200	730	143,884
9	199	1,220	743	147,767
10	208	1,220	743	154,450
11	210	1,120	682	143,153
12	205	1,110	676	138,497
13	206	1,080	657	135,411
14	199	1,110	676	134,444
15	206	1,140	694	142,934
16	210	1,150	700	146,988
17	212	1,150	700	148,388
18	213	1,120	682	145,198
19	204	1,100	670	136,580
20	202	1,080	657	132,782
21	199	1,070	651	129,599
22	201	1,060	645	129,678
23	198	1,060	645	127,742
24	213	1,040	633	134,827
25	267	931	567	151,295
26	261	857	522	136,140
27	283	871	530	150,027
28	287	785	478	137,125
29	284	879	535	151,940
30	277	930	566	156,793
31	266	967	589	156,557
TOTAL	6,783			4,373,090
MONTHLY FLOW WEIGHTED TDS			645	

1. TDS = EC x 0.608645

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

FEBRUARY 1994

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1) (mg/L)	OUTFLOW x TDS
1	255	987	601	153,187
2	254	982	598	151,813
3	211	931	567	119,563
4	226	717	436	98,626
5	433	437	266	115,168
6	467	364	222	103,462
7	321	734	447	143,405
8	898	646	393	353,080
9	1,120	658	400	448,547
10	666	708	431	286,993
11	558	706	430	239,774
12	543	772	470	255,142
13	529	767	467	246,953
14	581	741	451	262,034
15	621	729	444	275,539
16	554	763	464	257,275
17	419	936	570	238,701
18	615	764	465	285,978
19	607	713	434	263,416
20	603	674	410	247,367
21	610	584	355	216,824
22	603	638	388	234,154
23	590	674	410	242,034
24	496	715	435	215,850
25	448	793	483	216,230
26	435	878	534	232,460
27	417	953	580	241,876
28	323	1,000	609	196,592
TOTAL	14,403			6,342,044
MONTHLY FLOW WEIGHTED TDS			440	

1. TDS = EC x 0.608645

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

MARCH 1994

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1, 2, 3) (mg/L)	OUTFLOW x TDS
1	267	1,060	645	172,259
2	280	1,090	663	185,758
3	217	1,110	676	146,604
4	180	1,110	676	121,607
5	180	1,090	663	119,416
6	183	--	664	121,598
7	200	--	666	133,104
8	222	--	667	147,978
9	224	--	668	149,546
10	339	--	669	226,677
11	391	--	670	261,857
12	383	--	671	256,901
13	372	--	672	249,912
14	256	--	673	172,251
15	194	--	674	130,737
16	195	--	675	131,616
17	198	--	676	133,848
18	200	--	675	134,945
19	213	--	673	143,446
20	235	--	672	157,963
21	513	--	671	344,176
22	669	--	670	447,987
23	654	--	668	437,110
24	397	--	667	264,835
25	297	--	666	197,748
26	490	--	665	325,627
27	551	--	663	365,463
28	548	--	662	362,776
29	613	--	661	405,026
30	632	--	659	416,775
31	616	--	658	405,440
TOTAL	10,909			7,270,988
MONTHLY FLOW WEIGHTED TDS			667	

1. TDS = EC x 0.608645
2. March 6 - 31, 1994 TDS values are estimates.
3. March 19, 1994 TDS value is from Table B-1.

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

APRIL 1994

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1, 2, 3) (mg/L)	OUTFLOW x TDS
1	593	--	657	389,547
2	566	--	656	371,090
3	533	--	654	348,776
4	292	--	653	190,703
5	182	--	652	118,631
6	181	--	651	117,749
7	186	--	649	120,765
8	188	--	648	121,824
9	190	1,090	663	126,050
10	196	1,060	645	126,452
11	197	1,050	639	125,898
12	194	1,030	627	121,619
13	193	1,020	621	119,818
14	194	1,020	621	120,439
15	197	1,000	609	119,903
16	199	1,010	615	122,332
17	199	1,000	609	121,120
18	198	994	605	119,789
19	199	990	603	119,909
20	197	991	603	118,824
21	198	997	607	120,150
22	139	1,010	615	85,448
23	96	1,060	645	61,936
24	99	1,090	663	65,679
25	102	1,090	663	67,669
26	106	1,050	639	67,742
27	109	914	556	60,637
28	159	898	547	86,904
29	185	931	567	104,830
30	185	899	547	101,227
TOTAL	6,452			4,063,458
MONTHLY FLOW WEIGHTED TDS			630	

1. TDS = EC x 0.608645
2. April 1 - 7, 1994 TDS values are estimates.
3. April 8, 1994 TDS value is from Table B-1.

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

MAY 1994

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1) (mg/L)	OUTFLOW x TDS
1	183	892	543	99,353
2	183	943	574	105,033
3	185	971	591	109,334
4	194	993	604	117,251
5	182	984	599	109,001
6	165	1,000	609	100,426
7	165	1,050	639	105,448
8	164	1,040	633	103,810
9	166	1,040	633	105,076
10	168	1,030	627	105,320
11	168	1,030	627	105,320
12	169	1,020	621	104,918
13	168	1,040	633	106,342
14	167	1,070	651	108,759
15	167	1,050	639	106,726
16	166	1,050	639	106,087
17	175	1,070	651	113,969
18	176	1,100	670	117,834
19	178	1,080	657	117,006
20	179	1,080	657	117,663
21	183	1,090	663	121,406
22	186	1,060	645	120,000
23	186	1,020	621	115,472
24	185	1,010	615	113,725
25	184	1,020	621	114,230
26	179	1,070	651	116,574
27	178	1,090	663	118,089
28	175	1,100	670	117,164
29	173	1,110	676	116,878
30	170	1,080	657	111,747
31	166	1,060	645	107,097
TOTAL	5,433			3,437,061
MONTHLY FLOW WEIGHTED TDS			633	

1. TDS = EC x 0.608645

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

JUNE 1994

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1) (mg/L)	OUTFLOW x TDS
1	143	1,090	663	94,869
2	187	1,070	651	121,784
3	193	1,070	651	125,691
4	191	1,080	657	125,551
5	190	1,110	676	128,363
6	147	1,080	657	96,628
7	144	1,090	663	95,533
8	186	1,090	663	123,397
9	184	1,070	651	119,830
10	183	1,060	645	118,065
11	181	1,050	639	115,673
12	180	1,070	651	117,225
13	179	1,080	657	117,663
14	179	1,070	651	116,574
15	179	1,070	651	116,574
16	177	1,090	663	117,426
17	177	1,080	657	116,349
18	176	1,090	663	116,762
19	176	1,080	657	115,691
20	175	1,040	633	110,773
21	175	1,040	633	110,773
22	175	1,070	651	113,969
23	158	1,080	657	103,859
24	130	1,090	663	86,245
25	136	1,110	676	91,881
26	135	1,130	688	92,849
27	136	1,130	688	93,537
28	136	1,120	682	92,709
29	137	1,130	688	94,224
30	137	1,140	694	95,058
TOTAL	4,982			3,285,527
MONTHLY FLOW WEIGHTED TDS			659	

1. TDS = EC x 0.608645

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

JULY 1994

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1) (mg/L)	OUTFLOW x TDS
1	226	1,160	706	159,562
2	269	1,150	700	188,284
3	265	1,130	688	182,259
4	260	1,080	657	170,908
5	256	1,060	645	165,162
6	296	1,040	633	187,365
7	312	1,030	627	195,594
8	311	1,030	627	194,967
9	306	1,060	645	197,420
10	293	1,100	670	196,166
11	289	1,110	676	195,247
12	263	1,100	670	176,081
13	160	1,100	670	107,122
14	139	1,050	639	88,832
15	136	1,070	651	88,570
16	133	1,060	645	85,807
17	133	1,030	627	83,378
18	130	1,040	633	82,289
19	129	1,050	639	82,441
20	128	1,060	645	82,581
21	127	1,080	657	83,482
22	125	1,060	645	80,645
23	126	1,000	609	76,689
24	126	981	597	75,232
25	128	979	596	76,271
26	133	985	600	79,736
27	129	1,020	621	80,086
28	129	1,060	645	83,226
29	130	1,050	639	83,080
30	128	964	587	75,102
31	126	943	574	72,318
TOTAL	5,841			3,775,902
MONTHLY FLOW WEIGHTED TDS			646	

1. TDS = EC x 0.608645

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

AUGUST 1994

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1) (mg/L)	OUTFLOW x TDS
1	123	994	605	74,414
2	122	1,010	615	74,997
3	125	1,040	633	79,124
4	131	1,030	627	82,124
5	123	901	548	67,452
6	122	903	550	67,052
7	118	945	575	67,870
8	118	976	594	70,096
9	114	1,010	615	70,079
10	113	1,010	615	69,465
11	110	1,070	651	71,638
12	113	1,040	633	71,528
13	113	1,010	615	69,465
14	110	1,020	621	68,290
15	111	1,010	615	68,235
16	109	1,010	615	67,006
17	107	1,010	615	65,776
18	105	979	596	62,566
19	109	987	601	65,480
20	113	1,030	627	70,840
21	114	1,040	633	72,161
22	123	1,040	633	77,858
23	121	1,040	633	76,592
24	115	1,050	639	73,494
25	114	1,010	615	70,079
26	111	965	587	65,195
27	115	877	534	61,385
28	113	872	531	59,973
29	117	895	545	63,734
30	121	911	554	67,092
31	123	945	575	70,746
TOTAL	3,596			2,161,806
MONTHLY FLOW WEIGHTED TDS			601	

1. TDS = EC x 0.608645

TABLE B-2 (continued)

SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 1993-94

SEPTEMBER 1994

DAY	PRADO OUTFLOW (cfs-day)	DAILY MEAN EC (µsiemens/cm)	COMPUTED TDS (1, 2, 3) (mg/L)	OUTFLOW x TDS
1	122	973	592	72,250
2	125	992	604	75,472
3	123	995	606	74,489
4	123	998	607	74,714
5	122	1,000	609	74,255
6	128	--	582	74,496
7	123	--	589	72,433
8	121	--	596	72,089
9	127	--	603	76,539
10	108	--	610	65,832
11	108	--	616	66,576
12	123	--	623	76,670
13	119	--	630	74,996
14	122	--	637	77,728
15	124	--	644	79,856
16	128	945	575	73,622
17	124	910	554	68,680
18	128	933	568	72,687
19	134	988	601	80,580
20	134	977	595	79,683
21	131	960	584	76,543
22	140	950	578	80,950
23	139	941	573	79,610
24	147	925	563	82,761
25	142	916	558	79,168
26	144	929	565	81,422
27	140	958	583	81,631
28	134	967	589	78,867
29	136	932	567	77,147
30	144	910	554	79,757
TOTAL	3,863			2,281,500
MONTHLY FLOW WEIGHTED TDS			591	

1. TDS = EC x 0.608645
2. September 7 - 14, 1994 TDS values are estimates.
3. September 6 and 8, 1994 TDS value is from Table B-1.

