SANTA ANA RIVER WATERMASTER

FOR

ORANGE COUNTY WATER DISTRICT

VS. CITY OF CHINO et al.

CASE NO. 117628 - COUNTY OF ORANGE

THIRTY-FIRST

ANNUAL REPORT

OF THE

SANTA ANA RIVER WATERMASTER

FOR WATER YEAR

OCTOBER 1, 2000 - SEPTEMBER 30, 2001

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CASE NO. 117628--COUNTY OF ORANGE

WATERMASTER
Richard W. Atwater
Bill B. Dendy
Donald L. Harriger
William R. Mills, Jr
Robert L. Reiter

MAILING ADDRESS
c/o SBVMWD
Post Office Box 5906
San Bernardino CA 92412-5906
Telephone 909/387-9200
FAX 909/387-9247

April 30, 2002

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

Re: Watermaster Report for Water Year October 1, 2000 - September 30, 2001

Ladies and Gentlemen:

We have the honor of submitting herewith the Thirty-first Annual Report of the Santa Ana River Watermaster. We wish to point out that the supporting basic data heretofore presented as Appendices are bound separately.

The principal findings of the Watermaster for the water year 2000-01 are as follows:

At Prado

1	Base Flow at Prado	153,914 acre-feet
2	Annual Weighted TDS in Base and Storm Flows	525 mg/L
3	Annual Adjusted Base Flow	176,360 acre-feet
4	Cumulative Adjusted Base Flow	3,534,604 acre-feet
5	One-Half San Jacinto Watershed Discharge Reaching Prado Dam and Recharging Orange County Groundwater Basin	0 acre-feet
6	Cumulative Entitlement of OCWD	1,302,000 acre-feet
7	Cumulative Credit	2,232,604 acre-feet
8	One-Third of Cumulative Debit	0 acre-feet
9	Minimum Required Base Flow in 1999-00	34,000 acre-feet

At Riverside Narrows

1	Base Flow at Riverside Narrows	61,872 acre-feet
2	Annual Weighted TDS in Base Flow	603 mg/L
3	Annual Adjusted Base Flow	61,872 acre-feet
4	Cumulative Adjusted Base Flow	1,300,281 acre-feet
5	Cumulative Entitlement of IEUA and WMWD	472,750 acre-feet
6	Cumulative Credit	827,531 acre-feet
7	One-Third of Cumulative Debit	0 acre-feet
8	Minimum Required Base Flow in 1999-00	12,420 acre-feet

The above findings show that at the end of the 2000-01 water year, Inland Empire Utilities Agency (formerly Chino Basin Municipal Water District) and Western Municipal Water District have a cumulative credit of 2,232,604 acre-feet to their Base Flow obligation at Prado Dam. San Bernardino Valley Municipal Water District has a cumulative credit of 827,531 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 2000-01.

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: Richard W. Atwater

Richard W. Atwater

Bill B. Dendy

Bill B. Dendy

Donald L. Harriger

Donald L. Harriger

William R. Mills, Jr.

William R. Mills, Jr.

Robert L. Reiter

Robert L. Reiter

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The following appendices are bound separately and available for review at the office of the Secretary of the Santa Ana River Watermaster.

CHAPTER I

WATERMASTER ACTIVITIES AND WATER CONDITIONS

Introduction

This Thirty-First Annual Report of the Santa Ana River Watermaster covers Water Year 2000-01. The annual report is required by the Stipulated Judgment (Judgment) 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). The Stipulated Judgment became effective on October 1, 1970. It contains a declaration of rights of the water users and other entities in the Lower Area of the Santa Ana River Basin downstream of Prado Dam as against those in the Upper Area tributary to Prado Dam, and provides a physical solution to satisfy those rights. Chapter IV presents a history of the litigation and a summary of the Judgment.

The physical solution accomplishes, in general, a regional intrabasin allocation of the surface flow of the Santa Ana River System. The Judgment leaves to each of the major hydrologic units within the basin the determination and regulation of individual rights therein and the development and implementation of its own water management plan subject only to compliance with the physical solution.

The Judgment designates four public agencies to represent the interests of the Upper and Lower Areas and gives them the responsibility to fulfill the obligations set forth in the Judgment, including the implementation of the physical solution. The Lower Area is represented by Orange County Water District (OCWD). The Upper Area is represented by San Bernardino Valley Municipal Water District (SBVMWD), Western Municipal Water District of Riverside County (WMWD), and Inland Empire Utilities Agency (IEUA), formerly the Chino Basin Municipal Water District (CBMWD). The locations of the districts are shown on Plate 1, "Santa Ana River Watershed".

The court appoints a five-member Watermaster Committee to administer the provisions of the Judgment. The Watermaster's duty is to maintain a continuous accounting of each of the items listed in the letter of transmittal hereof and to report thereon annually for each water year to the court and the parties. The water year begins October 1 and ends the following September 30. The time for submission of the annual report is April 30, seven months after the end of the water year.

For the 2000-01 Water Year the Watermaster Committee consisted of Donald L. Harriger, William R. Mills, Jr., Robert L. Reiter, Bill B. Dendy, and Richard W. Atwater. Mr. Mills served as Chairman and Mr. Reiter served as Secretary/Treasurer. Chapter IV presents the history of Watermaster Committee membership.

Watermaster Service Expenses

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 parties by whom they were nominated. All other Watermaster service expenses are shared by the parties, with OCWD paying 40% of the cost and WMWD, SBVMWD, and IEUA each paying 20% of the cost.

Stream flow measurements and water quality data required by the Watermaster are, for the most part, furnished by the U.S. Geological Survey (USGS) through a cooperative monitoring program. The costs of the cooperative monitoring program for the 2000-01 Water Year, and each party's share of the costs, are set forth in Table 1.

TABLE 1
COSTS TO THE PARTIES AND USGS FOR MEASUREMENTS WHICH PROVIDE DATA USED BY THE SANTA ANA RIVER WATERMASTER

October 1, 2000 to September 30, 2001

	Total Cost	USGS Share	Parties' Share
USGS GAGING STATION			
Santa Ana River at MWD Crossing (Riverside Narrows)			
Surface Water Gage	$21,90	$10,950	$10,950
Water Quality Monitoring/TDS Sampling	9,000	4,500	4,500
Chino Creek at Schaefer	15,600	7,800	7,800
Cucamonga Creek at Mira Loma	15,600	7,800	7,800
Santa Ana River below Prado Dam			
Surface Water Gage	15,600	7,800	7,800
Water Quality Monitoring/TDS Sampling	17,350	8,675	8,675
Water Quality Conductance Program	1,750	0	1,750
TOTAL COST AND SHARES	$96,800	$47,525	$49,275
COST DISTRIBUTION AMONG PARTIES			
Inland Empire Utilities Agency	20%		$9,855
Orange County Water District	40%		$19,710
San Bernardino Valley Municipal Water District	20%		$9,855
Western Municipal Water District	20%		$9,855

The Watermaster annually adopts a budget for the costs of services other than those provided by the USGS. Table 2 shows the budget and actual expenses incurred for such services during the 2000-01 fiscal year as well as the budget adopted for the 2001-02 fiscal year. A financial review was performed by OCWD and is reported in Appendix C.

TABLE 2

WATERMASTER SERVICE BUDGET AND EXPENSES

Budget Item	July 1, 2000 to June 30, 2001 Budget	July 1, 2000 to June 30, 2001 Expenses[1]	July 1, 2001 to June 30, 2002 Budget
Support Services	$9,500.00	$14,519.87	$9,500.00
Reproduction of Annual Report	2,500.00	1,962.52	2,500.00
TOTAL	$12,000.00	$16,482.39	$12,000.00

(1) Includes expenses from prior fiscal year.

Compilation of Basic Data

The Watermaster annually compiles the basic hydrologic and water quality data necessary to determine compliance with the provisions of the Judgment. The data include records of stream flow and quality for the Santa Ana River (River) at Prado Dam and at Riverside Narrows as well as stream flows for most tributaries; flow and quality of nontributary water entering the River; rainfall records at locations in or adjacent to the Watershed; and other data that may be used to support the Watermaster's determinations.

For Water Year 2000-01 the USGS provided flow and water quality data for the Santa Ana River at two gaging stations, "Santa Ana River Below Prado" (Prado) and "Santa Ana River at Metropolitan Water District (MWD) Crossing" (Riverside Narrows). The flow data at both stations consist of computed mean daily discharges, expressed in cubic feet per second (cfs), based on continuous recordings. The water quality data at Prado consist of daily maximum and minimum values for electrical conductivity (EC), measured as specific conductance and expressed in microsiemens per centimeter (µs/cm) based on a continuous recording, and twice-monthly measured values for total dissolved solids (TDS), expressed in milligrams per liter (mg/L). The water quality data at Riverside Narrows consist of twice-monthly values for both EC and TDS. The USGS also provided discharge data for other gaging stations for streams tributary to Prado, including, among others, the Santa Ana River at E Street in San Bernardino, Chino

Creek at Schaefer Avenue, Cucamonga Creek near Mira Loma, and Temescal Creek in the City of Corona (see Appendix A).

The 2000-01 daily mean discharge record at Prado is considered by the USGS to be a "good" record. Daily mean discharges at the station are controlled at times by storage operations in the reservoir behind Prado Dam just upstream. The maximum and minimum daily mean discharge values during the water year were, respectively, 4,780 cfs on February 13, 2001, and 127 cfs on October 1, 2000. The maximum and minimum daily mean EC values at Prado were 1060 µs/cm on April 2 and 6, 2001, and 319 µs/cm on February 14, 2001. The respective corresponding calculated TDS concentrations were 663 and 200 mg/L.

The 2000-01 daily mean discharge record at Riverside Narrows is considered by the USGS to be "fair" below 250 cfs and "poor" above. The maximum and minimum daily mean discharge values during the year were 1,960 cfs on January 11, 2001 and 56 cfs on August 23, 2001. The maximum and minimum daily mean EC values were 947 µs/cm on March 15, 2001 and 606 µs/cm on March 1, 2001. The respective corresponding measured TDS concentrations were 598 and 388 mg/L.

To assist in making its determinations each year the Watermaster refers to the rainfall records of many National Weather Service precipitation stations located in or near the Santa Ana River watershed. The record for Station 2146, located at the San Bernardino County Hospital, was used to define the hydrologic base period upon which the physical solution in the Judgment was based, and annual reports of the Watermaster have always presented the daily and total annual rainfall record at the station in order to provide a comparison with historical conditions.

During 2000-01 Station 2146 was destroyed when the hospital buildings were demolished. For many days of the year precipitation data were missing entirely, and for many other days the reported data were clearly inconsistent with data from other nearby stations. The Watermaster decided that the record for Station 2146 for the entire year might be unreliable and decided to replace it with estimated data. OCWD hydrogeologists Roy Herndon and Gwen Sharp obtained the records for three nearby stations (2357 at San Bernardino CDF, 2015 at Del Rosa Ranger Station and 2001B3 at San Bernardino County Flood Control District) and, using the method recommended by the U.S. Weather Service, estimated the precipitation at the location of the former Station 2146 to be 16.13 inches during 2000-01 (see Appendix B).

The estimated 2000-01 rainfall total was 90% of the average of 17.98 inches per year that occurred during the 26-year base period (1934-35 through 1959-60) that was used in the formulation of the physical solution. Plate 3 shows annual precipitation from 1934-35 through 2000-01.

SBVMWD engineer Sam Fuller conducted a field investigation and discovered that a new precipitation station was established a short distance from the Station 2146 site. The environment at the new station is markedly different from that at the former

Station 2146 site. The Watermaster decided to determine during 2001-02 whether or not the future record at the new station would be appropriate to compare with historical data at Station 2146.

Watermaster Determinations

Each year the Watermaster uses its long-established procedures to analyze the basic hydrologic data for the Water Year to determine, at Riverside Narrows and at Prado, the amounts of Storm Flow and Base Flow, as well as other flows, including Nontributary Flow, that are not to be credited toward Base Flow. The Watermaster also analyzes the basic water quality data to determine the TDS of Base Flow at Riverside and the TDS of the combined Base Flow and Storm Flow at Prado, in both cases excluding the impacts on TDS of other flows. The Watermaster then calculates for each of the two locations the Adjusted Base Flow, the Cumulative Credits or Debits to Upper Area parties, and the Minimum Required Base Flow for the following Water Year.