TABLE B-3

ANNUAL SUMMARY OF WEIGHTED TDS BELOW PRADO DAM

WATER YEAR 1993-94

MONTH	MONTHLY FLOW (cfs-days)	MONTHLY WEIGHTED TDS (1) (mg/L)	MONTHLY FLOW x TDS
OCTOBER	4,877	678	3,306,592
NOVEMBER	5,769	692	3,993,499
DECEMBER	7,537	567	4,273,793
JANUARY	6,783	645	4,373,090
FEBRUARY	14,403	440	6,342,044
MARCH	10,909	667	7,270,988
ARPIL	6,452	630	4,063,458
MAY	5,433	633	3,437,061
JUNE	4,982	659	3,285,527
JULY	5,841	646	3,775,902
AUGUST	3,596	601	2,161,806
SEPTEMBER	3,863	591	2,281,500
TOTAL	80,445		48,565,259
	WATER YEAR WEIGHTED TDS	604	

1. Some daily TDS values for March, April, and September, 1994 include estimated data.

APPENDIX C

WATER QUALITY
SANTA ANA RIVER AT RIVERSIDE NARROWS

WATER YEAR 1993-94

PREPARED BY

DONALD L. HARRIGER

TABLE C-1

WATER QUALITY ANALYSES
SANTA ANA RIVER AT RIVERSIDE NARROWS
WATER YEAR 1993-94

Date Sampled	EC Microsiemens/cm	TDS mg/L	Source
1993			
10/09/93	1075	720	C of R
10/13/93	1080	652	USGS
10/21/93	1078	697	C of R
10/26/93	1211	715	C of R
10/28/93	945	644	USGS
11/03/93	1010	638	USGS
11/04/93	1073	685	C of R
11/09/93	1058	678	C of R
11/10/93	552	*336	DWR
11/18/93	1008	699	C of R
11/23/93	946	679	C of R
11/30/93	600	*368	USGS
12/02/93	891	*658	C of R
12/06/94	1040	*660	USGS
12/07/93	987	*650	C of R
12/15/93	801	*608	C of R
12/20/93	905	*653	C of R
12/22/93	1080	*658	USGS
1994			
01/05/94	995	685	C of R
01/06/94	1070	656	USGS
01/13/94	1028	702	C of R
01/18/94	991	671	C of R
01/26/94	845	*522	USGS
01/27/94	372	*267	C of R
02/01/94	971	*670	C of R
02/04/94	290	*182	USGS
02/09/94	836	*503	DWR
02/18/94	690	*416	USGS
02/24/94	1008	*673	C of R

* Data not used in determining monthly averages, storm flow.

C of R	City of Riverside
USGS	United States Geological Survey
DWR	Dept. of Water Resources

TABLE C-1

SANTA ANA RIVER AT RIVERSIDE NARROWS

WATER YEAR 1993-94

Date Sampled	EC Microsiemens/cm	TDS mg/L	Source
03/03/94	967	635	C of R
03/03/94	1070	656	USGS
03/15/94	1014	*684	C of R
03/17/94	985	*624	USGS
03/24/94	1003	*689	C of R
03/29/94	985	686	C of R
04/07/94	1020	649	C of R
04/08/94	1110	692	USGS
04/12/94	1101	689	C of R
04/21/94	1104	680	C of R
04/26/94	946	*479	C of R
04/28/94	880	*564	USGS
05/05/94	1040	*656	C of R
05/10/94	1020	*744	C of R
05/12/94	1070	*640	USGS
05/19/94	1080	*668	C of R
05/24/94	1110	666	C of R
05/26/94	980	612	USGS
06/03/94	-	692	C of R
06/07/94	1120	686	USGS
06/07/94	1180	735	C of R
06/16/94	1146	640	C of R
06/20/94	1150	682	USGS
06/21/94	1160	700	C of R
06/30/94	1140	723	C of R
07/05/94	-	695	C of R
07/14/94	940	714	C of R
07/14/94	1040	714	USGS
07/19/94	1063	708	C of R
07/21/94	1100	697	DWR
07/28/94	1105	763	C of R
07/29/94	1130	722	USGS

* Data not used in determining monthly averages, storm flow.

C of R	City of Riverside
USGS	United States Geological Survey
DWR	Dept. of Water Resources

TABLE C-1

SANTA ANA RIVER AT RIVERSIDE NARROWS

WATER YEAR 1993-94

Date Sampled	EC Microsiemens/cm	TDS mg/L	Source
08/02/94	1074	725	C of R
08/09/94	1050	652	USGS
08/11/94	1066	710	C of R
08/16/94	1000	689	C of R
08/25/94	1016	682	C of R
08/25/94	1020	638	USGS
08/30/94	1330	703	C of R
09/06/94	1110	702	USGS
09/08/94	1037	546	C of R
09/13/94	1024	725	C of R
09/15/94	1140	690	USGS
09/22/94	1020	688	C of R
09/27/94	940	686	C of R

* Data not used in determining monthly averages, storm flow.

C of R	City of Riverside
USGS	United States Geological Survey
DWR	Dept. of Water Resources

TABLE C - 2

FLOW WEIGHTED TDS OF BASE FLOW AT RIVERSIDE NARROWS
(Including Nontributary Flow)
Discharged Above the Narrows

WATER YEAR 1993-94

Month	Acre-feet (1)	TDS (2) mg/L	Acre-feet times TDS
October	2,551	685	1,747,416
November	1,996	675	1,347,351
December	2,377	677	1,609,394
January	3,256	679	2,210,563
February	2,933	679	1,991,531
March	3,166	659	2,086,394
April	3,125	678	2,118,852
May	2,814	639	1,798,451
June	2,365	694	1,641,330
July	2,364	719	1,699,826
August	2,290	688	1,575,463
September	2,041	667	1,361,347
	31,279		21,187,919

Flow weighted TDS $\frac{21,187,919}{31,279} = 677$ mg/L

(1) Total Flow minus Storm Flow from Table 6
(2) Estimated average TDS based on water quality data from Table C - 1

APPENDIX D

QUANTITY AND QUALITY OF WASTEWATER FROM RUBIDOUX COMMUNITY SERVICES DISTRICT DISCHARGED BELOW THE RIVERSIDE NARROWS GAGING STATION

WATER YEAR 1993-94

PREPARED BY

DONALD L. HARRIGER

TABLE D-1

QUANTITY AND QUALITY OF WASTEWATER FROM RUBIDOUX DISCHARGE BELOW THE RIVERSIDE NARROWS GAGING STATION

WATER YEAR 1993-94

Month	Acre-feet	TDS mg/L	Acre-feet times TDS
1993			
January			
October	174	683	118,847
November	171	689	117,713
December	172	734	126,392
1994			
January	180	661	119,126
February	154	603	92,996
March	180	653	117,615
April	170	820	139,037
May	182	715	130,142
June	176	727	128,310
July	184	625	114,720
August	185	612	113,028
September	183	617	112,607
	2,110		1,430,533
Flow Weighted TDS =		678	mg/L

APPENDIX E

WATER RELEASED FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN

WATER YEAR 1993-94

PREPARED BY

DONALD L. HARRIGER

TABLE E-1

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE
ARLINGTON VALLEY DRAIN

MONTHLY TOTALS
(Acre-Feet)

WATER YEAR 1993-94

1993	Acre Feet Discharged
October	245
November	434
December	450
1994	
January	557
February	142
March	306
April	561
May	551
June	545
July	0
August	232
September	548
Total	4,570

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River In CFS-days	Discharge to the Santa Ana River in A.F.
October 1993		
1	4	8
2	4	8
3	4	8
4	4	8
5	4	8
6	4	8
7	4	8
8	4	8
9	4	8
10	4	8
11	4	8
12	4	8
13	4	8
14	4	8
15	4	8
16	4	8
17	4	8
18	4	8
19	4	8
20	4	8
21	4	8
22	4	8
23	4	8
24	4	8
25	4	8
26	4	8
27	4	8
28	4	8
29	4	8
30	4	8
31	4	8
Total	123	245

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River In CFS-days	Discharge to the Santa Ana River in A.F.
November 1993		
1	4	8
2	3	5
3	4	8
4	4	8
5	4	8
6	4	8
7	4	8
8	4	8
9	7	14
10	10	19
11	10	19
12	10	19
13	10	19
14	9	17
15	9	19
16	9	19
17	9	19
18	9	19
19	9	19
20	9	19
21	9	19
22	9	19
23	9	18
24	9	18
25	7	14
26	6	13
27	7	13
28	8	15
29	6	12
30	6	12
Total	219	434

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River In CFS-days	Discharge to the Santa Ana River in A.F.
December 1993		
1	4	8
2	8	17
3	8	17
4	9	18
5	9	18
6	7	14
7	9	18
8	9	18
9	9	18
10	7	14
11	6	12
12	6	13
13	6	13
14	6	12
15	6	11
16	6	12
17	7	14
18	7	14
19	6	13
20	6	12
21	6	11
22	7	14
23	8	15
24	8	15
25	8	15
26	8	15
27	8	15
28	8	15
29	8	15
30	8	16
31	9	19
Total	227	450

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River in CFS-days	Discharge to the Santa Ana River in A.F.
January 1994		
1	10	19
2	10	19
3	10	19
4	10	19
5	10	19
6	10	19
7	10	19
8	10	19
9	10	19
10	10	19
11	10	19
12	10	19
13	9	17
14	8	17
15	9	18
16	9	18
17	7	14
18	9	18
19	9	18
20	9	18
21	9	18
22	9	18
23	9	18
24	8	17
25	6	12
26	9	18
27	9	18
28	9	18
29	9	17
30	9	17
31	8	17
Total	281	557

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River in CFS-days	Discharge to the Santa Ana River in A.F.
February 1994		
1	9	17
2	9	17
3	9	17
4	8	17
5	8	17
6	8	17
7	8	17
8	8	16
9	4	7
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
Total	71	142

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River In CFS-days	Discharge to the Santa Ana River in A.F.
March 1994		
1	0	0
2	0	0
3	1	2
4	4	8
5	5	10
6	6	11
7	6	12
8	8	16
9	10	20
10	10	19
11	10	20
12	10	20
13	7	14
14	8	16
15	10	19
16	10	19
17	10	19
18	10	19
19	10	19
20	10	19
21	5	10
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	6	11
Total	154	306

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River in CFS-days	Discharge to the Santa Ana River in A.F.
April 1994		
1	10	20
2	10	20
3	10	19
4	10	19
5	9	19
6	10	19
7	10	19
8	9	17
9	8	17
10	10	19
11	10	19
12	10	19
13	10	19
14	10	19
15	10	19
16	10	19
17	10	19
18	9	19
19	9	19
20	9	18
21	9	18
22	9	18
23	9	18
24	9	18
25	9	18
26	9	18
27	9	18
28	9	18
29	9	18
30	9	18
Total	283	561

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River in CFS-days	Discharge to the Santa Ana River in A.F.
May 1994		
1	9	18
2	9	18
3	9	18
4	9	18
5	9	18
6	9	18
7	9	18
8	9	18
9	9	18
10	9	18
11	9	18
12	9	18
13	8	16
14	6	12
15	9	18
16	9	18
17	9	18
18	9	18
19	9	18
20	9	18
21	9	17
22	9	17
23	9	17
24	9	17
25	9	17
26	9	18
27	10	19
28	10	19
29	10	19
30	10	19
31	10	19
Total	278	551

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River in CFS-days	Discharge to the Santa Ana River in A.F.
June 1994		
1	10	19
2	10	19
3	10	19
4	10	19
5	10	19
6	10	19
7	10	19
8	10	19
9	10	19
10	10	19
11	10	19
12	10	19
13	9	19
14	9	18
15	9	19
16	9	19
17	5	11
18	5	9
19	8	15
20	7	15
21	8	16
22	9	19
23	10	20
24	10	20
25	10	20
26	10	20
27	10	19
28	10	19
29	10	19
30	10	19
Total	275	545

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River In CFS-days	Discharge to the Santa Ana River in A.F.
July 1994		
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	0	0
27	0	0
28	0	0
29	0	0
30	0	0
31	0	0
Total	0	0

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River In CFS-days	Discharge to the Santa Ana River in A.F.
August 1994		
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	10	19
20	10	19
21	9	17
22	8	17
23	9	18
24	9	18
25	7	14
26	9	18
27	9	18
28	9	18
29	9	18
30	9	18
31	9	18
Total	117	232

TABLE E-2

WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Discharge to the Santa Ana River in CFS-days	Discharge to the Santa Ana River in A.F.
September 1994		
1	6	13
2	7	14
3	8	16
4	8	16
5	8	16
6	8	16
7	9	18
8	10	20
9	10	20
10	10	20
11	10	20
12	10	20
13	10	20
14	10	20
15	10	20
16	10	20
17	10	20
18	10	19
19	9	17
20	7	15
21	7	14
22	8	16
23	10	20
24	10	20
25	10	20
26	10	20
27	10	20
28	10	20
29	10	20
30	10	20
Total	276	548

TABLE E-3

QUALITY OF WATER DISCHARGED FROM THE
ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN
Water Year 1993-94

Month	Acre Feet	TDS	AF x TDS
1993			
October	245	582	142,320
November	434	453	196,476
December	450	482	216,871
1994			
January	557	333	185,388
February	142	473	66,961
March	306	435	133,003
April	561	440	246,623
May	551	430	237,149
June	545	468	254,996
July	0	0	0
August	232	478	110,632
September	548	452	247,734
Total	4,570		2,038,152

$$\frac{2{,}038{,}152}{4{,}570} = 446$$

Flow Weighted average TDS for 1993-94 is 446 mg/L

APPENDIX F

SANTA ANA RIVER WATERMASTER
FINANCIAL STATEMENTS WITH REPORT
ON EXAMINATION BY
ORANGE COUNTY WATER DISTRICT CONTROLLER

ORANGE
COUNTY
WATER
DISTRICT

MAILING ADDRESS:
P.O. BOX 8300
FOUNTAIN VALLEY
CA 92728-8300

10500 ELLIS AVENUE
FOUNTAIN VALLEY
CA 92708

PHONE (714) 378-3200
FAX (714) 378-3373

April 25, 1995

Santa Ana River Watermaster
c/o SBVMWD
P.O. Box 5906
San Bernardino, CA 92412-5906

Gentlemen:

I have reviewed the attached summary of transactions for the checking and savings accounts of the Santa Ana River Watermaster. As part of this review, I have compared the transactions on the attached summary with those shown on the original Bank of America Checking and Savings Account statements.

The transactions on the summary also match those found on original documents. The Checking and Savings Accounts balances as of June 30, 1994, are as shown.

Very truly yours,

ORANGE COUNTY WATER DISTRICT

Barbara Heatherly
Controller

BH:ddd

SARW.LTR

SANTA ANA RIVER WATERMASTER

FINANCIAL STATEMENTS

JUNE 30, 1994

SANTA ANA RIVER WATERMASTER

STATEMENT OF ASSETS AND LIABILITIES
ARISING FROM CASH TRANSACTIONS

June 30, 1994

ASSETS

Cash in checking account (Note 3)	$	10,707
Cash in savings account (Note 3)		2,167
TOTAL ASSETS	$	12,874

FUND BALANCE

Fund balance	$	12,874

See independent reviewer's reports and notes to financial statements.

SANTA ANA RIVER WATERMASTER

STATEMENT OF ASSETS AND LIABILITIES
ARISING FROM CASH TRANSACTIONS

June 30, 1994

		Actual	Budget	Over (Under) Budget
REVENUE COLLECTED:				
Water district contributions (Note 2):				
Orange County Water District		$ 6,400	$ 6,400	$ -
Chino Basin Municipal Water District		3,200	3,200	-
San Bernardino Valley Municipal Water District		3,200	3,200	-
Western Municipal Water District		3,200	3,200	-
Interest from Savings Account		43	-	43
TOTAL REVENUE COLLECTED		16,043	16,000	43
EXPENSES PAID:				
Professional Engineering Service		8,363	8,363	0
Administrative Expenses:				
Office and Bank Service Charges	$ 19			
Auditing Services	1,250	1,269	1,250	19
Annual Reports		1,841	1,841	0
TOTAL EXPENSES PAID		11,473	11,454	19
EXCESS OF REVENUE COLLECTED OVER EXPENSES PAID		4,570	-	(4,570)
FUND BALANCE AT JULY 1, 1993		8,305		
FUND BALANCE AT JUNE 30, 1994		$ 12,875		

See independent reviewer's report and notes to financial statements

SANTA ANA RIVER WATERMASTER

NOTES TO FINANCIAL STATEMENTS

June 30, 1994

1. SIGNIFICANT ACCOUNTING POLICIES:

Basis of Accounting:

The Santa Ana River Watermaster's ("Watermaster") policy is to prepare its financial statements on the cash basis of accounting; consequently, certain revenues are recognized when received rather than when earned, and certain expenses are recognized when cash is disbursed rather than when the obligation is incurred.

2. ORGANIZATION AND HISTORY:

The Santa Ana River Watermaster is composed of committee of five representatives from 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 judgment resulting from a lawsuit by the 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 Districts	20%
Total	100%

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

See independent reviewer's report.

3. CASH IN BANK:

The following disclosures are made in accordance with Statement No. 3 of the Governmental Accounting Standards Board (GASB 3):

Cash at June 30, 1994 consisted of the following:

Bank of America:		
Checking account	$	10,707
Savings account		2,167
	$	12,874

All cash is fully insured by the FDIC.

See independent reviewer's report.