During the year there were three sources of flow in the River at Prado, in addition to Storm Flow, that the Watermaster has not included in Base Flow: imported water purchased by OCWD, product water from the Arlington Desalter, and water produced for SBVMWD's High Groundwater Mitigation Project (HGMP).

A total of 5,994 acre-feet of Nontributary Flow attributable to imported State Water Project water, purchased by OCWD and released at the OC-59 turnout from MWDSC's Foothill Feeder into San Antonio Creek, was calculated to have reached Prado with an estimated average TDS concentration of 308 mg/L.

At its Arlington Desalter in Riverside, the Santa Ana Watershed Project Authority (SAWPA) produced and delivered to a channel tributary to the Santa Ana River between Riverside Narrows and Prado 4,692 acre-feet of water having an average TDS concentration of 423 mg/L.

During the year, 2,788 acre-feet of HGMP water was produced and delivered to the River just upstream of Riverside Narrows. After adjusting for losses the Watermaster determined that 2,760 acre-feet with a flow-weighted TDS of 497 mg/L reached Riverside Narrows and 2,705 acre-feet with a flow-weighted TDS of 507 mg/L reached Prado Dam. The balance of HGMP water remaining in storage in the Colton and Riverside Basins is 2,924 acre-feet. The HGMP is more fully explained in Chapter 2.

The Watermaster's determinations for the 2000-01 Water Year are explained in detail for Prado in Chapter II and for Riverside Narrows in Chapter III. A summary of annual determinations by the Watermaster for the period 1970-71 through 2000-01 is presented in Table 3. Note that the Base Flow obligations set forth in the Judgment at both Prado and Riverside Narrows have been met and cumulative credits have accrued to the Upper Area.

Upper Area Wastewater Discharges and Salt Exports

Although not used directly in the Watermaster's analyses and determinations, data on municipal wastewater discharged in the Upper Area are compiled annually because it is a major contributor to Base Flow in the River. The historical data on wastewater discharged are summarized in Table 4.

Similarly, while data on the amounts of high salinity water exported from the Upper Area to the ocean through SAWPA's Santa Ana Regional Interceptor (SARI) and IEUA's Non-Reclaimable Wastewater System (NRWS) are not used directly by the Watermaster, salt export helps to protect River water quality. Historical data on amounts of high salinity water exported are summarized in Table 5. The SARI first went into service in 1985-86. The NRWS was in service prior to 1970, but records of flow data prior to 1981-82 are missing. Plate 2 is a map showing the locations of wastewater treatment plants and the SARI and NRWS pipelines.

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	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	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	111,151[11]	514	128,379	1,064,040
1991-92	16.54	193,225	106,948[11]	499	124,869	1,146,909
1992-93	30.92	568,677	128,068[11]	368	163,499	1,268,408
1993-94	11.62	158,241	111,186[11]	611	119,432	1,345,840
1994-95	25.14	424,017[4]	123,468[11]	415	152,792[5]	1,458,394[6]
1995-96	11.92	194,797	131,861[11]	514	152,299	1,568,693
1996-97	18.64	204,610	136,676[11]	514	157,861	1,684,554
1997-98	33.41	462,633[4]	155,711[11]	392	195,677	1,838,231
1998-99	8.02	182,310	158,637	581	174,369	1,970,600
1999-00	11.09	187,905	148,269	527	169,644	2,098,244
2000-01	16.13	207,902	153,914	525	176,360	2,232,604

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	69,772[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	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	31,278[11]	677	31,278	508,075
1994-95	25.14	243,411	45,562[11]	646	45,562	538,387
1995-96	11.92	81,786	54,548[11]	625	54,548	577,685
1996-97	18.64	104,518	62,618[11]	624	62,618	625,053
1997-98	33.41	214,375	65,013[11]	601	65,013	674,816
1998-99	8.02	76,294	73,094	603	73,094	732,660
1999-00	11.09	75,572	63,499	602	63,499	780,909
2000-01	16.13	78,091	61,872	603	61,872	827,531

TABLE 3 (Continued)

(1) Measured at San Bernardino County Hospital, except was estimated for San Bernardino in 2000-01.
(2) Excludes Nontributary Flow and Exchange Waters.
(3) For Base and Storm Flow at Prado and Base Flow only at Riverside Narrows.
(4) Includes San Jacinto Watershed discharges which passed Prado Dam totaling 16,090 acre-feet in 1980-81; 7,720 acre-feet in 1982-83; 12,550 acre-feet in 1983-84; 4,697 acre-feet in 1994-95; and 1,690 acre-feet in 1997-98.
(5) Excludes water discharged from the San Jacinto Watershed.
(6) Includes a credit for a portion of San Jacinto Watershed discharges totaling 8,045 acre-feet in 1980-81; 3,362 acre-feet in 1982-83; 4,602 acre-feet in 1983-84; and 1,762 acre-feet in 1994-95.
(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 the 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 Project 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).

TABLE 4

MUNICIPAL WASTEWATER EFFLUENT DISCHARGED ABOVE PRADO
(acre-feet)

Water Year	Wastewater discharges upstream from Colton that generally do not flow continuously to Santa Ana River above E Street				Wastewater discharges to Santa Ana River and its tributaries that have hydraulic continuity to the Santa Ana River above Riverside Narrows					Wastewater discharges to Santa Ana River between Riverside Narrows and Prado Dam							Total Discharge to Surface Flow of the Santa Ana River (B + C)	Total Wastewater Discharged in Watershed (A + B + C)
												Inland Empire Utilities Agency						
	Redlands	Beaumont	Yucaipa	Subtotal (A)	San Bernardino	Colton	Rialto	RIX[1]	Subtotal (B)	Riverside	Corona	RP #1&4[2]	RP #2	CCWRF[3]	WRCR[4]	Subtotal (C)		
1970-71	2,650	no record	--	2,650	17,860	2,520	2,270	--	22,650	18,620	3,190	--	--	--	--	21,810	44,460	47,110
1971-72	2,830	no record	--	2,830	16,020	2,230	2,400	--	20,650	19,010	3,230	6,740	--	--	--	28,980	49,630	52,460
1972-73	2,810	450	--	3,260	18,670	2,530	2,260	--	23,460	19,060	3,340	10,380	--	--	--	32,780	56,240	59,500
1973-74	2,770	600	--	3,370	17,680	2,530	2,320	--	22,530	19,560	3,510	11,440	2,320	--	--	36,830	59,360	62,730
1974-75	2,540	570	--	3,110	16,750	1,980	2,320	--	21,050	19,340	4,020	14,960	2,280	--	--	40,600	61,650	64,760
1975-76	2,450	620	--	3,070	17,250	2,540	2,240	--	22,030	19,580	4,700	15,450	2,950	--	--	42,680	64,710	67,780
1976-77	3,170	580	--	3,750	17,650	3,260	2,330	--	23,240	18,770	5,010	14,640	3,380	--	--	41,800	65,040	68,790
1977-78	3,280	620	--	3,900	18,590	3,810	2,380	--	24,780	20,310	5,200	14,650	4,060	--	--	44,220	69,000	72,900
1978-79	3,740	670	--	4,410	19,040	3,850	3,050	--	25,940	21,070	5,390	15,040	5,070	--	--	46,570	72,510	76,920
1979-80	4,190	690	--	4,880	20,360	4,190	2,990	--	27,540	22,910	5,360	14,410	5,520	--	--	48,200	75,740	80,620
1980-81	4,410	690	--	5,100	20,550	3,930	3,370	--	27,850	24,180	5,590	17,270	5,260	--	--	52,300	80,150	85,250
1981-82	4,420	700	--	5,120	23,340	3,780	3,470	--	30,590	25,640	5,410	19,580	5,360	--	--	55,990	86,580	91,700
1982-83	4,530	710	--	5,240	24,160	3,600	3,620	--	31,380	25,020	5,860	20,790	4,290	--	--	55,960	87,340	92,580
1983-84	5,150	800	--	5,950	22,080	3,700	3,830	--	29,610	26,090	6,200	20,950	3,950	--	--	57,190	86,800	92,750
1984-85	4,990	840	--	5,830	23,270	3,830	4,070	--	31,170	27,750	6,250	25,160	4,280	--	--	63,440	94,610	100,440
1985-86	5,200	820	--	6,020	24,720	4,010	4,720	--	33,450	28,820	5,900	28,240	2,660	--	--	65,620	99,070	105,090
1986-87	5,780	880	800	7,460	26,810	4,170	5,350	--	36,330	30,340	6,170	27,160	5,000	--	--	68,670	105,000	112,460
1987-88	6,060	940	1,850	8,850	27,880	5,240	6,040	--	39,160	34,660	6,050	31,290	5,500	--	--	77,500	116,660	125,510
1988-89	5,250	1,030	2,260	8,540	27,640	5,550	6,280	--	39,470	35,490	8,080	35,510	6,180	--	--	85,260	124,730	133,270
1989-90	6,360	1,100	2,370	9,830	28,350	5,810	6,260	--	40,420	33,210	9,140	34,760	5,730	--	--	82,840	123,260	133,090
1990-91	6,690	1,120	2,490	10,300	27,570	5,670	6,290	--	39,530	32,180	9,110	36,840	6,100	--	--	84,230	123,760	134,060
1991-92	6,230	1,150	2,580	9,960	25,060	5,660	6,360	--	37,080	32,660	9,010	40,360	5,780	1,550	--	89,360	126,440	136,400
1992-93	6,880	1,180	2,580	10,640	25,550	6,210	6,460	--	38,220	34,100	9,600	41,510	5,640	4,720	--	95,570	133,790	144,430
1993-94	6,440	1,150	2,710	10,300	23,800	5,830	6,540	--	36,170	32,640	7,790	37,310	5,430	7,010	--	90,180	126,350	136,650
1994-95	6,720	1,180	2,560	10,460	26,330	5,500	6,820	--	38,650	33,950	7,340	39,680	5,360	8,690	--	95,020	133,670	144,130
1995-96	6,550	1,260	2,640	10,450	13,240	2,770	6,890	20,760	43,660	33,960	7,850	39,590	4,810	9,060	--	95,270	138,930	149,380
1996-97	6,510	1,280	2,780	10,570	--	--	7,160	42,800	49,960	34,240	5,040	39,940	4,790	9,750	--	93,760	143,720	154,290
1997-98	7,022	1,356	3,116	11,494	--	--	7,063	49,683	56,746	35,422	8,718	44,940	4,969	9,264	1,461	104,774	161,520	173,014
1998-99	7,379	1,367	3,128	11,874	--	--	6,524	47,587	54,111	34,844	11,629	43,354	5,345	9,534	4,594	109,300	163,411	175,285
1999-00	7,670	1,373	3,284	12,327	--	--	7,392	45,012	52,404	35,399	13,152	42,967	4,378	9,954	2,371	108,221	160,625	172,952
2000-01	7,379	1,377	3,345	12,101	--	--	8,346	49,407	57,753	35,663	13,100	43,863	4,401	11,615	2,210	110,852	168,605	180,706

1. RIX = Rapid Infiltration and Extraction Facility for San Bernadino and Colton, including over-extraction of groundwater
2. Beginning in 1997-98, includes IEUA Plant #4 flows.
3. CCWRF = Carbon Canyon Water Reclamation Facility
4. WRCR = Western Riverside County Regional Wastewater Treatment Plant

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

TABLE 5

HIGH SALINITY WATER EXPORTED FROM THE SANTA ANA RIVER WATERSHED

Water Year	Inland Empire Utility Agency Non-Reclaimable Wastewater	Santa Ana Watershed Project Authority Santa Ana Regional Interceptor (SARI)[1]		
	North System acre-feet	SARI Flow[2] acre-feet	Average TDS mg/L	Total Flow acre-feet
1970-71	NA	---	---	---
1971-72	NA	---	---	---
1972-73	NA	---	---	---
1973-74	NA	---	---	---
1974-75	NA	---	---	---
1975-76	NA	---	---	---
1976-77	NA	---	---	---
1977-78	NA	---	---	---
1978-79	NA	---	---	---
1979-80	NA	---	---	---
1980-81	NA	---	---	---
1981-82	4,236	NA	---	---
1982-83	4,651	NA	---	---
1983-84	4,142	NA	---	---
1984-85	2,346	NA	---	---
1985-86	2,995	2,791 [3]	---	---
1986-87	4,943	2,869 [3]	---	---
1987-88	5,177	2,948 [3]	---	---
1988-89	5,949	3,622 [3]	---	---
1989-90	5,240	7,393	1649	12,633
1990-91	2,847	7,340	1906	10,187
1991-92	3,421	6,457	2346	9,878
1992-93	3,774	5,277	2516	9,051
1993-94	3,764	7,860	2302	11,624
1994-95	4,131	8,656	1903	12,787
1995-96	3,863	9,597	2175	13,460
1996-97	4,191	10,225	2292	14,417
1997-98	4,575	8,210	2456	12,785
1998-99	3,666	4,305	2611	7,971
1999-00	4,272	7,711	2154	11,983
2000-01	5,075	8,205	2504	13,280

1. Santa Ana Regional Interceptor began operation in 1985-86.
2. IEUA Non-Reclaimable Wastewater from the South System goes into the SARI and is included in SARI Flow.
3. SARI flow for 1985-86 through 1988-89 is partial flow.

NA = Data Not Available

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 discharge, Storm Flow, and Base Flow and 2) the Adjusted Base Flow at Prado credited to IEUA and WMWD.

Flow at Prado

During the 2000-01 Water Year, the flow of the Santa Ana River as measured at the USGS gaging station below Prado Dam amounted to 222,559 acre-feet. There were 633 acre-feet in storage behind the dam at the beginning and no water in storage at the end of the water year. Inflow to the reservoir included 153,914 acre-feet of Base Flow and 54,621 acre-feet of Storm Flow, based on an adjusted Prado Reservoir storage-elevation curve described in the following section. Nontributary flows consisted of State Water Project water, Arlington Desalter discharge, and SBVMWD High Groundwater Mitigation Project (HGMP) water. Of the nontributary flow due to State Water Project water released to San Antonio Creek at turnout OC-59, 5,994 acre-feet were calculated to have reached Prado Reservoir during 2000-01. Arlington Desalter flows totaled 4,692 acre-feet. HGMP water contributed 2,705 acre-feet. The monthly components of flow of the Santa Ana River at Prado Dam for 2000-01 are listed in Table 6 and are shown graphically on Plate 4. Historical Base and Storm Flows of the Santa Ana River below Prado during the period 1934-35 through 2000-01 are presented on Plate 5.

Prado Reservoir Storage-Elevation Curve Adjustment

The Watermaster calculates inflow to Prado Reservoir by adjusting outflow data using change in reservoir storage. Reservoir storage is based on a storage-elevation curve last updated by the U.S. Army Corps of Engineers (ACOE) in 1988. The ACOE reports that sedimentation averaged about 200 acre-feet per year between 1969 and 1979. Such sedimentation affects the accuracy of the storage-elevation curve when the storage in the reservoir is low. This inaccuracy results in anomalies in the calculated inflow near the end of each period of reservoir storage.

In 1997, the Watermaster adjusted the Prado Reservoir storage-elevation curve to improve the calculated Santa Ana River inflow hydrograph from which Base Flow and Storm Flow are determined. Assuming an average sedimentation rate of 200 acre-feet per year from 1988 through 1996, the portion of the ACOE storage-elevation curve below elevation 520 feet was adjusted to include a 1,600 acre-foot reservoir storage loss. Elevation 520 feet represents the approximate maximum flood storage elevation attained behind Prado Dam in the last several years where most sedimentation would likely have occurred. The new storage-elevation curve was developed by distributing the 1,600 acre-foot storage loss until the curve produced inflow values without significant anomalies.

TABLE 6

COMPONENTS OF FLOW AT PRADO DAM

FOR WATER YEAR 2000-01
(acre-feet)

	USGS Measured Outflow	Storage Change (1)	Computed Inflow	Lake Elsinore Flows at Prado Dam (2)	HGMP Water (3)	San Antonio Creek (4)	Arlington Desalter	Storm Flow	Base Flow
2000									
October	17,284	(593)	16,691	0	730	2,106	489	1,215	12,152
November	18,633	(39)	18,594	0	826	3,888	517	182	13,181
December	15,431	(1)	15,430	0	1,149	0	537	190	13,554
2001									
January	23,113	5,147	28,260	0	0	0	183	14,117	13,960
February	41,195	2,999	44,194	0	0	0	117	30,541	13,536
March	27,070	(6,254)	20,816	0	0	0	88	4,524	16,204
April	18,952	(904)	18,048	0	0	0	553	3,641	13,854
May	14,515	(988)	13,527	0	0	0	585	0	12,942
June	11,913	0	11,913	0	0	0	527	0	11,386
July	11,568	0	11,568	0	0	0	343	211	11,014
August	11,072	0	11,072	0	0	0	306	0	10,766
September	11,813	0	11,813	0	0	0	447	0	11,366
Total	222,559	(633)	221,926	0	2,705	5,994	4,692	54,621	153,915

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

(2) Because Lake Elsinore discharge was not envisioned during the formulation of the Final Judgment, it is removed from Santa Ana River flows at Prado Dam for the purpose of calculating Base and Storm flow.

(3) HGMP water pumped from the Bunker Hill groundwater basin and discharged into the Santa Ana River, less 1% for evapotranspiration above Riverside Narrows and 2% evapotranspiration between Riverside Narrows and Prado Dam.

(4) State Water Project water released into San Antonio Creek from turnout OC-59 during 2000-01 and calculated to have reached Prado Dam in the 2000-01 Water Year.

Nontributary Flow

Nontributary Flow includes water that originated outside the watershed, as well as other water that the Watermaster has determined should be excluded from Base Flow. During the 2000-01 Water Year it included State Water Project water imported by OCWD and released to San Antonio Creek, water discharged to the river from the Arlington Desalter, and SBVMWD HGMP water. In the past it has included, and in the future may include, other water discharged to the river pursuant to the water exchanges or other such programs, as well as discharges of water from the San Jacinto River watershed to the Santa Ana River watershed.

Releases to San Antonio Creek

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 the City of Upland.

During the 2000-01 Water Year, 6,036 acre-feet of State Water Project water was released into San Antonio Creek from the Foothill Feeder at turnout OC-59 near Upland. Total monthly deliveries and daily flow rates were provided by the MWDSC. Water loss between OC-59 and Prado Dam was calculated per the procedures set forth in the Twelfth Annual Report (1981-82), Appendix C. It was determined that of the OC-59 water released, a total of 5,994 acre-feet reached Prado Dam and 42 acre-feet (0.7%) was lost to evapotranspiration. A monthly summary of Nontributary Flow released from OC-59 into San Antonio Creek is contained in Appendix E.

Arlington Desalter

Groundwater flowing from the Arlington Basin has historically been a component of the Santa Ana River flow. This groundwater has 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 that is designed to reduce the poor quality underflow from the basin. This project is known as the Arlington Desalter and consists of five extraction wells and a treatment facility that reduces salinity. The capacity of the facility is approximately 6 million gallons per day (mgd). The facility began operations in July 1990, with OCWD buying the product water delivered through the Santa Ana River. The Watermaster determined that the flow and TDS of the water from this facility would be excluded from the computation of Base Flow and Adjusted Base at Prado. During the 2000-01 Water Year, 4,692 acre-feet of water discharged from the Arlington Desalter were determined to have reached Prado Dam. OCWD Operations provided daily discharge rates and electrical conductance of water discharged. A summary of Arlington Desalter discharges is contained in Appendix F.

High Groundwater Mitigation Project

In Water Years 1998-99 and 1999-00, a total of 5,712 acre-feet of HGMP water, pumped from the Bunker Hill Basin and purchased by OCWD, was determined to have percolated to storage in Colton and Riverside Basins. During the 2000-01 Water Year SBVMWD contracted with the Rapid Infiltration and Extraction (RIX) facility to discharge in excess of their requirements to compensate for a portion of the water that percolated in previous years. The RIX facility is described in the Twenty-sixth (1995-96) Annual Report. During Water Year 2000-01 RIX produced 2,788 acre-feet of HGMP water for delivery to the River just upstream of Riverside Narrows. Assuming 1% and 2% evapotranspiration losses above Riverside Narrows and between Riverside Narrows and Prado, respectively, the Watermaster determined that 2,760 acre-feet reached Riverside Narrows and 2,705 acre-feet reached Prado Dam. A summary of the HGMP discharges is contained in Appendix D. The balance of HGMP water remaining in storage in the Colton and Riverside Basins is 2,924 acre-feet. The Watermaster determined that the flow and TDS of HGMP waster reaching Riverside Narrows and Prado would be excluded from the computation of Base Flow and Adjusted Base Flow.

San Jacinto Watershed Discharge

No stream flow or other discharges from the San Jacinto Watershed reached Prado Dam during the 2000-01 Water Year. The Watermaster previously determined that to the extent such discharges occur and are captured by OCWD, fifty percent of such captured water will be credited as Base Flow at Prado.

Storm Flow

Portions of storm flows are retained behind Prado Dam for flow regulation and for water conservation purposes. The ACOE owns the Dam, which has a spillway elevation of 543 feet above mean sea level, and operates it according to a flow release schedule with a buffer 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, 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. On April 12, 1995, the ACOE, the U.S. Fish and Wildlife Service, and OCWD reached an agreement to accelerate immediately the raising of the seasonal water conservation pool to elevation 505 feet, in exchange for a $1 million contribution by OCWD to the U.S. Fish and Wildlife Service to be used to develop least Bell's vireo habitat by the removal of a non-native plant, *Arundo donax*. Storm flows captured within the reservoir for conservation are released following the storm to downstream groundwater recharge facilities. Monthly and annual quantities of Storm Flow are shown in Table 6.

During the 2000-01 Water Year, the maximum volume of water stored in Prado Reservoir reached 8,894 acre-feet on March 1, 2001. The maximum daily mean flow released from Prado Dam to the Santa Ana River was 4,780 cfs on February 13, 2001.

Base Flow

The Base Flow is affected by Nontributary Flow releases to San Antonio Creek, discharges from the Arlington Desalter, discharges of the HGMP water, and discharges from the San Jacinto Watershed. Nontributary Flow releases to San Antonio Creek, Arlington Desalter discharges, and HGMP water affected the Base Flow during the 2000-01 Water Year. The general procedure used by the Watermaster to separate the 2000-01 flow components was the same as used for previous years and is fully described in the Fifth (1974-75) and the Twelfth (1981-82) Annual Reports. The monthly and annual quantities of Base Flow are shown in Table 6.

Water Quality Adjustments

The flow-weighted average TDS for the total flow passing Prado Dam, including Nontributary Flow released to San Antonio Creek, Arlington Desalter discharge, and HGMP water, was found to be 517 milligrams per liter (mg/L). This determination was based on records from a continuous monitoring device operated by the USGS for EC of the Santa Ana River flow below Prado Dam. This record was supplemented by twenty-four (24) grab samples for EC collected by the USGS and analyzed for TDS.

A correlation between TDS and EC yields the following best fit equation:

$$TDS = EC \times 0.625894$$

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

Using the daily EC data, flow-weighted average daily values for TDS were calculated using the above equation. The plot of TDS on Plate 6 shows the daily average TDS concentration of the Santa Ana River flow passing Prado Dam. A summary of daily TDS and EC of the Santa Ana River below Prado Dam is contained in Appendix H.

At Prado Dam, the flow-weighted average annual TDS value of 517 mg/L represents the quality of the total flow including releases to San Antonio Creek, discharge from the Arlington Desalter, and delivered HGMP water. 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.

Adjustment for Flow to San Antonio Creek

During the 2000-01 Water Year, 5,994 acre-feet of water released from OC-59 to San Antonio Creek were calculated to have reached Prado Dam. A flow-weighted average TDS of 308 mg/L was calculated for State Water Project water reaching Prado Dam. A summary of these calculations is contained in Appendix E.