APPENDIX G

EXCHANGE GROUNDWATER DISCHARGED TO THE SANTA ANA RIVER ABOVE PRADO

WATER YEAR 1993-94

PREPARED BY

DONALD L. HARRIGER

TABLE G-1

EXCHANGE WATER
DISCHARGED TO THE SANTA ANA RIVER
ABOVE PRADO DAM

WATER YEAR 1993-94

Month	Acre-feet
1993	
October	0
November	0
December	0
1994	
January	0
February	0
March	0
April	508
May	398
June	0
July	0
August	0
September	144
Total	1,049

TABLE G-2

EXCHANGE WATER
DISCHARGED TO THE SANTA ANA RIVER
ABOVE PRADO DAM

WATER YEAR 1993-94

April 1994

Day	Discharged at Van Buren Blvd.
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	8
14	8
15	8
16	9
17	7
18	11
19	16
20	19
21	21
22	16
23	17
24	17
25	19
26	19
27	17
28	16
29	14
30	14
Total in CFS-DAYS	256
Total In AF	508

TABLE G-2

EXCHANGE WATER
DISCHARGED TO THE SANTA ANA RIVER
ABOVE PRADO DAM

WATER YEAR 1993-94

May 1994

Day	Discharged at Van Buren Blvd.
1	11
2	7
3	8
4	10
5	11
6	9
7	13
8	19
9	18
10	13
11	3
12	5
13	10
14	12
15	0
16	0
17	0
18	20
19	20
20	12
21	0
22	0
23	0
24	0
25	0
26	0
27	0
28	0
29	0
30	0
31	0
Total in CFS-DAYS	201
Total in AF	398

TABLE G-2

EXCHANGE WATER
DISCHARGED TO THE SANTA ANA RIVER
ABOVE PRADO DAM

WATER YEAR 1993-94

September 1994

Day	Discharged above Riverside Narrow
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0
17	0
18	0
19	0
20	0
21	0
22	0
23	9
24	9
25	9
26	9
27	9
28	9
29	9
30	10
Total in CFS-DAYS	73
Total In AF	144

TABLE G-3

EXCHANGE WATER
DISCHARGED TO THE SANTA ANA RIVER
ABOVE PRADO DAM

WATER YEAR 1993-94

Month	Acre-feet	TDS mg/L	Acre-feet times TDS
1993			
October	0	0	0
November	0	0	0
December	0	0	0
1994			
January	0	0	0
February	0	0	0
March	0	0	0
April	508	303	153,854
May	398	303	120,499
June	0	0	0
July	0	0	0
August	0	0	0
September	144	636	91,458
Total	1,049		365,810

$$\frac{365{,}810}{1{,}049} = 349$$

Flow Weighted TDS of Pumped Groundwater Releases to the river = 349 mg/L

APPENDIX H

USGS FLOW MEASUREMENTS OF THE SANTA ANA RIVER BELOW PRADO, AT MWD CROSSING, AND AT E STREET, AND TEMESCAL CREEK ABOVE MAIN STREET (AT CORONA)

WATER YEAR 1993-94

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA
(National Stream-Quality Accounting Network Station)

LOCATION.--Lat 33°53'00", long 117°38'40", in La Sierra Grant, Riverside County, Hydrologic Unit 18070203, on left bank of outlet channel, 2,500 ft downstream from axis of Prado Dam, and 4.5 mi west of Corona.

DRAINAGE AREA.--1,490 mi^2, excludes 768 mi^2 above Lake Elsinore.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1930 to November 1939 (irrigation seasons only), March 1940 to current year. Published as "at Santa Fe Railroad Bridge, near Prado" May 1930 to November 1931, as "at Atchison, Topeka, and Santa Fe Railroad Bridge, near Prado" May 1932 to November 1939, and as "below Prado Dam, near Prado" March 1940 to September 1950.

GAGE.--Water-stage recorder and concrete control since August 1944. Datum of gage is approximately 449 ft above sea level (levels by U.S. Army Corps of Engineers). Prior to Mar. 18, 1940, at about same site at various datums.

REMARKS.--Records good. Flow regulated since 1940 by Prado flood-control reservoir, capacity, 196,200 acre-ft. Natural streamflow affected by extensive ground-water withdrawals, diversion for irrigation, and return flow from irrigated areas. During the current year, no California Water Project releases were made. See schematic diagram of Santa Ana River basin.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,440 ft^3/s, Feb. 21, 1980, gage height, 6.88 ft; minimum daily, 2.4 ft^3/s, July 29 to Aug. 3, Sept. 20, 1978 (result of gate closure).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 2, 1938, reached a discharge of 100,000 ft^3/s, on basis of slope-area measurement of peak flow at site 2.5 mi downstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,610 ft^3/s, Feb. 8, gage height, 5.09 ft; minimum daily, 96 ft^3/s, Apr. 23.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	125	201	247	181	255	267	593	183	143	226	123	122
2	125	202	255	182	254	280	566	183	187	269	122	125
3	125	194	258	199	211	217	533	185	193	265	125	123
4	125	188	253	206	226	180	292	194	191	260	131	123
5	124	187	218	210	433	180	182	182	190	256	123	122
6	131	171	212	202	467	183	181	165	147	296	122	128
7	141	164	198	196	321	200	186	165	144	312	118	123
8	144	181	196	197	898	222	188	164	186	311	118	121
9	144	177	190	199	1120	224	190	166	184	306	114	127
10	143	173	190	208	666	339	196	168	183	293	113	108
11	144	220	216	210	558	391	197	168	181	289	110	108
12	144	245	407	205	543	383	194	169	180	263	113	123
13	152	241	304	206	529	372	193	168	179	160	113	119
14	157	233	243	199	581	256	194	167	179	139	110	122
15	157	272	333	206	621	194	197	167	179	136	111	124
16	156	252	432	210	554	195	199	166	177	133	109	128
17	158	184	416	212	419	198	199	175	177	133	107	124
18	158	172	213	213	615	200	198	176	176	130	105	128
19	160	181	237	204	607	213	199	178	176	129	109	134
20	164	159	402	202	603	235	197	179	175	128	113	134
21	164	160	254	199	610	513	198	183	175	127	114	131
22	164	167	214	201	603	669	139	186	175	125	123	140
23	164	169	209	198	590	654	96	186	158	126	121	139
24	166	177	195	213	496	397	99	185	130	126	115	147
25	166	177	200	267	448	297	102	184	136	128	114	142
26	189	178	183	261	435	490	106	179	135	133	111	144
27	201	178	190	283	417	551	109	178	136	129	115	140
28	199	179	182	287	323	548	159	175	136	129	113	134
29	198	168	157	284	---	613	185	173	137	130	117	136
30	196	219	162	277	---	632	185	170	137	128	121	144
31	193	---	171	266	---	616	---	166	---	126	123	---
TOTAL	4877	5769	7537	6783	14403	10909	6452	5433	4982	5841	3596	3863
MEAN	157	192	243	219	514	352	215	175	166	188	116	129
MAX	201	272	432	287	1120	669	593	194	193	312	131	147
MIN	124	159	157	181	211	180	96	164	130	125	105	108
AC-FT	9670	11440	14950	13450	28570	21640	12800	10780	9880	11590	7130	7660

PROVISIONAL DATA
SUBJECT TO REVISION

11066460 SANTA ANA RIVER AT MWD CROSSING, NEAR ARLINGTON, CA

LOCATION.--Lat 33°58'07", long 117°26'51", in NE 1/4 SW 1/4 sec.30, T.2 S., R.5 W., Riverside County, Hydrologic Unit 18070203, on right bank (left bank since June 17, 1993) at MWD pipeline crossing, 0.8 mi downstream from Union Pacific Railroad Bridge, 1.1 mi upstream from bridge on Van Buren Boulevard, and 3.3 mi north of Arlington.
DRAINAGE AREA.--852 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1970 to current year.
REVISED RECORDS.--WDR CA-83-1: Drainage area.
GAGE.--Water-stage recorder. Elevation of gage is 685 ft above sea level, from topographic map. Gage moved to left bank at present datum on June 17, 1993. Prior to Oct. 1, 1984, water-stage recorder at site 300 ft upstream on left bank at different datum.
REMARKS.--Records fair except for estimated daily discharges, which are poor. Flow partly regulated by Big Bear Lake (station 11049000). Natural streamflow affected by ground-water withdrawals, diversions for irrigation, and return flows from irrigated areas. The records at this station are equivalent to those collected at Santa Ana River at Riverside Narrows, near Arlington minus the flow at Riverside Water-Quality Control Plant at Riverside Narrows, near Arlington.
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26,200 ft^3/s, Mar. 2, 1983, gage height, 15.38 ft, site and datum then in use, from rating curve extended above 5,100 ft^3/s on basis of area-velocity study; maximum gage height, 20.23 ft, Mar. 4, 1978; minimum daily, 15 ft^3/s, Sept. 7, 8, 1980.
EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1927, 100,000 ft^3/s, Mar. 2, 1938, on basis of slope-area measurement at site 1.1 mi downstream. Flood of Jan. 22, 1862, 320,000 ft^3/s, on basis of slope-conveyance study at site 8.2 mi upstream. Stage at that site was 5 ft higher than that of Mar. 2, 1938.
EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,500 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 8	0045	*2,900	*9.75	Mar. 19	0900	2,010	9.10
Mar. 7	1930	1,890	9.08				

Minimum daily, 23 ft^3/s, Sept. 14.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	32	91	e40	69	e47	54	63	45	34	27	48
2	32	33	76	e44	69	e49	60	59	39	33	27	35
3	40	33	67	e48	69	e50	60	57	40	36	32	35
4	37	31	61	e45	445	52	45	52	37	34	25	34
5	42	30	52	e46	142	49	50	51	42	37	27	33
6	37	32	48	e47	73	81	52	61	39	34	24	34
7	37	33	50	47	550	340	46	82	39	39	26	30
8	44	35	46	50	1590	135	44	111	37	39	32	29
9	41	34	47	54	e135	67	80	65	36	36	29	27
10	37	35	50	52	e90	59	58	56	34	39	30	27
11	47	64	64	55	e61	57	47	54	33	38	29	29
12	36	38	70	55	e52	51	44	47	35	36	28	25
13	48	33	54	52	e50	48	43	42	38	39	26	25
14	45	41	75	53	e48	47	46	44	35	42	30	23
15	48	35	84	53	e49	44	64	45	35	38	35	25
16	45	30	52	54	e48	42	59	44	35	40	39	29
17	44	29	44	45	e215	39	70	51	36	36	41	29
18	46	28	44	48	e125	38	66	77	38	32	40	32
19	44	27	74	47	e65	1120	61	57	38	37	46	32
20	44	27	54	48	e200	826	44	53	36	40	38	33
21	41	28	47	53	e117	182	43	42	36	40	36	35
22	40	31	47	54	e62	75	46	45	34	42	46	45
23	36	32	47	55	e54	55	45	44	38	35	43	46
24	34	32	45	55	e49	79	58	44	e38	33	44	41
25	35	32	49	207	e46	552	131	47	e38	35	42	37
26	33	32	e43	72	e45	112	136	52	e38	32	41	39
27	32	34	e41	153	e45	60	104	49	e36	32	40	43
28	33	33	e42	78	e46	52	118	45	e36	32	39	35
29	33	31	e42	63	---	42	62	41	e38	32	38	42
30	31	110	e43	67	---	41	64	40	e38	30	40	46
31	32	---	e42	72	---	44	---	46	---	31	35	---
TOTAL	1212	1075	1691	1912	4609	4535	1900	1666	1117	1113	1075	1023
MEAN	39.1	35.8	54.5	61.7	165	146	63.3	53.7	37.2	35.9	34.7	34.1
MAX	48	110	91	207	1590	1120	136	111	45	42	46	48
MIN	31	27	41	40	45	38	43	40	33	30	24	23
AC-FT	2400	2130	3350	3790	9140	9000	3770	3300	2220	2210	2130	2030

e Estimated.

11059300 SANTA ANA RIVER AT E STREET, NEAR SAN BERNARDINO, CA

LOCATION.--Lat 34°03'54", long 117°17'58", in San Bernardino Grant, San Bernardino County, Hydrologic Unit 18070203, on left bank, 0.4 mi downstream from E Street Bridge, 0.4 mi upstream from Warm Creek, 1.2 mi downstream from San Timoteo Creek, 2.8 mi south of San Bernardino, and 26 mi downstream from Big Bear Lake.
DRAINAGE AREA.--541 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1939 to September 1954, October 1966 to current year.
GAGE.--Water-stage recorder. Elevation of gage is 940 ft above sea level, from topographic map. Prior to Nov. 10, 1950, water-stage recorder on right bank 0.4 mi upstream at datum 964.50 ft above sea level. Nov. 11, 1950, to Sept. 30, 1954, water-stage recorder on both banks 0.4 mi upstream at datum 964.50 ft above sea level. Oct. 1, 1966, to Sept. 30, 1976, water-stage recorder on right bank 0.4 mi upstream at datum 954.50 ft above sea level. Oct. 1, 1976, to Sept. 30, 1977, gage was removed for channel construction. Oct. 1, 1977, to Jan. 28, 1981, water-stage recorder on right bank 0.5 mi upstream at elevation 950 ft above sea level, from topographic map.
REMARKS.--Records fair except for discharges above 200 ft3/s and estimated daily discharges, which are poor. Flow partly regulated by Big Bear Lake (station 11049000). Natural flow of stream affected by ground-water withdrawals and diversion for domestic use and irrigation upstream from station. Effluent from sewage reclamation plant 1.0 mi upstream has caused sustained flow past gage since 1967. See schematic diagram of Santa Ana River basin.
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 28,000 ft3/s, Feb. 25, 1969, gage height, 11.9 ft, site and datum then in use; no flow for many days many years prior to 1967.
EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft3/s)	Gage height (ft)
Nov. 30	0530	1,310	4.75	Mar. 19	1715	1,760	4.94
Feb. 7	2215	*3,350	*5.41	Mar. 25	0215	1,890	4.99

Minimum daily, 29 ft3/s, May 25, 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	e36	45	31	34	48	36	41	32	31	31	32
2	38	e36	44	35	37	49	36	39	33	31	31	32
3	e37	e36	42	37	37	51	35	34	33	31	32	32
4	e36	e36	42	35	268	49	36	39	31	31	31	32
5	e36	e35	43	36	46	48	40	36	31	31	32	33
6	e36	e37	45	37	34	85	38	43	30	32	31	33
7	e37	e38	41	38	758	164	39	47	33	32	31	32
8	e36	e39	41	38	1080	46	36	44	34	32	31	33
9	e37	e38	40	38	121	37	46	38	32	31	30	34
10	e42	e38	40	37	84	39	41	31	33	31	30	34
11	e38	e46	76	39	56	42	42	31	32	31	31	34
12	e39	e44	61	38	48	41	41	31	32	32	31	34
13	e39	e37	48	38	46	40	43	33	34	32	30	33
14	e38	e40	e75	37	45	40	42	31	33	31	37	33
15	e37	e38	e57	37	46	40	41	31	32	31	38	33
16	e36	e37	47	40	44	40	39	37	33	31	38	34
17	e37	e38	45	42	172	39	37	38	33	31	38	33
18	e36	e38	37	39	107	39	42	41	33	32	35	33
19	e35	e39	73	38	67	707	41	41	34	32	34	33
20	e34	e40	40	39	176	315	38	36	37	31	34	32
21	e35	e40	39	42	120	79	36	32	35	30	35	32
22	e36	e44	38	39	68	52	39	30	34	31	32	32
23	e35	e44	37	45	58	50	40	30	32	30	32	33
24	e37	44	36	45	54	102	54	31	32	30	32	32
25	e36	44	31	e157	49	354	79	29	32	31	32	32
26	e37	43	30	e54	48	56	71	30	32	31	32	32
27	e36	43	31	e72	47	41	62	32	32	31	33	32
28	e35	43	31	44	48	39	64	30	31	31	32	32
29	e33	44	31	40	---	37	45	29	31	31	32	31
30	e35	130	32	37	---	34	40	34	32	30	32	31
31	e36	---	34	36	---	35	---	34	---	30	32	---
TOTAL	1134	1284	1352	1360	3768	2839	1319	1083	978	963	1011	978
MEAN	36.6	42.8	43.6	43.9	135	91.6	44.0	34.9	32.6	31.1	32.6	32.6
MAX	42	130	76	157	1080	707	79	47	37	32	38	34
MIN	33	35	30	31	34	34	35	29	30	30	30	31
AC-FT	2250	2550	2680	2700	7470	5630	2620	2150	1940	1910	2010	1940

e Estimated.

11072100 TEMESCAL CREEK ABOVE MAIN STREET, AT CORONA, CA

LOCATION.--Lat 33°53'21", long 117°33'43", in La Sierra Grant, Riverside County, Hydrologic Unit 18070203, on right bank 500 ft upstream from Main Street Bridge in Corona and 1.5 mi upstream from topographic boundary of Prado Flood Control basin.

DRAINAGE AREA.--224 mi^2, excludes 768 mi^2 above Lake Elsinore.

PERIOD OF RECORD.--December 1980 to July 1983, February 1984 to current year. December 1967 to September 1974, water-stage recorder at site 1.2 mi downstream at different datum (published as Station 11072200, Temescal Creek at Corona, CA).

GAGE.--Water-stage recorder and concrete-lined flood control channel. Elevation of gage is 600 ft above sea level, from topographic map. December 1980 to July 1983 at site 500 ft downstream at different datum.

REMARKS.--No estimated daily discharges. Records fair. Flow regulated by several small storage reservoirs. Many diversions upstream from station for irrigation. Water discharged to channel from Arlington Desalter at times since September 1990; records for water years 1981 to 1990 and 1991 to current year are not equivalent.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,720 ft^3/s, Mar. 1, 1983, gage height, 11.67 ft; minimum daily, 0.27 ft^3/s, Sept. 25, 1981.