Adjustment for Arlington Desalter Discharge

The amount of product water discharged to the Santa Ana River during the 2000-01 Water Year totaled 4,692 acre-feet. A conversion factor of 0.625965 was determined by regression analysis based on eight (8) grab samples collected by the OCWD and analyzed for EC and TDS. Using daily EC and daily flow values, a flow-weighted average TDS of 423 mg/L was calculated. A summary of these calculations is contained in Appendix F.

Adjustment for High Groundwater Mitigation Project Discharge

During the 2000-01 Water Year SBVMWD contracted with the RIX plant to discharge in excess of its requirements to compensate for a portion of the water that percolated in previous years. A total of 2,705 acre-feet of RIX discharge (in excess of its requirements) were determined to have reached Prado Dam this year. A flow-weighted average TDS of 507 mg/L was calculated for that water. A summary of the HGMP discharges is contained in Appendix D.

Adjustment for San Jacinto Watershed Discharge

No water discharged from the San Jacinto Watershed reached Prado Dam during the 2000-01 Water Year.

Flow Component	Annual Flow (acre-feet)	Average TDS (mg/L)	Annual Flow x Average TDS (acre-feet x mg/L)
1. Measured Outflow	222,559	517	115,063,003
2. Less Arlington Desalter	(4,692)	423	(1,984,716)
3. Less Nontributary Flow San Antonio Creek	(5,994)	308	(1,846,152)
4. Less High Groundwater Mitigation Project	(2,705)	507	(1,371,197)
5. Measured Outflow less lines 2, 3, and 4	209,168		109,860,938
Average TDS in total Base and Storm Flow	109,860,938 ÷ 209,168 = 525 mg/L		

After adjusting for Nontributary Flow of OC-59 water to San Antonio Creek, Arlington Desalter discharges, and HGMP water, the weighted average annual TDS of Storm Flow and Base Flow for 2000-01 is 525 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 subject 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 525 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:

$$(153{,}914 \text{ acre-feet}) + \frac{35}{42{,}000} (153{,}914 \text{ acre-feet}) (700 - 525) = 176{,}360 \text{ acre-feet}$$

Entitlement and Credit or Debit

Paragraph 5(c) of the Stipulated Judgment states that "CBMWD [now IEUA] and WMWD shall be responsible for an average annual Adjusted Base Flow of 42,000 acre-feet at Prado. CBMWD [IEUA] 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 no 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 2000-01 required under the Stipulated Judgment are as follows:

1.	Measured Outflow at Prado	222,559 acre-feet
2.	Base Flow at Prado	153,914 acre-feet
3.	Annual Weighted TDS of Base and Storm Flow	525 mg/L
4.	Annual Adjusted Base Flow	176,360 acre-feet
5.	Cumulative Adjusted Base Flow	3,534,604 acre-feet
6.	Cumulative Entitlement of OCWD	1,302,000 acre-feet
7.	Cumulative Credit	2,232,604 acre-feet
8.	One-Third of Cumulative Debit	0 acre-feet
9.	Minimum Required Base Flow in 2001-02	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 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 78,091 acre-feet, measured at the USGS gaging station near the MWD Crossing. Separated into its components, Base Flow was 61,872 acre-feet and Storm Flow was 15,725 acre-feet. Excluded from the Base Flow are 2,705 acre-feet of HGMP water. Included in Base Flow are 2,266 acre-feet of wastewater from Rubidoux Community Services District that 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 2000-01 Water Year are listed in Table 7 and shown graphically on Plate 7. The components of flow of the Santa Ana River at Riverside Narrows during the period 1934-35 through 2000-01 are presented on Plate 8.

High Groundwater Mitigation Project

As mentioned in Chapter 2, the RIX Facility delivered a total of 2,760 acre-feet of HGMP water during the 2000-01 Water Year. This water was a portion of the 5,712 acre-feet determined to have percolated to storage in Colton and Riverside Basins during previous Water Years 1998-99 and 1999-00. A summary of the HGMP discharges is contained in Appendix D. The Watermaster determined that High Groundwater Mitigation Project water would be excluded from the computation of Santa Ana River Base Flow and Base Flow quality.

Base Flow

Based on the hydrograph shown on Plate 7 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.

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 2000-01, in the amount of 2,266 acre-feet, has been added to the Base Flow as measured at the gaging station.

TABLE 7

COMPONENTS OF FLOW AT RIVERSIDE NARROWS

FOR WATER YEAR 2000-01
(acre-feet)

	Month	USGS Measured Flow	Storm Flow	HGMP Water [1]	Rubidoux Waste-water	Base Flow [2]
2000	October	5,849	153	744	195	5,146
	November	5,935	4	843	187	5,275
	December	6,188	0	1,173	191	5,207
2001	January	10,776	5,205	0	189	5,760
	February	12,103	7,024	0	174	5,253
	March	7,737	1,931	0	193	5,999
	April	6,837	1,358	0	183	5,662
	May	4,701	0	0	189	4,890
	June	4,542	0	0	187	4,729
	July	4,473	50	0	194	4,617
	August	4,485	0	0	194	4,679
	September	4,465	0	0	190	4,655
Total		78,091	15,725	2,760	2,266	61,871

(1) HGMP water pumped from the Bunker Hill groundwater basin and discharged into the Santa Ana River less 1% for evapotranspiration above Riverside Narrows.

(2) Base Flow equals USGS measured flow, minus storm flow, minus HGMP water, plus Rubidoux Wastewater.

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 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 633 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 603 mg/L.

Flow Component	Annual Flow (acre-feet)	Average TDS (mg/L)	Annual Flow x Average TDS (acre-feet x mg/L)
1. Base Flow plus Nontributary Flow	62,366	597	37,232,502
2. Less High Groundwater Mitigation Project Water	(2,760)	497	(1,371,583)
3. Plus Rubidoux Wastewater	2,266	633	1,434,378
4. Base Flow (line 1 less line 2 plus line 3)	61,872		37,295,297
Average TDS of Base Flow	37,295,297 ÷ 61,872 = 603 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 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 Flow 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 Water Year 2000-01 was 603 mg/L. Therefore, no adjustment is necessary, and the Adjusted Base Flow for 2000-01 is 61,872 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 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 concerning flow at Riverside Narrows for 2000-01 required under the Stipulated Judgment are as follows:

1.	Base Flow at Riverside Narrows	61,872 acre-feet
2.	Annual Weighted TDS of Base Flow	603 mg/L
3.	Annual Adjusted Base Flow	61,872 acre-feet
4.	Cumulative Adjusted Base Flow	1,300,281 acre-feet
5.	Cumulative Entitlement of CBMWD and WMWD	472,750 acre-feet
6.	Cumulative Credit	827,531 acre-feet
7.	One-Third of Cumulative Debit	0 acre-feet
8.	Minimum Required Base Flow in 2001-02	12,420 acre-feet

CHAPTER IV

HISTORY AND SUMMARY OF THE JUDGMENT

History of Litigation

The complaint in the case was filed by Orange County Water District on October 18, 1963, seeking an adjudication of water rights against substantially all water users in the area tributary to Prado Dam within the Santa Ana River Watershed, but excluding the area tributary to Lake Elsinore. Thirteen cross-complaints were filed in 1968, extending the adjudication to include substantially all water users in the area downstream from Prado Dam. With some 4,000 parties involved in the case (2,500 from the Upper Area and 1,500 from the Lower Area), it became obvious that every effort should be made to arrive at a settlement and physical solution in order to avoid enormous and unwieldy litigation.

Efforts to arrive at a settlement and physical solution were pursued by public officials, individuals, attorneys, and engineers. Attorneys for the parties organized in order to facilitate settlement discussions and, among other things, provided guidance for the formation and activities of an engineering committee to provide information on the physical facts.

An initial meeting of the engineers representing the parties was held on January 10, 1964. Agreement was reached that it would be beneficial to undertake jointly the compilation of basic data. Liaison was established with the Department of Water Resources, State of California, to expedite the acquisition of data. Engineers representing the parties were divided into subcommittees which were given the responsibility of investigating such things as the boundary of the Santa Ana River Watershed and its subareas, standardization of the terminology, the location and description of wells and diversion facilities, waste disposal and transfer of water between subareas.

In response to a request from the attorneys' committee at a meeting held April 17, 1964, on April 30, 1964, the joint engineering committee prepared a list of preliminary engineering studies directed toward settlement of the Santa Ana River water rights litigation. Special assignments were made to individual engineers on selected items requested by the attorneys' committee.

The attorneys and engineers for the defendants then commenced a series of meetings separate from the representatives of the plaintiffs in order to consolidate their positions and to determine a course of action. On October 7, 1964, engineers for the defendants presented the results of the studies made by the joint engineering committee. The defendants' attorneys requested that additional information be provided on the methods of measuring flow at Prado Dam, the historical supply and disposal of water passing Prado Dam, segregation of flow into components, and determination of the amount of

supply which was usable by the downstream area. On December 11, 1964, the supplemental information was presented to the defendants' attorneys.

During 1965, engineers and attorneys for the defendants held numerous conferences and conducted additional studies in an attempt to determine their respective positions in the case. Early in 1966, the plaintiff and defendants exchanged drafts of possible principles for settlement. Commencing March 22 and ending April 13, 1966, four meetings were held by the engineers to discuss the draft of principles for settlement.

On February 25, 1968, the defendants submitted a request to the Court that the Order of Reference be issued requesting the California Department of Water Resources to determine the physical facts. On May 9, 1968, the plaintiffs' attorney submitted motions opposing the Order of Reference and requested that a preliminary injunction be issued. In the meantime, every effort was being made to come to an agreement on the Stipulated Judgment. Commencing on February 28, 1968 and extending until May 14, 1968, six meetings were held to determine the scope of physical facts on which agreement could be reached so that if an Order of Reference were to be approved by the Court, the work under the proposed reference would not repeat the extensive basic data collection and compilation which had already been completed and on which engineers for both plaintiffs and defendants had reached substantial agreement. Such basic data were compiled and published in two volumes under date of May 14, 1968 entitled "Appendix A, Basic Data."

On May 21, 1968, an outline of a proposal for settlement of the case was prepared and a committee of attorneys and engineers for the parties commenced preparation of the settlement documents. On June 16, 1968, the Court held a hearing on the motions it had received requesting a preliminary injunction and an Order of Reference. The parties requested that the Court delay the preliminary hearings on these motions in view of the efforts toward settlement that were underway. The plaintiff, however, was concerned regarding the necessity of bringing the case to trial within the statutory limitation and, accordingly, on July 15, 1968, submitted a motion to set the complaint in the case for trial. On October 15, 1968, the trial was commenced and was adjourned after one-half day of testimony on behalf of the plaintiff. Thereafter, the parties filed with the Court the necessary Settlement Documents including a Stipulation for Judgment. The Court entered the Judgment on April 17, 1969, along with Stipulations and Orders dismissing all defendants and cross-defendants except for the four major public water districts overlying, in aggregate, substantially all of the major areas of water use in the watershed. The districts, the locations of which are shown on Plate 1, "Santa Ana River Watershed", are as follows:

(1) Orange County Water District (OCWD), representing all lower basin entities located within Orange County downstream of Prado Dam.

(2) Western Municipal Water District (WMWD), representing middle basin entities located within Riverside County on both sides of the Santa Ana River primarily upstream from Prado Dam.

(3) Inland Empire Utilities Agency (IEUA), formerly Chino Basin Municipal Water District (CBMWD), located in the San Bernardino County Chino Basin area, representing middle basin entities within its boundaries and located primarily upstream from Prado Dam.

(4) San Bernardino Valley Municipal Water District (SBVMWD), representing all entities within its boundaries, and embraced within the upper portion of the Riverside Basin area, the Colton Basin area (being an upstream portion of the middle basin) and the San Bernardino Basin area, being essentially the upper basin.