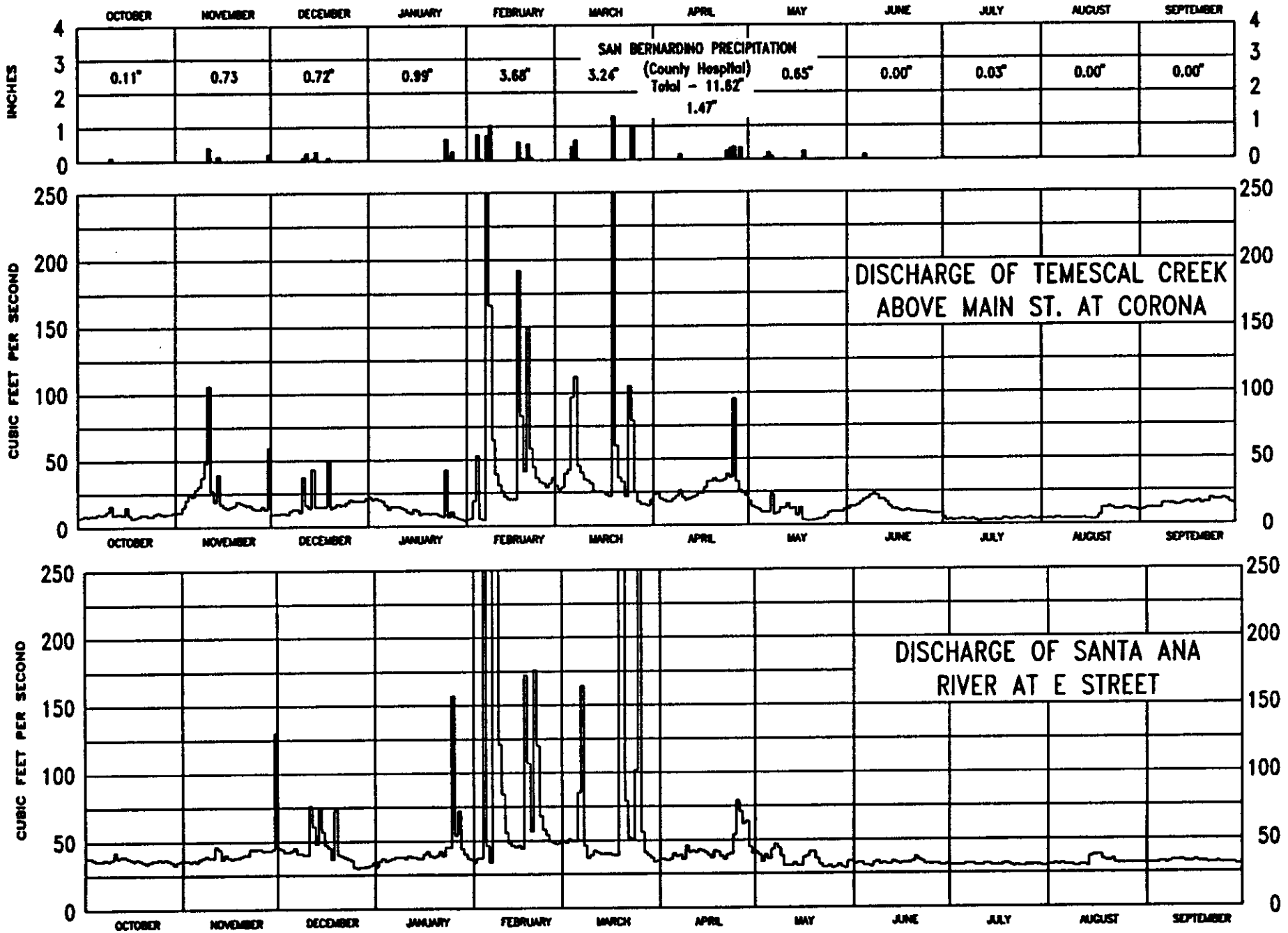
EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge, 8,850 ft^3/s, Feb. 25, 1969, gage height, 8.17 ft, from floodmark, at old site (Station 11072200) 1.2 mi downstream on basis of slope-area measurement of peak flow.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,380 ft^3/s, Mar. 19, gage height, 5.05 ft; minimum daily, 2.1 ft^3/s, July 12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1993 TO SEPTEMBER 1994
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.2	11	9.1	22	4.6	30	23	18	14	5.5	4.0	9.7
2	7.7	11	9.4	20	5.7	27	24	14	14	3.0	3.7	11
3	8.7	15	9.1	21	19	29	20	13	14	3.8	4.5	12
4	8.0	20	10	20	53	39	19	12	15	2.9	3.6	12
5	8.9	25	10	19	5.6	42	18	10	17	3.4	4.4	12
6	8.5	23	9.2	16	4.5	97	18	10	19	3.7	4.9	12
7	10	28	12	13	262	112	20	9.5	20	4.1	3.8	12
8	9.4	30	13	15	166	45	22	23	22	3.3	4.2	15
9	10	37	13	15	65	40	26	8.2	23	3.4	4.0	15
10	12	48	11	15	39	35	21	9.3	22	4.2	4.0	15
11	16	106	37	14	31	34	19	13	19	3.2	4.0	15
12	9.1	27	16	13	26	32	20	13	19	2.1	4.2	14
13	9.8	19	14	11	22	26	21	16	17	2.8	4.2	14
14	9.9	39	43	9.7	20	25	22	12	14	3.1	4.3	15
15	9.0	17	15	13	20	26	24	13	12	2.9	3.8	16
16	15	15	15	12	20	25	24	7.2	12	3.1	3.8	16
17	8.9	14	15	8.9	192	23	28	16	11	3.5	3.0	15
18	6.4	15	15	9.4	83	22	33	10	10	2.6	3.6	16
19	7.5	16	49	10	41	281	33	8.9	11	3.1	6.4	17
20	8.3	19	14	9.3	149	60	35	8.6	11	4.5	12	15
21	9.6	18	15	10	58	36	33	9.6	10	4.0	12	16
22	9.5	17	17	9.5	44	33	33	10	9.9	3.4	13	16
23	8.2	16	16	8.1	36	22	34	11	9.6	3.9	12	19
24	8.2	16	16	7.1	33	105	38	12	9.6	4.3	11	18
25	10	14	18	42	32	79	36	15	9.4	3.6	11	18
26	11	13	20	6.9	29	25	95	18	8.8	3.5	11	18
27	9.9	13	19	11	32	18	33	18	8.6	4.1	12	19
28	9.3	15	19	6.7	36	16	26	17	8.2	4.8	12	18
29	9.9	13	19	5.9	---	16	24	15	8.5	3.6	11	16
30	10	59	19	5.1	---	15	22	14	8.6	3.3	11	15
31	11	---	21	4.1	---	19	---	14	---	3.7	10	---
TOTAL	296.9	729	537.8	402.7	1528.4	1434	844	398.3	407.2	110.4	216.4	451.7
MEAN	9.58	24.3	17.3	13.0	54.6	46.3	28.1	12.8	13.6	3.56	6.98	15.1
MAX	16	106	49	42	262	281	95	23	23	5.5	13	19
MIN	6.4	11	9.1	4.1	4.5	15	18	7.2	8.2	2.1	3.0	9.7
AC-FT	589	1450	1070	799	3030	2840	1670	790	808	219	429	896

PROVISIONAL DATA
SUBJECT TO REVISION


OCTOBER
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
INCHES
SAN BERNARDINO PRECIPITATION
(County Hospital)
Total - 11.82"
0.11"
0.73
0.72"
0.99"
3.68"
3.24"
1.47"
0.65"
0.00"
0.03"
0.00"
0.00"
CUBIC FEET PER SECOND
DISCHARGE OF TEMESCAL CREEK
ABOVE MAIN ST. AT CORONA
DISCHARGE OF SANTA ANA
RIVER AT E STREET

APPENDIX I

DAILY PRECIPITATION DATA
AT SAN BERNARDINO COUNTY HOSPITAL

WATER YEAR 1993-94

WS FORM B-91
(7-89)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

STATION (Climatological): SAN BDNO. CO. MED. CTR.
MONTH: AUG. 19 94
STATE: CA
COUNTY: SAN BDNO.
TIME OF OBSERVATION — TEMP.: 4PM PRECIPITATION: 4PM
STANDARD TIME IN USE: DAY. SAV.

Date	Temperature °F Max.	Min.	At Obsn.
1	96	63	94
2	98	63	94
3	100	63	96
4	99	62	98
5	108	62	106
6	102	62	100
7	101	70	94
8	99	67	97
9	101	70	99
10	101	71	96
11	104	73	100
12	106	70	100
13	105	71	99
14	100	74	98
15	104	73	93
16	101	71	93
17	95	71	92
18	94	70	93
19	95	69	95
20	95	69	94
21	94	64	87
22	91	58	84
23	93	59	91
24	97	59	95
25	99	59	94
26	96	58	92
27	95	58	92
28	96	60	97
29	96	62	94
30	91	60	86
31	88	60	82
Sum			

PRECIPITATION — 24-HR AMOUNTS: Sum 0

WEATHER (Calendar Day) — Mark 'X' for all types occurring each day: Fog, Ice Pellets, Glaze, Thunder, Hail, Damaging Winds

RIVER STAGE: Condition, Gage Reading at A.M., Tendency

REMARKS (Special observations, etc.)

COPIES TO:
- DILWORTH ☐
- DIRECTORS ☐
- FLETCHER ☐
- FULLER ☐
- GRIZEL ☐
- REITER ☐
- TINCHER ☒
- VAN GELDER ☐
- Palmer ☒
- ☐
- FILE ☐

CHECK BAR (for wire-weight) NORMAL CK. BAR — READING — DATE

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER: R. L. Sloan

SUPERVISING OFFICE

STATION INDEX NO. 04 7723 6

WS FORM B-91 (7-89)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

RECEIVED
'94 OCT -7 A9:15
S.B.V.M.W.D.

Station: SAN BDNO. CO. MED. CTR.
Month: SEPT 19 94
State: CA F.
County: SAN BERNARDINO
River:
Time of observation — Temp.: 4PM; Precipitation: 4PM
Standard time in use: DAY. SAVINGS
Type of river gage:
Elevation of river gage zero: Ft.
Flood stage: Ft.
Normal pool stage: Ft.

TEMPERATURE F. — 24 HRS. ENDING AT OBSERVATION

Date	Max.	Min.	At Obsn.
1	88	60	81
2	90	58	88
3	93	58	90
4	95	58	93
5	98	58	93
6	99	67	95
7	96	65	95
8	76	62	94
9	98	64	94
10	93	65	90
11	87	656	82
12	78	59	75
13	77	56	75
14	91	52	68
15	96	57	93
16	96	56	92
17	94	56	89
18	91	58	86
19	88	59	85
20	89	57	88
21	92	57	85
22	89	62	88
23	87	62	82
24	85	61	80
25	94	57	90
26	88	65	87
27	92	67	91
28	94	67	90
29	88	69	87
30	83	65	80
31			
			SUM

PRECIPITATION — 24-HR AMOUNTS: Rain, melted snow, etc. (ins. and hundredths); Snow, ice pellets, hail (ins. and tenths); At Obsn: Snow, ice pellets, hail, ice on ground (ins.)

Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved.

A.M. NOON P.M.

WEATHER (Calendar Day) — Mark 'X' for all types occurring each day: Fog, Ice Pellets, Glaze, Thunder, Hail, Damaging Winds

RIVER STAGE — Condition; Gage reading at A.M.; Tendency

REMARKS (Special observations, etc.)

COPIES TO:
- DILWORTH ☐
- DIRECTORS ☐
- FLETCHER ☐
- FULLER ☑
- GRIZEL ☐
- REITER ☐
- TINCHER ☑
- VAN GELDER ☐
- Palmer ☑
- ☐
- FILE ☐

CHECK BAR (for wire-weight) — NORMAL CK. BAR
Reading | Date

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER: R. L. Sleeman

SUPERVISING OFFICE

STATION INDEX NO. 04 7723 6

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WS FORM B-91
(7-89)

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

STATION (Climatological): SAN BDNO. CO. MED. CTR.
(River Station, if different):
MONTH: OCT. 19 93
STATE: CA
COUNTY: SAN BDNO
RIVER:
TIME (local) OF OBSERVATION: TEMP. 6 PM | PRECIPITATION 6 PM | RIVER:
STANDARD TIME IN USE: DAY. SAVINGS
TYPE OF RIVER GAGE:
ELEVATION OF RIVER GAGE ZERO: Ft.
FLOOD STAGE: Ft.
NORMAL POOL STAGE: Ft.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (ins. and hundredths)	Snow, ice pellets, hail (ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (ins.)	WEATHER (Calendar Day)	RIVER STAGE	REMARKS (Special observations, etc.)
1	100	62	94						
2	97	63	91						
3	96	62	87						
4	81	61	78						
5	75	62	71						
6	76	54	70						
7	70	53	69						
8	70	57	70						
9	76	57	76						LIGHT RAIN
10	82	56	76						LIGHT RAIN
11	78	61	76	.10					
12	80	57	77						
13	79	54	77						
14	76	55	73						
15	72	55	71						LIGHT MIST
16	69	50	60	.01					
17	69	52	66						
18	76	52	70						
19	81	49	77						
20	88	58	79						
21	83	56	73						
22	86	52	81						
23	87	52	81						
24	83	52	76						
25	83	51	78						
26	87	54	83						
27	81	68	77						
28	81	50	78						
29	81	49	76						
30	83	48	80						
31	80	49	68						
SUM									

CHECK BAR (for wire-weight) READING | NORMAL CK. BAR | DATE

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER: BOILER ROOM OPERATOR
SUPERVISING OFFICE:
STATION INDEX NO. 04 7723 6

STATION (Climatological) SAN BDNO. CO. MED. CENTER (River Station, if different)

MONTH NOV. 19 93

STATE C .IF.

COUNTY SAN BDNO

TIME (local) OBSERVATION RIVER

TEMP. 4 PM

PRECIPITATION 4 PM

STANDARD TIME IN USE DAY. SAVINGS

TYPE OF RIVER GAGE

ELEVATION OF RIVER GAGE ZERO Ft.

FLOOD STAGE Ft.

NORMAL POOL STAGE Ft.

WS FORM B-91 (7-89)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

RECEIVED

'93 DEC -2 A8:40

S.B.V.M.W.D.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Inches and hundredths)	Snow, ice pellets (Inches and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	PRECIPITATION Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. 1 2 3 4 5 6 7 8 9 10 11	NOON	P.M. 1 2 3 4 5 6 7 8 9 10 11	WEATHER (Calendar Day) Mark 'X' for all types occurring each day. Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	(Time of observation if different from above)	RIVER STAGE CONDITION	GAGE READING AT A.M.	TENDENCY	REMARKS (Special observations, etc.)
1	82	45	76																	
2	83	67	72																	
3	85	50	73																	
4	80	47	71																	
5	79	44	67																	
6	79	44	73																	
7	75	44	65																	
8	72	46	72																	
9	74	45	69																	
10	71	53	64																	
11	60	58	57	.38																LIGHT SHOWERS
12	60	51	57	.02																LIGHT DRIZZLE
13	61	51	57																	LIGHT RAIN
14	58	41	57	.13																
15	66	53	58																	
16	68	39	57																	
17	70	42	67																	
18	67	47	52																	
19	73	42	61																	
20	74	39	71																	
21	74	39	71																	
22	69	53	65																	
23	65	55	62																	
24	69	49	63																	
25	69	38	64																	
26	71	37	64																	
27	71	37	61																	
28	74	49	69																	
29	70	40	62																	STEADY LIGHT RAIN
30	65	51	54	.20																
31																				
			SUM	.73																

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

CHECK BAR (For water-year) NORMAL CK. BAR

READING DATE

OBSERVER BOILER ROOM OPERATOR

SUPERVISING OFFICE

STATION INDEX NO. 04 7723 6

WS FORM B-91 (7-89)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

RECEIVED '94 JAN -6 A9:06 S.B.V.M.W.D.

STATION (Climatological): SAN BDNO. CO. MED. CTR.
(River Station, if different):
MONTH:
19__
RIVER:
STATE: CALIF.
COUNTY: SAN BERNARDINO
TIME (local) OBSERVATION RIVER:
TEMP.: 4 PM
PRECIPITATION:
STANDARD TIME IN USE: DAY. SAVINGS
TYPE OF RIVER GAGE:
ELEVATION OF RIVER GAGE ZERO: Ft.
FLOOD STAGE: Ft.
NORMAL POOL STAGE: Ft.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (ins. and hundredths)	Snow, ice pellets (ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (ins.)	WEATHER (Calendar Day) Fog	REMARKS (Special observations, etc.)
1	71	49	51					
2	75	48	68					
3	77	53	53					
4	74	43	68					
5	75	42	64					
6	61	42	54				X	LIGHT MIST & FOG
7	66	37	58					
8	68	37	58					
9	64	37	58					
10	77	40	68					
11	58	42	51	.08				LIGHT TO HEAVY
12	57	43	51	.22				LIGHT RAIN
13	66	37	56					
14	57	37	47	.07				LIGHT TO HEAVY
15	57	34	47	.26				
16	57	34	54					
17	60	34	56					
18	61	34	55					
19	60	44	56	.09				LIGHT RAIN
20	62	40	56					
21	65	33	52					
22	67	37	52					
23	69	44	57					
24	66	38	58					
25	71	40	65					
26	60	45	56					
27	60	40	56					
28	69	40	60					
29	70	43	65					
30	67	37	57					
31	70	39	68					
SUM				.72				

Other printed columns (Ice Pellets, Glaze, Thunder, Hail, Damaging Winds, Time of observation if different from above, RIVER STAGE: Condition, Gage reading at A.M., Tendency) are blank.

PRECIPITATION: Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M.

CHECK BAR (For wire-weight) NORMAL CK. BAR — READING — DATE

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER: BOILER ROOM OPERATOR

SUPERVISING OFFICE:

STATION INDEX NO.: 04 7723 6

COPIES TO:
DILWORTH ☐
DIRECTORS ☐
FLETCHER ☐
FULLER ☐
GRIZZLE ☐
HEITER ☐
TINCHER ☐
VAN GELDER ☐
☐
☐
FILE ☐

STATION (Climatological) SAN BDNO. CO. LLED. CTR. (River Station, if different)

MONTH JAN YR. 94

STATE CALIF. COUNTY SAN BDNO

TIME (Loc.) OBSERVATION (River) TEMP. 4 PM PRECIP. 4 PM

STANDARD TIME IN USE DAY. SAVINGS

TYPE OF RIVER GAGE

ELEVATION OF RIVER GAGE (Ft.)

FLOOD STAGE Ft.

NORMAL POOL STAGE Ft.

WS FORM B-91 (7-89)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

RECEIVED

'94 FEB -7 A10:53

S.B.V.M.W.D.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Inches and hundredths)	Snow, ice pellets (Inches and tenths)	At Ob. Snow, ice pellets, hail on ground
1	70	41	39			
2	78	42	66			
3	81	45	71			
4	76	46	68			
5	69	49	65			
6	67	46	64			
7	66	35	62			
8	68	38	61			
9	66	39	63			
10	69	42	64			
11	70	37	69			
12	72	52	69			
13	76	45	72			
14	71	49	68			
15	71	45	64			
16	75	41	72			
17	79	44	73			
18	81	46	79			
19	78	45	75			
20	76	42	72			
21	77	43	72			
22	79	48	73			
23	66	48	62			
24	66	49	57			
25	52	43	51	.62		
26	59	42	52	.12		
27	57	45	52	.25		
28	60	36	54			
29	64	36	53			
30	67	36	63			
31	62	40	69			
			SUM	.99		X

PRECIPITATION — Draw a straight line (——) through hours precipitation was observed, and a wavy line (~~~) through hours precipitation probably occurred undetected.

A.M. NOON P.M.

1 2 3 4 5 6 7 8 9 10 11 | 1 2 3 4 5 6 7 8 9 10 11

CHECK BAR (Use when available) NORMAL CK. BAR

READING	DATE

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

WEATHER (Calendar Day) — Mark 'X' for all types occurring each day.

Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	Time of observation a different from above
Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	X

RIVER STAGE

CONDITION	GAGE READING AT ___ A.M.	TENDENCY
X	X	X

REMARKS (Special observations, etc.)

LIGHT RAIN
LIGHT TO MODERATE
LIGHT TO HEAVY

OBSERVER BOILER ROOM OPERATOR

SUPERVISING OFFICE

STATION INDEX NO. 04 7723 6

WS FORM B-91 (7-89)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

RECEIVED 94 MAR -2 A8:28 S.B.V.M.W.D.

STATION (Climatological)	(River Station, if different)	MONTH	YEAR
SAN BDNO. CO. MED. CTR.		FEB	19 94

STATE	COUNTY	RIVER
CA LF	SAN BDNO	

TIME (local) OBSERVATION RIVER	TEMP.	PRECIPITATION	STANDARD TIME IN USE
	4 PM	4 PM	DAY. SAVINGS

TYPE OF RIVER GAGE	ELEVATION OF RIVER GAGE ZERO	FLOOD STAGE	NORMAL POOL STAGE
	Ft.	Ft.	Ft.

PRECIPITATION: Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved.

WEATHER (Calendar Day): Mark 'X' for all types occurring each day.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	24-HR AMOUNTS Rain, melted snow, etc. (Ins. and hundredths)	Snow, ice pellets, hail (Ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	RIVER STAGE Gage reading A.M.	Condition	Tendency	REMARKS (Special observations, etc.)
1	58	38	52													
2	64	37	51													
3	61	41	60													LIGHT SPRINKLES
4	51	47	50	.75												LIGHT TO MODERATE
5	60	41	58	.05												LIGHT RAIN
6	65	43	58													LIGHT TO MODERATE
7	57	47	55	.73												" " "
8	57	47	51	1.02							X					" " "
9	62	38	61													
10	62	41	55													
11	62	41	60													
12	63	40	61													
13	68	35	64													
14	71	37	70													
15	74	36	72													
16	71	49	67													
17	54	47	51	.52												LIGHT RAIN
18	51	41	50	.06												" "
19	55	41	50	.02												
20	54	43	51	.46												LIGHT RAIN
21	58	38	55	.07												
22	65	36	62													
23	69	37	65													
24	73	48	67													
25	73	43	67													
26	66	46	62													
27	58	47	58													
28	75	45	72				X									PERIODS OF LIGHT FOG
29																
30																
31																
SUM				3.68												

CHECK BAR (For wire-weight) NORMAL CK. BAR

READING | DATE

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER: BOILER ROOM OPERATOR

SUPERVISING OFFICE

STATION INDEX NO. 04 7723 6

WS FORM B-91 (7-89)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

RECEIVED '94 APR -5 A8:28 S.D.V.M.W.D.