Summary of Judgment

Declaration of Rights. The Judgment sets forth a declaration of rights. Briefly stated, the Judgment provides that the water users in the Lower Area have rights, as against the water users in the Upper Area, to receive certain average and minimum annual amounts of non-storm flow ("base flow") at Prado Dam, together with the right to all storm flow reaching Prado Dam. The amount of the Lower Area entitlement is variable based on the quality of the water received by the Lower Area. Water users in the Upper Area have the right as against the water users in the Lower Area to divert, pump, extract, conserve, store and use all surface and groundwater supplies originating within the Upper Area, so long as the Lower Area receives the water to which it is entitled under the Judgment and there is compliance with all of its provisions.

Physical Solution. The Judgment also sets forth a comprehensive "physical solution" for satisfying the rights of the Lower Area. To understand the physical solution it is necessary to understand the following terms that are used in the Judgment:

Storm Flow – That portion of the total flow which originates from precipitation and runoff and which passes a point of measurement (either Riverside Narrows or Prado Dam) without having first percolated to groundwater storage in the zone of saturation, calculated in accordance with procedures referred to in the Judgment.

Base Flow - That portion of the total surface flow passing a point of measurement (either Riverside Narrows or Prado Dam) which remains after deduction of storm flow, nontributary flows, exchange water purchased by OCWD, and certain other flows as determined by the Watermaster.

Adjusted Base Flow - Actual base flow in each year adjusted for water quality pursuant to formulas specified in the Judgment. The adjustment of Base Flow for water quality is intended to provide an incentive to the Upper Area to maintain a better quality of water in the river. When the total dissolved solids (TDS) is lower than a specified value at one of the measuring points, the water quantity obligation is lower. When the TDS is higher than a specified value, the water quantity

obligation is higher. This is the first comprehensive adjudication in Southern California in which the quality of water is taken into consideration in the quantification of water rights.

Credits and Debits - Under the accounting procedures provided for in the Judgment, credits accrue to SBVMWD in any year when the Adjusted Base Flow exceeds 15,250 acre-feet at Riverside Narrows and jointly to IEUA and WMWD when the Adjusted Base Flow exceeds 42,000 acre-feet at Prado Dam. Debits accrue in any year when the Adjusted Base Flows falls below those levels. Credits or debits accumulate year to year.

Obligation at Riverside Narrows. SBVMWD has an obligation to assure an average annual Adjusted Base Flow of 15,250 acre-feet at Riverside Narrows, subject to the following:

(1) A minimum Base Flow of 13,420 acre-feet plus one-third of any cumulative debit.

(2) After October 1, 1986, if no cumulative debit exists, the minimum Base Flow shall be 12,420 acre-feet.

(3) Prior to 1986, if the cumulative credits exceed 10,000 acre-feet, the minimum Base Flow shall be 12,420 acre-feet.

(4) All cumulative debits shall be removed by the discharge of a sufficient Base Flow at Riverside Narrows at least once in any ten consecutive years following October 1, 1976. Any cumulative credits shall remain on the books of account until used to offset any subsequent debits or until otherwise disposed of by SBVMWD.

(5) The Base Flow at Riverside Narrows shall be adjusted using weighted average annual TDS in such Base Flow in accordance with the formula set forth in the Judgment.

Obligation at Prado Dam. IEUA and WMWD have a joint obligation to assure an average annual Adjusted Base Flow of 42,000 acre-feet at Prado Dam, subject to the following:

(1) Minimum Base Flow at Prado shall not be less than 37,000 acre-feet plus one-third of any cumulative debit.

(2) After October 1, 1986, if no cumulative debit exists, the minimum Base Flow quantity shall be 34,000 acre-feet.

(3) Prior to 1986, if the cumulative credit exceeds 30,000 acre-feet, the minimum Base Flow shall be 34,000 acre-feet.

(4) Sufficient quantities of Base Flow shall be provided at Prado to discharge completely any cumulative debits at least once in any ten consecutive years following October 1, 1976. Any cumulative credits shall remain on the books of account until used to offset any debits, or until otherwise disposed of by IEUA and WMWD.

(5) The Base Flow at Prado during any year shall be adjusted using the weighted average annual TDS in the total flow at Prado (Base Flow plus Storm Flow) in accordance with the formula set forth in the Judgment.

Other Provisions. SBVMWD, IEUA and WMWD are enjoined from exporting water from the Lower Area to the Upper Area. OCWD is enjoined from exporting or "causing water to flow" from the Upper Area to the Lower Area. Any inter-basin acquisition of water rights will have no effect on Lower Area entitlements. OCWD is prohibited from enforcing two prior judgments so long as the Upper Area Districts are in compliance with the physical solution. The composition of the Watermaster and the nomination and appointment process for members are described along with a definition of the Watermaster's duties and a formula for sharing its costs. The court retains continuing jurisdiction over the case. There are provisions for appointment of successor parties and rules for dealing with future actions that might conflict with the physical solution.

History of the Watermaster Committee Membership

The Santa Ana River Watermaster is a committee composed of five members nominated by the parties and appointed by the court. SBVMWD, IEUA (formerly CBMWD), and WMWD nominate one member each and OCWD nominates two. The Watermaster members annually elect two officers: chairman and secretary.

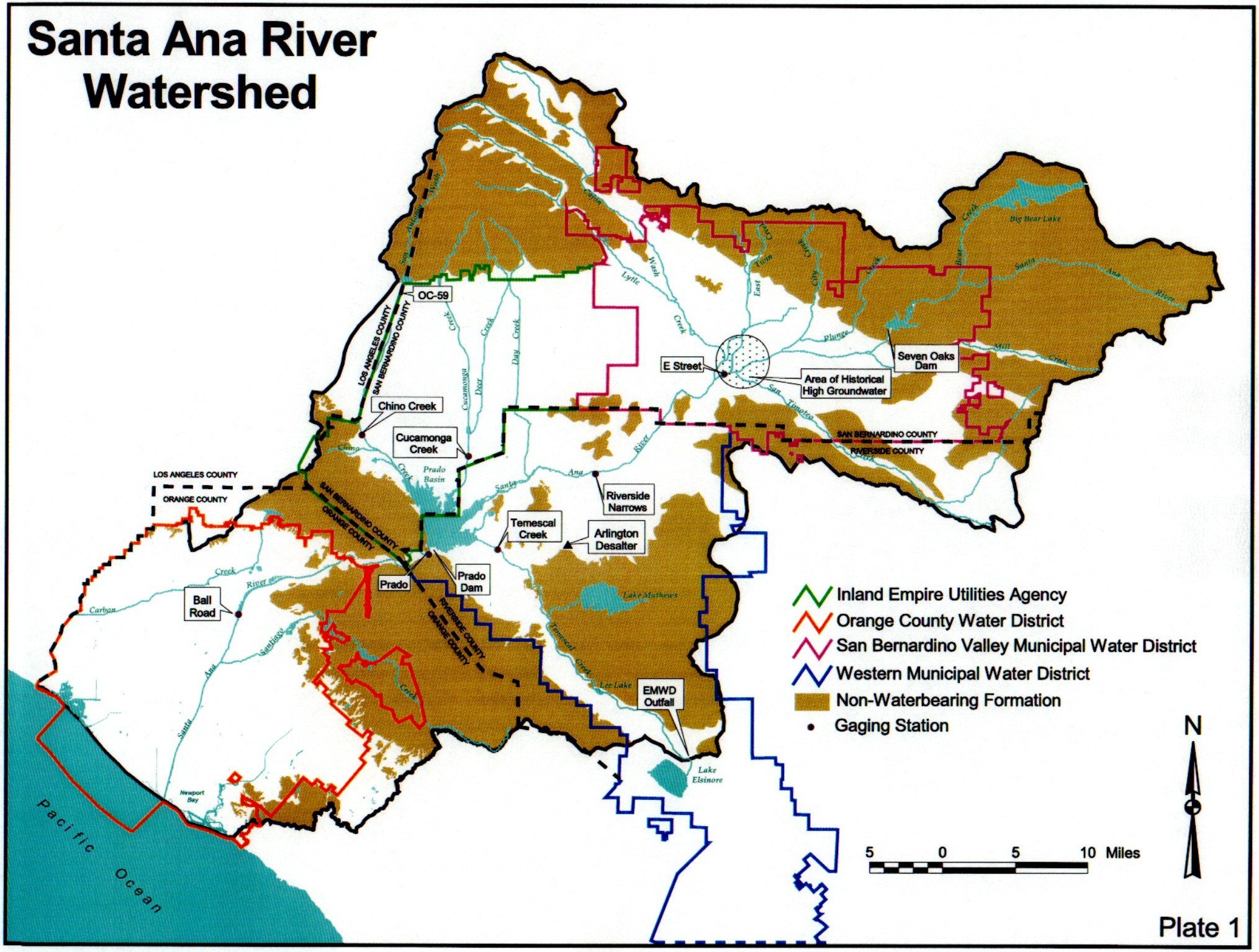
The original five members were appointed at the time of entry of the judgment. They prepared a *pro forma* annual report for the 1969-70 Water Year. The first annual report required by the judgment was prepared for the 1970-71 Water Year and reports have been prepared annually since then.

The membership of the Watermaster has changed over the years. The historical listing of members and officers shown in Table 8 reflects the signatories to each annual report prior to this year.

TABLE 8

HISTORY OF THE WATERMASTER COMMITTEE MEMBERSHIP

Water Year	SBVMWD	IEUA	WMWD	OCWD	OCWD
1969-70	Clinton O. Henning	William J. Carroll	Albert A. Webb, Secretary	Max Bookman, Chairman	John M. Toups
1970-71 through 1973-74	James C. Hanson	William J. Carroll	Albert A. Webb, Secretary	Max Bookman, Chairman	John M. Toups
1974-75 through 1977-78	James C. Hanson	William J. Carroll	Donald L. Harriger	Max Bookman, Chairman	John M. Toups, Secretary
1978-79 through 1981-82	James C. Hanson	William J. Carroll	Donald L. Harriger	Max Bookman, Chairman	William R. Mills, Jr., Secretary
1982-83 through 1983-84	James C. Hanson	William J. Carroll	Donald L. Harriger	Harvey O. Banks, Chairman	William R. Mills, Jr., Secretary
1984-85 through 1988-89	Robert L. Reiter	William J. Carroll	Donald L. Harriger	Harvey O. Banks, Chairman	William R. Mills, Jr., Secretary
1989-90 through 1994-95	Robert L. Reiter, Secretary/Treasurer	William J. Carroll	Donald L. Harriger	Harvey O. Banks, Chairman	William R. Mills, Jr.
1995-96	Robert L. Reiter, Secretary/Treasurer	William J. Carroll, Chairman	Donald L. Harriger	Bill B. Dendy	William R. Mills, Jr.
1996-97	Robert L. Reiter, Secretary/Treasurer	William J. Carroll	Donald L. Harriger	Bill B. Dendy	William R. Mills, Jr., Chairman
1997-98	Robert L. Reiter, Secretary/Treasurer	Robb D. Quincey	Donald L. Harriger	Bill B. Dendy	William R. Mills, Jr., Chairman
1998-99 through 2000-01	Robert L. Reiter, Secretary/Treasurer	Richard W. Atwater	Donald L. Harriger	Bill B. Dendy	William R. Mills, Jr., Chairman


Santa Ana River Watershed
OC-59
LOS ANGELES COUNTY
SAN BERNARDINO COUNTY
Chino Creek
Cucamonga Creek
E Street
Seven Oaks Dam
Area of Historical High Groundwater
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
ORANGE COUNTY
Riverside Narrows
Temescal Creek
Arlington Desalter
Prado
Prado Dam
Ball Road
RIVERSIDE COUNTY
ORANGE COUNTY
Lake Mathews
EMWD Outfall
Lake Elsinore
Pacific Ocean
Inland Empire Utilities Agency
Orange County Water District
San Bernardino Valley Municipal Water District
Western Municipal Water District
Non-Waterbearing Formation
Gaging Station
N
5 0 5 10 Miles
Plate 1