Station: San Bdno co medical
State: Cal
County: San Bdno
Month: March 19 94
Time of observation: Temp. 4 PM — Precipitation 4 PM
Standard time in use: Pacific

Date	Temp. Max.	Temp. Min.	Temp. At obsn.	Precip. 24-hr amount	Remarks
1	78	45	76		
2	86	46	76	—	
3	80	49	74	—	
4	75	45	72		mist
5	74	51	71		LT Drizzle
6	61	46	55	.38	Heavy 3.64
7	55	41	54	.57	
8	58	51	58	.03	
9	72	49	70		
10	64	47	64		
11	67	52	65		
12	76	48	76		
13	83	62	78		
14	83	51	87		
15	83	49	78		
16	80	49	78		
17	73	53	72		
18	73	54	71		
19	64	52	54	1.28	
20	68	53	64		
21					
22	63	51	53		
23	62	44	54		
24	58	47	53		
25	59	42	50	.98	
26	66	41	60		
27	72	42	70		
28	73	47	74		
29	76	46	72		
30	80	50	70		
31	80	50	74		
Sum				3.24	

Condition of river at gage:
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

Observer: Barbara Beers Operator

COPIES TO:
- DILWORTH ☐
- DIRECTORS ☐
- FLETCHER ☐
- FULLER ☐
- GRIZEL ☐
- REITER ☐
- TINCHER ☑
- VAN GELDER ☐
- ☐
- ☐
- FILE ☐

WS FORM B-91 (7-89)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

RECEIVED
'94 MAY -4 A8:26
S.B.V.M.W.D.

STATION (Climatological): SAN BDNO. CO. MED. CTR. (River Station, if different):
MONTH: APRIL 19 94
RIVER:
STATE: CA.
COUNTY: SAN BDNO.
TIME (local): OBSERVATION RIVER: TEMP 4 PM PRECIPITATION 4 PM
STANDARD TIME IN USE: PDT
TYPE OF RIVER GAGE: ELEVATION OF RIVER GAGE ZERO: Ft. FLOOD STAGE: Ft. NORMAL POOL STAGE: Ft.

DATE	TEMPERATURE F. 24 HRS ENDING AT OBSERVATION MAX.	MIN.	AT OBSN	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc.	Snow, ice pellets, hail	AT OB. Snow, ice pellets, hail, ice on ground	WEATHER Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	RIVER STAGE Condition	Gage Reading at A.M.	Tendency	REMARKS (Special observations, etc.)
1	76	51	74													
2	78	53	76				X									
3	76	56	68													
4	77	44	72													
5	79	48	78													EARTHQUAKE @ 12:02 4.8
6	74	50	73													
7	66	54	65													LIGHT RAIN
8	62	54	59													LIGHT RAIN
9	63	49	62	.15												
10	71	43	69													
11	83	43	82													
12	85	50	83													
13	82	51	81													
14	73	49	73													
15	87	53	87													
16	86	53	83													
17	83	61	83													
18	89	62	83													
19	86	57	85													
20	85	56	84													
21	74	56	73													
22	71	57	71													
23	72	55	69							X	X					LIGHT RAIN
24	59	48	59	.25												LIGHT TO MEDIUM
25	57	48	53	.33												LIGHT DRIZZLE
26	54	47	50	.37												LIGHT TO HEAVY
27	55	45	54	.02												" " "
28	65	45	64	.35						X						
29	73	44	72													
30	73	51	72													
31																
SUM				1.47												

PRECIPITATION: Draw a straight line (——) through hours precipitation was observed, and a wavy line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M.

CHECK BAR (for wire weight) NORMAL CK. BAR — READING — DATE

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER: BOILER ROOM OPERATOR
SUPERVISING OFFICE:
STATION INDEX NO.: 04 7723 6

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

(7-89)

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

SAN BDNO. CO. MED. CTR. — MAY 19 [illegible]

STATE: CALIF. — COUNTY: SAN BDNO. — RIVER:

TIME (local) OF OBSERVATION: RIVER — TEMP. 4PM — PRECIPITATION 4PM — STANDARD TIME IN USE: DAYLIGHT SAV.

TYPE OF RIVER GAGE — ELEVATION OF RIVER GAGE ZERO Ft. — FLOOD STAGE Ft. — NORMAL POOL STAGE Ft.

RECEIVED
'94 JUN -3 A8:39
S.B.V.M.W.D.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (ins. and hundredths)	Snow, ice pellets, hail (ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (ins.)	WEATHER (Calendar Day) Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	RIVER STAGE Gage reading at ___ A.M.	Tendency	REMARKS (Special observations, etc.)
1	70	53	68												
2	75	54	71												
3	77	51	67												
4	80	52	74												
5	73	56	70												
6	66	53	57	.06											LIGHT - MED. SHOWERS
7	68	50	57	.20											
8	68	51	67	.10											LIGHT TO MODERATE
9	76	51	74												
10	79	52	74												
11	78	57	74							X					SHORT SHOWERS
12	72	58	71	.02			X								LIGHT FOG - DRIZZLE
13	66	57	66				X								
14	81	57	80												
15	66	58	65												
16	73	56	68												
17	58	52	56	.01											LIGHT SPRINKLES
18	62	48	57	.24											
19	69	47	62												
20	78	47	72												
21	86	47	82												
22	80	52	77												
23	84	55	83												
24	75	54	69												
25	64	54	62	.02											LIGHT DRIZZLE
26	73	58	72												
27	82	52	81												
28	89	53	82												
29	94	56	92												
30	85	60	76												
31	80	59	79												
SUM				.65											

CONDITION OF RIVER AT GAGE

A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

CHECK BAR (For wire-weight) NORMAL CK. BAR — READING — DATE

OBSERVER: BOILER ROOM OPERATOR

SUPERVISING OFFICE

STATION INDEX NO. 04 7723 6

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

WS FORM B-91 (7-89)

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

STATION (Climatological): SAN BDNO CO. MED. CTR. (River Station, if different)
MONTH: JUNE 19 94
STATE: CALIF.
COUNTY: SAN BDNO.
RIVER:
TIME (local) OBSERVATION RIVER | TEMP. 4 PM | PRECIPITATION
STANDARD TIME IN USE: DAY. SAV.
TYPE OF RIVER GAGE | ELEVATION OF RIVER GAGE ZERO Ft. | FLOOD STAGE Ft. | NORMAL POOL STAGE Ft.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.
1	94	53	91
2	93	54	91
3	91	59	89
4	88	52	82
5	87	58	80
6	79	60	78
7	86	55	85
8	93	58	91
9	101	60	96
10	98	63	91
11	94	56	90
12	86	59	85
13	89	60	86
14	81	60	78
15	76	60	74
16	86	76	84
17	89	56	88
18	93	57	91
19	95	59	93
20	94	59	92
21	96	52	95
22	101	62	98
23	103	63	100
24	101	62	99
25	105	62	100
26	107	62	104
27	102	72	99
28	101	69	101
29	103	20	101
30	96	67	94
31			
			SUM

PRECIPITATION: 24-HR AMOUNTS (Rain, melted snow, etc. (ins. and hundredths); Snow, ice pellets (ins. and tenths)); AT OB (Snow, ice pellets, hail, ice on ground (ins.)). Draw a straight line (——) through hours precipitation was observed, and a wavy line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M.

WEATHER (Calendar Day): Mark "X" for all types occurring each day. Fog | Ice Pellets | Glaze | Thunder | Hail | Damaging Winds | Time of observation if different from above

RIVER STAGE: CONDITION | GAGE READING AT ___ A.M. | TENDENCY

REMARKS (Special observations, etc.)

CHECK BAR (For wire-weight) NORMAL CK. BAR: READING | DATE

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER: R. K. Starm
SUPERVISING OFFICE:
STATION INDEX NO. 04 7723 0

WS FORM B-91
(7-89)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

RECORD OF RIVER AND CLIMATOLOGICAL OBSERVATIONS

STATION (Climatological): SAN BDNO. CO. MED. CTR. (River Station, if different)
MONTH: JULY 19 94
STATE: CA
COUNTY: SAN BDNO
RIVER:
TIME (local) OF OBSERVATION RIVER: TEMP. 4PM PRECIPITATION 4PM
STANDARD TIME IN USE: DAY. SAVINGS
TYPE OF RIVER GAGE:
ELEVATION OF RIVER GAGE ZERO: Ft.
FLOOD STAGE: Ft.
NORMAL POOL STAGE: Ft.

DATE	TEMPERATURE F. 24 HRS. ENDING AT OBSERVATION MAX.	MIN.	AT OBSN.	PRECIPITATION 24-HR AMOUNTS Rain, melted snow, etc. (Ins. and hundredths)	Snow, ice pellets, hail (Ins. and tenths)	At Ob. Snow, ice pellets, hail, ice on ground (Ins.)	WEATHER (Calendar Day) Fog	Ice Pellets	Glaze	Thunder	Hail	Damaging Winds	RIVER STAGE Condition	Gage reading at A.M.	Tendency	REMARKS (Special observations, etc.)
1	97	68	96	.03						X						
2	93	66	91													
3	90	65	84													
4	88	64	86													
5	88	64	87													
6	89	62	87													
7	92	62	91													
8	96	62	95													
9	95	63	92													
10	97	63	95													
11	95	63	92													
12	93	62	92													
13	92	60	92													
14	91	62	90													
15	94	62	94													
16	100	61	100													
17	91	67	87													
18	93	71	90													
19	87	52	85													
20	87	64	85													
21	94	63	88													
22	93	63	90													
23	93	62	92													
24	99	61	90													
25	101	63	99													
26	101	64	95													
27	100	65	96													
28	101	66	98													
29	95	65	87													
30	92	64	91													
31	91	61	91													
			SUM	.03			Fog	Ice Pel.	Glaze	Thund.	Hail	Dam. Winds				

PRECIPITATION: Draw a straight line (——) through hours precipitation was observed, and a waved line (~~~) through hours precipitation probably occurred unobserved. A.M. NOON P.M.

CHECK BAR (for wire-weight) NORMAL CK. BAR
READING | DATE

CONDITION OF RIVER AT GAGE
A. Obstructed by rough ice.
B. Frozen, but open at gage.
C. Upper surface of smooth ice.
D. Ice gorge above gage.
E. Ice gorge below gage.
F. Shore ice.
G. Floating ice.
H. Pool stage.

OBSERVER: R. L. Storm

SUPERVISING OFFICE:

STATION INDEX NO. 04 7723 6