Santa Ana River Watershed Wastewater Treatment Plants and Salt Export Pipelines

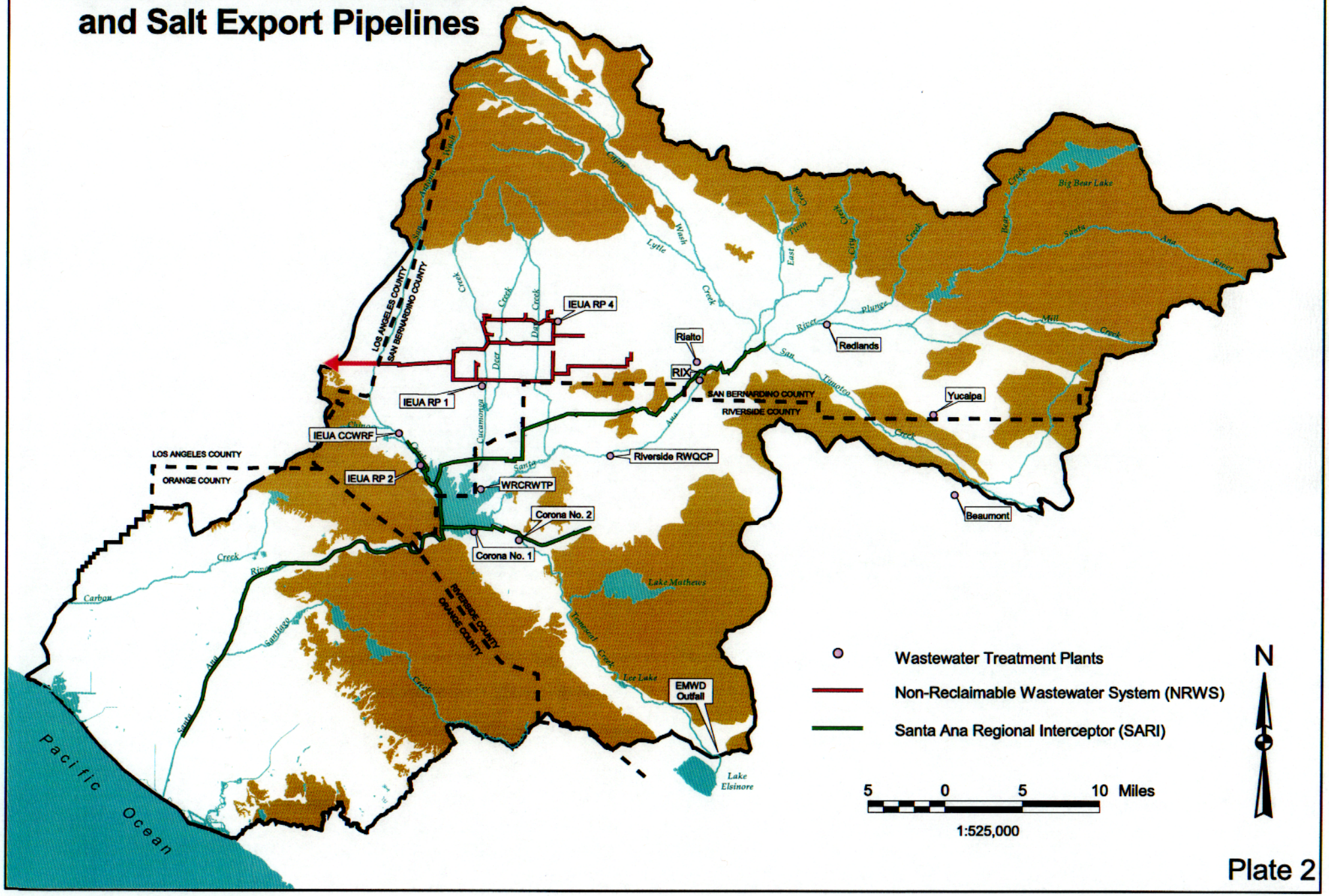


Plate 2

PRECIPITATION AT SAN BERNARDINO STARTING WITH 1934-35

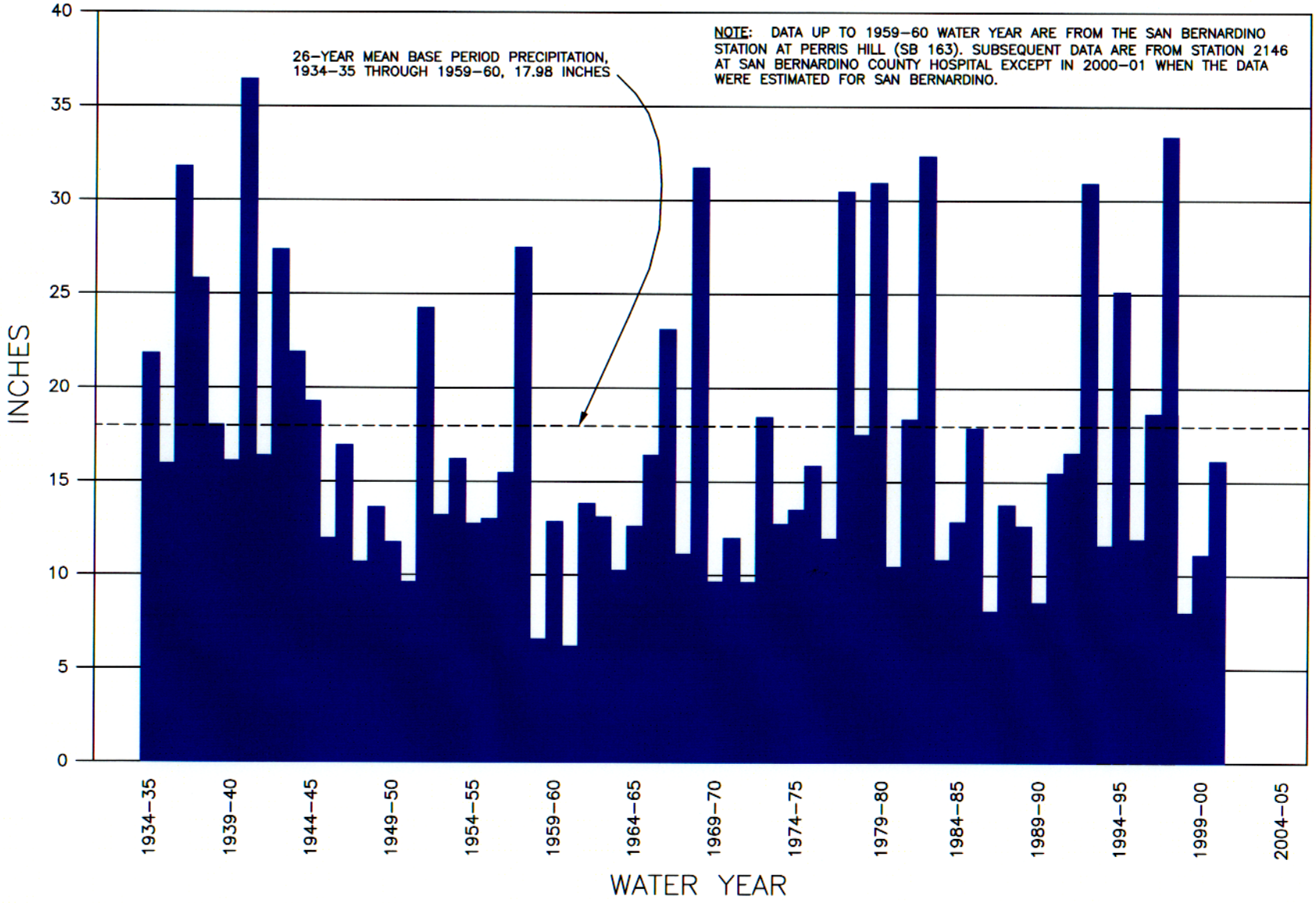
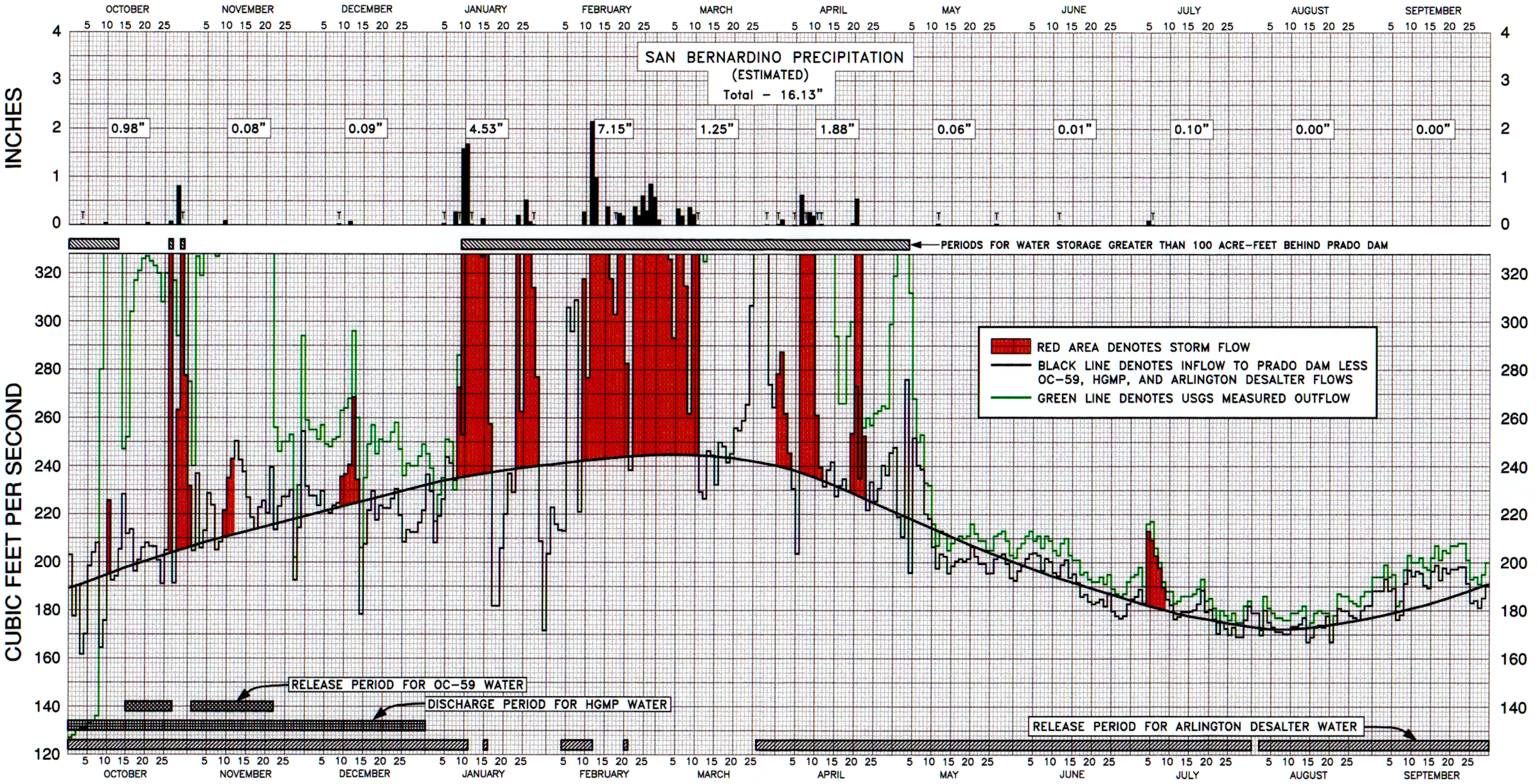


PLATE 3



DISCHARGE OF SANTA ANA RIVER AT PRADO DAM & SAN BERNARDINO PRECIPITATION
WATER YEAR 2000-01

Plate 4

DISCHARGE OF SANTA ANA RIVER AT PRADO STARTING WITH 1934-35

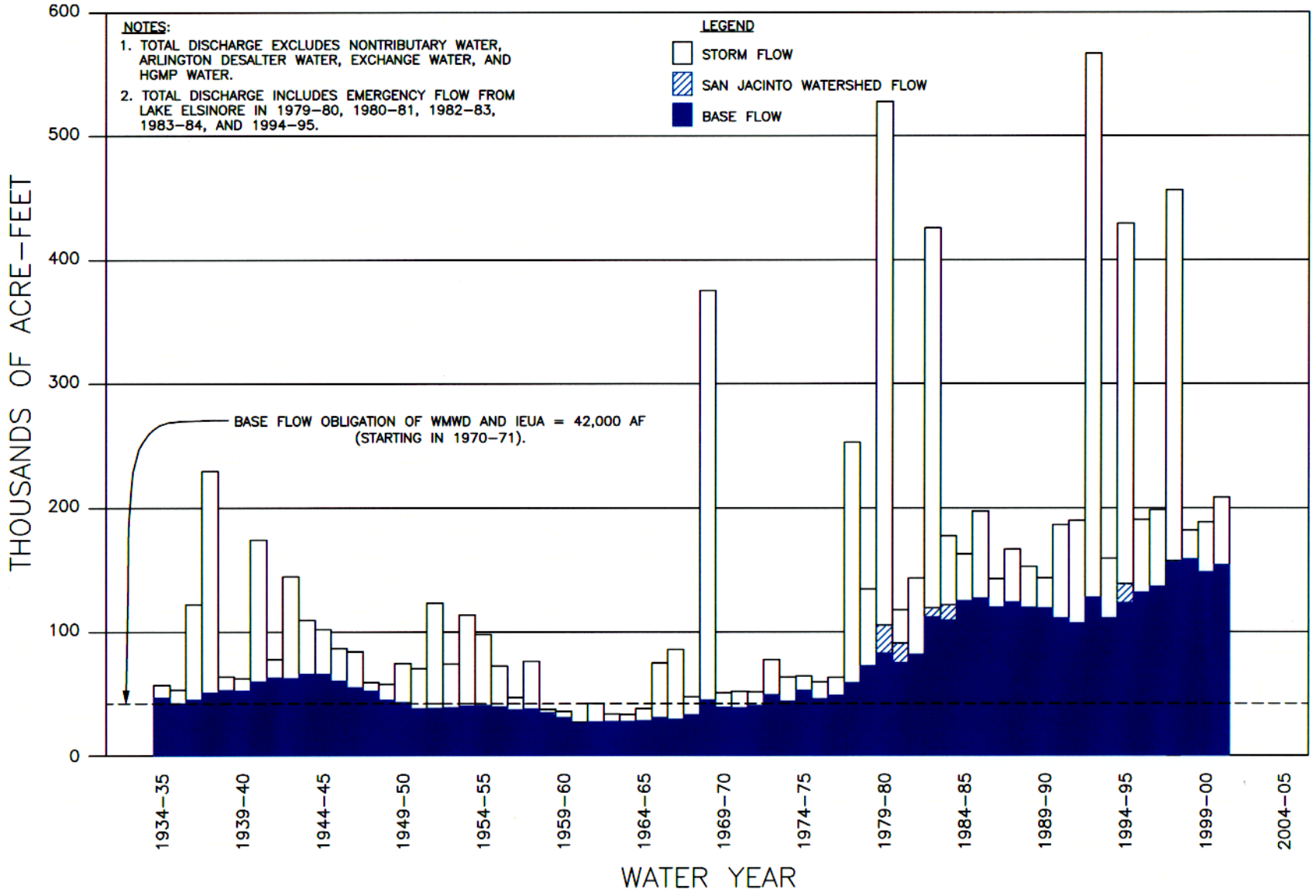
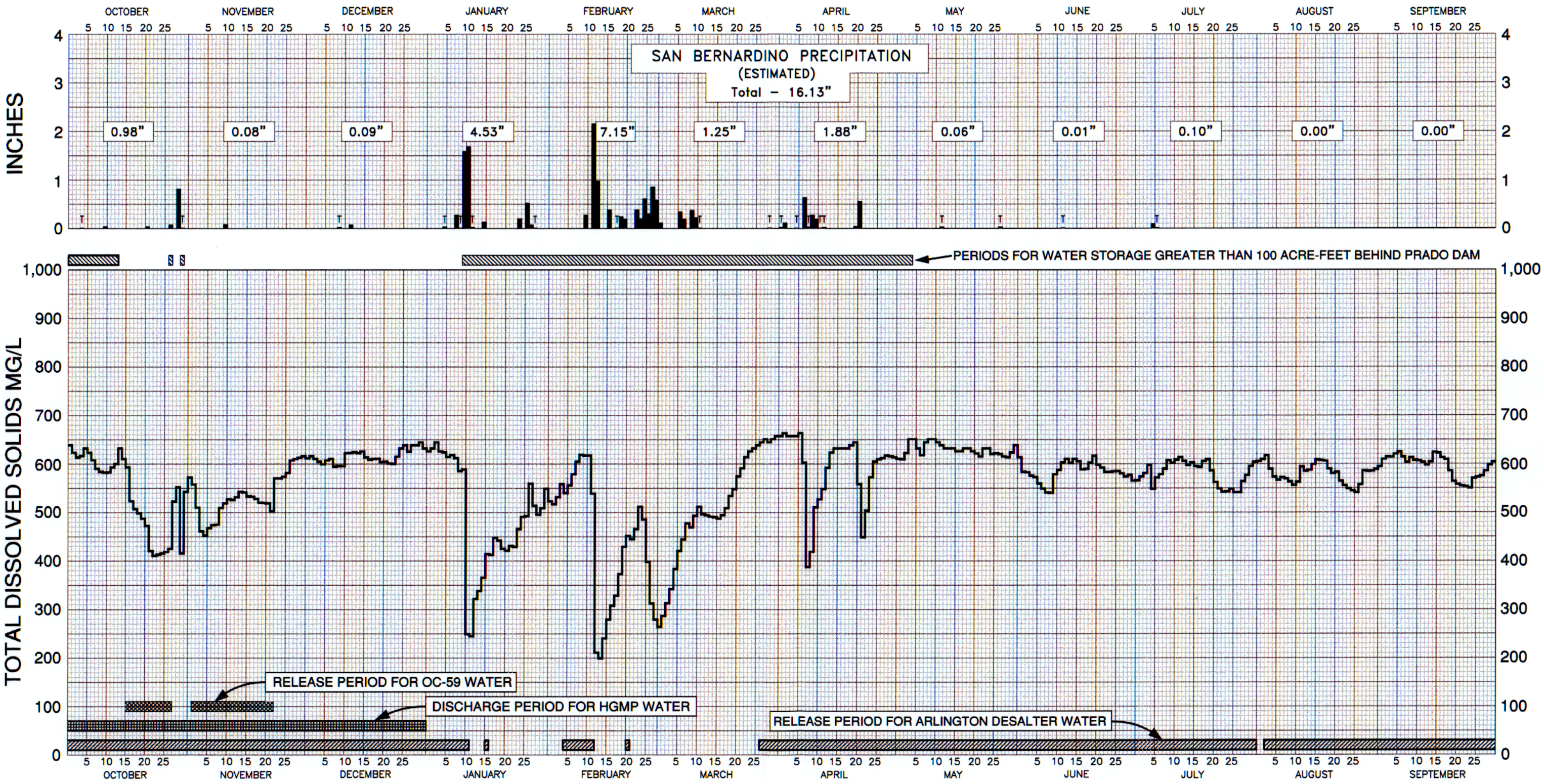
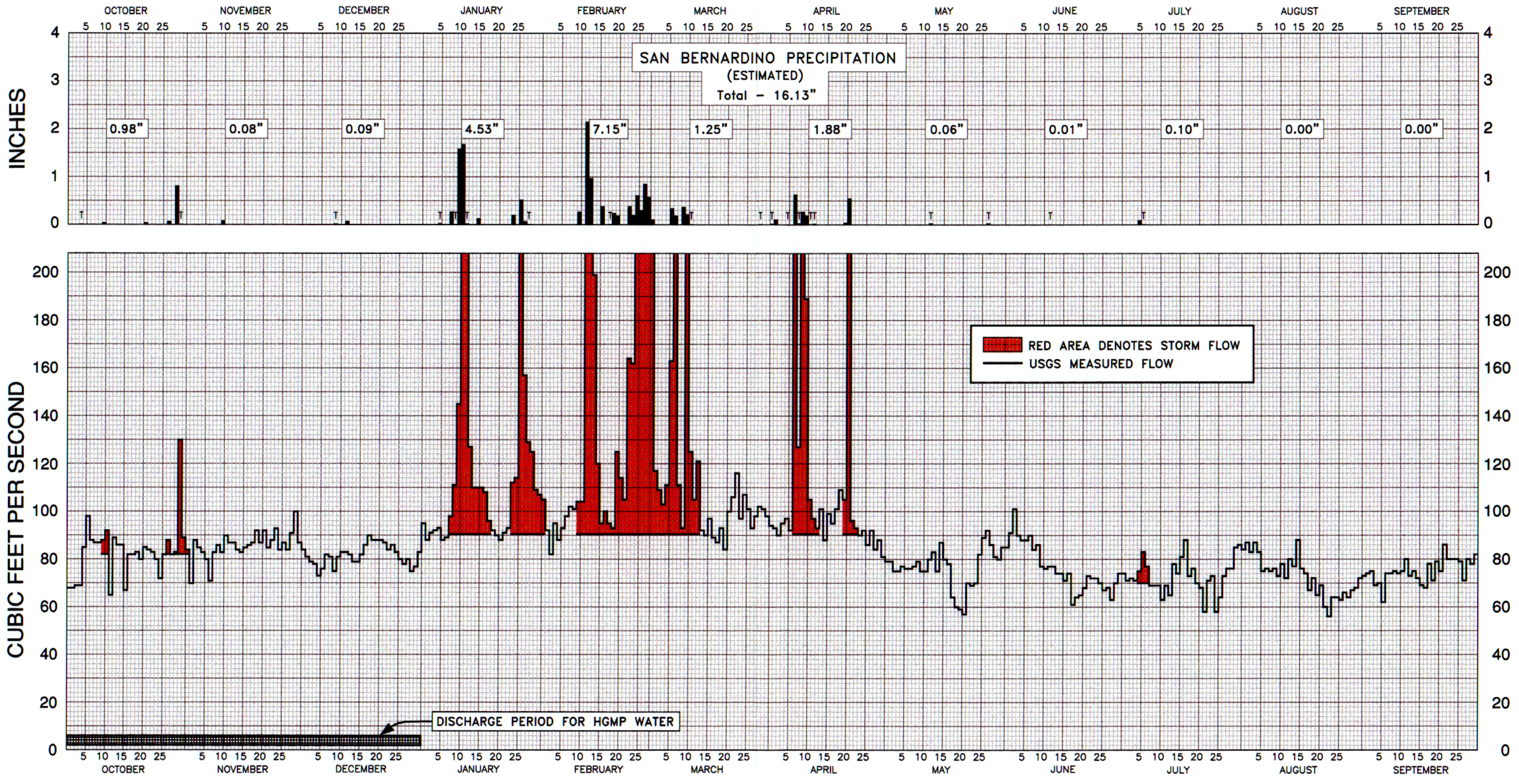


PLATE 5



DISSOLVED SOLIDS IN SANTA ANA RIVER BELOW PRADO DAM
WATER YEAR 2000-01

Plate 6



DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS & SAN BERNARDINO PRECIPITATION
WATER YEAR 2000-01

Plate 7

DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS STARTING WITH 1934-35

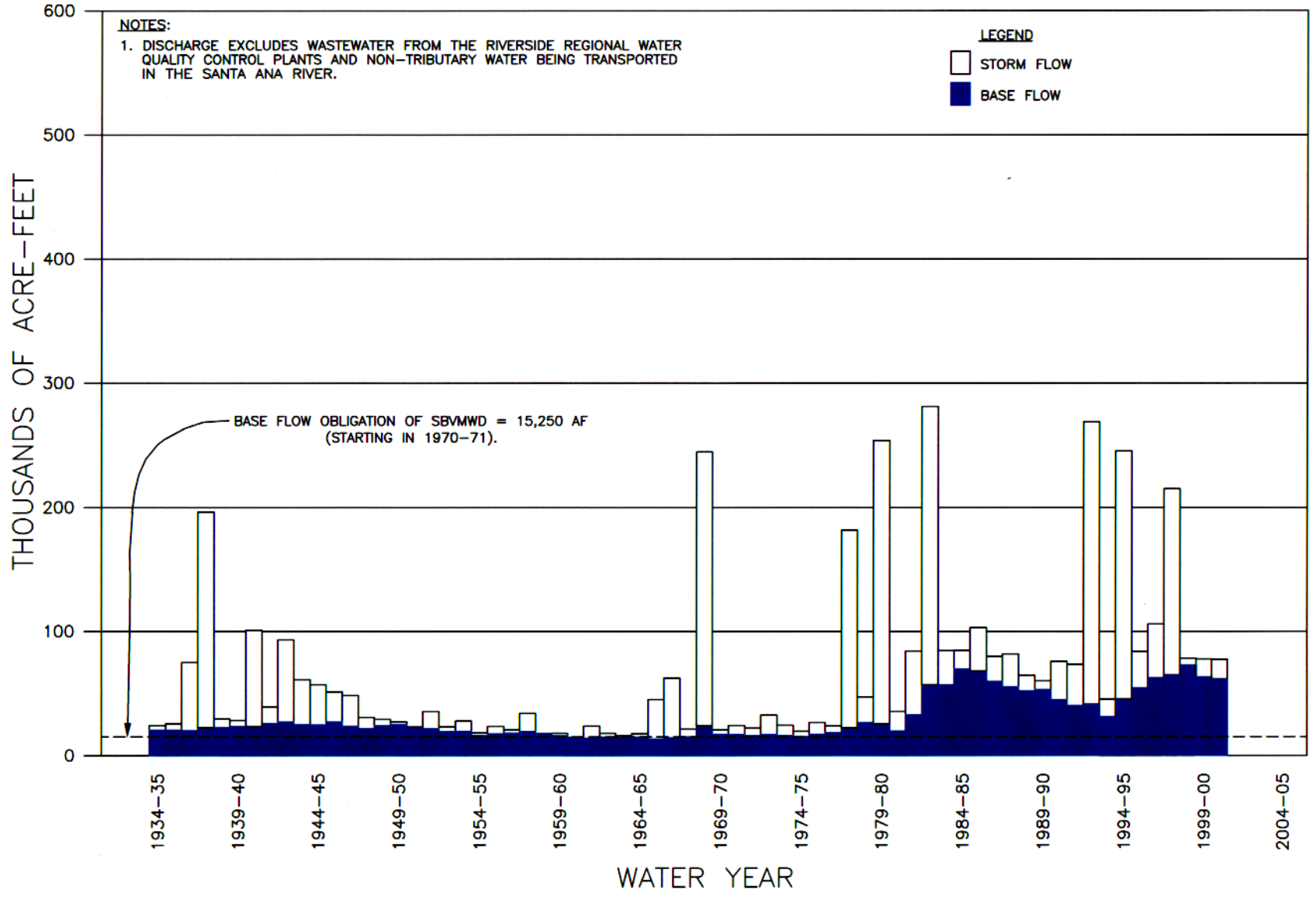


PLATE 8

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

THIRTY-FIRST ANNUAL REPORT

OF THE

SANTA ANA RIVER WATERMASTER

FOR WATER YEAR

OCTOBER 1, 2000 - SEPTEMBER 30, 2001

APRIL 30, 2002

APPENDIX A

USGS FLOW MEASUREMENTS OF THE SANTA ANA RIVER FLOWS BELOW PRADO, AT MWD CROSSING, AND AT E STREET; AND OF TEMESCAL CREEK ABOVE MAIN STREET (AT CORONA), CUCAMONGA CREEK (NEAR MIRA LOMA) AND CHINO CREEK AT SCHAEFER AVENUE (NEAR CHINO); AND WATER QUALITY RECORDS FOR THE SANTA ANA RIVER AT PRADO DAM AND AT MWD CROSSING

WATER YEAR 2000-01

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA

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, discharges of treated effluent, and return flow from irrigated areas. Releases of imported water are made to the basin by the California Water Project at times in some years, via San Antonio Creek from Rialto Pipeline below San Antonio Dam. During the current year, the California Water Project released 6,520 acre-ft to the basin. 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; maximum gage height, 7.29 ft, Jan. 19, 1993; 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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	127	275	259	245	386	533	416	319	202	194	179	194
2	128	240	255	239	414	524	410	347	206	195	179	194
3	130	327	255	217	410	520	397	356	208	198	172	194
4	131	319	251	228	405	520	376	341	211	190	186	199
5	131	331	257	235	415	515	361	312	213	216	181	194
6	133	355	249	251	425	515	348	268	209	217	179	195
7	134	343	248	250	421	517	344	250	211	206	177	182
8	136	327	251	230	417	520	366	253	206	200	177	184
9	280	330	252	286	413	435	362	233	211	192	176	197
10	339	343	263	253	407	367	365	232	209	188	176	203
11	334	357	264	1220	404	369	362	216	205	188	179	200
12	438	365	268	1070	399	450	355	207	203	183	179	200
13	476	378	296	333	4780	325	350	213	208	184	180	202
14	344	372	260	330	1270	339	347	212	210	186	182	198
15	247	359	206	327	493	372	342	205	203	186	173	197
16	252	349	235	367	428	383	294	208	201	186	175	202
17	304	341	249	385	422	385	266	210	201	187	179	207
18	317	336	257	382	419	387	266	211	195	189	180	201
19	321	343	245	379	416	390	294	210	196	193	179	205
20	326	348	251	374	416	396	300	211	193	184	179	204
21	327	342	250	372	416	419	273	216	192	185	167	207
22	325	331	250	371	416	446	235	212	192	181	178	207
23	323	256	254	368	416	451	256	209	194	175	187	208
24	320	246	258	368	416	448	260	209	191	180	186	208
25	308	250	247	368	1060	447	257	205	195	178	186	201
26	320	250	236	368	2040	444	262	205	189	176	184	193
27	312	253	241	370	955	452	263	211	187	179	183	194
28	317	e202	240	369	1490	455	265	212	186	175	182	191
29	294	e232	240	368	---	450	264	213	187	175	186	195
30	397	294	244	362	---	443	299	209	192	182	188	200
31	443	---	249	368	---	431	---	203	---	184	188	---
TOTAL	8714	9394	7780	11653	20769	13648	9555	7318	6006	5832	5582	5956
MEAN	281	313	251	376	742	440	318	236	200	188	180	199
MAX	476	378	296	1220	4780	533	416	356	213	217	188	208
MIN	127	202	206	217	386	325	235	203	186	175	167	182
AC-FT	17280	18630	15430	23110	41200	27070	18950	14520	11910	11570	11070	11810

e Estimated.

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1941 - 2001, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	109	137	203	319	411	393	247	178	146	120	97.3	93.3
MAX	344	322	709	3543	2733	2556	1101	915	736	446	352	372
(WY)	1984	1997	1967	1993	1998	1980	1980	1998	1983	1998	1983	1997
MIN	22.4	33.5	39.5	49.2	49.8	54.3	43.3	35.2	29.0	17.7	14.8	16.2
(WY)	1962	1963	1963	1963	1961	1961	1961	1961	1961	1960	1960	1960

SUMMARY STATISTICS	FOR 2000 CALENDAR YEAR		FOR 2001 WATER YEAR		WATER YEARS 1941 - 2001	
ANNUAL TOTAL	107546		112207			
ANNUAL MEAN	294		307		203	
HIGHEST ANNUAL MEAN					789	1993
LOWEST ANNUAL MEAN					36.4	1961
HIGHEST DAILY MEAN	3780	Feb 22	4780	Feb 13	6440	Feb 23 1980
LOWEST DAILY MEAN	123	Sep 29	127	Oct 1	2.4	Jul 29 1978
ANNUAL SEVEN-DAY MINIMUM	128	Sep 29	131	Oct 1	3.0	Sep 24 1973
MAXIMUM PEAK FLOW			5800	Feb 13	7440	Feb 21 1980
MAXIMUM PEAK STAGE			6.67	Feb 13	7.29	Jan 19 1993
ANNUAL RUNOFF (AC-FT)	213300		222600		147400	
10 PERCENT EXCEEDS	405		420		354	
50 PERCENT EXCEEDS	250		250		122	
90 PERCENT EXCEEDS	180		182		38	

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 left bank, 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 and crest-stage gage. Elevation of gage is 685 ft above sea level, from topographic map. Prior to Apr. 15, 1985, water-stage recorder at site 300 ft upstream on left bank at different datum. From Apr. 15 to Sept. 30, 1985, water-stage recorder near right bank (atop pier 9 of MWD pipeline crossing), at same site and datum. From Oct. 1, 1985, to June 16, 1993, water-stage recorder and crest-stage gage on right bank at same site and datum.

REMARKS.—Records fair below 250 ft^3/s and poor above. Flow partly regulated by Big Bear Lake (station 11049000) and, since November 1999, by Seven Oaks Flood-Control Reservoir, capacity, 145,600 acre-ft. Natural streamflow affected by ground-water withdrawals, diversions for irrigation, return flows from irrigated areas, and discharges of treated effluent. 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. See schematic diagram of Santa Ana River Basin.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 31,300 ft^3/s, Feb. 24, 1998, gage height, 14.69 ft, on basis of area-velocity study; maximum gage height, 20.23 ft, site and datum then in use, 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, or maximum:

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Jan. 11	0930	5,370	10.17	Feb. 27	1730	2,490	8.95
Feb. 12	2215	3,830	9.46	Mar. 10	0445	2,030	8.49

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	80	98	103	95	105	210	94	79	85	74	84	73
2	80	84	100	88	92	117	93	79	91	71	87	74
3	81	102	98	91	82	109	90	75	101	72	83	75
4	81	99	97	92	95	103	95	75	90	71	87	69
5	97	97	92	93	88	111	97	77	88	75	83	70
6	110	94	95	88	93	163	92	76	88	83	75	62
7	100	85	101	89	98	233	303	76	90	77	76	74
8	99	97	100	98	102	111	127	77	84	69	75	74
9	99	100	94	111	101	93	216	79	86	69	76	75
10	100	97	100	145	104	549	189	75	77	69	73	74
11	104	104	102	1960	104	125	105	75	76	63	78	75
12	77	101	102	244	1070	105	97	80	77	69	72	80
13	101	101	101	127	981	121	93	83	77	65	80	73
14	98	98	98	110	199	92	101	75	74	78	77	75
15	98	97	98	110	120	90	88	87	74	74	88	72
16	79	99	101	110	95	97	99	80	71	81	76	69
17	94	100	105	108	100	89	95	78	74	88	74	68
18	94	101	109	96	95	87	101	64	61	73	67	78
19	95	106	107	92	93	93	109	60	64	76	72	71
20	92	101	107	90	125	84	105	59	65	70	65	79
21	97	106	107	88	114	100	256	57	68	68	69	75
22	96	99	106	e91	105	106	96	70	73	58	60	86
23	95	102	103	e93	164	116	93	69	72	71	56	80
24	92	107	105	112	162	97	90	70	72	73	64	80
25	84	98	102	114	315	107	92	82	70	58	64	80
26	94	101	99	271	340	101	86	89	67	64	63	79
27	100	98	97	157	467	93	92	92	68	73	66	71
28	94	105	99	129	493	98	84	86	63	76	64	80
29	95	114	94	125	---	102	88	81	70	76	67	78
30	142	101	96	109	---	101	81	80	74	85	68	82
31	101	---	102	107	---	98	---	85	---	86	72	---
TOTAL	2949	2992	3120	5433	6102	3901	3447	2370	2290	2255	2261	2251
MEAN	95.1	99.7	101	175	218	126	115	76.5	76.3	72.7	72.9	75.0
MAX	142	114	109	1960	1070	549	303	92	101	88	88	86
MIN	77	84	92	88	82	84	81	57	61	58	56	62
AC-FT	5850	5930	6190	10780	12100	7740	6840	4700	4540	4470	4480	4460

e Estimated.

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 2001, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	61.4	79.1	103	232	288	314	146	118	79.2	54.2	53.7	55.2
MAX	194	259	292	1839	1411	1806	604	666	351	145	233	129
(WY)	1988	1984	1984	1993	1980	1995	1983	1983	1983	1983	1983	1976
MIN	20.5	21.2	23.3	24.7	23.1	23.7	23.1	22.3	20.2	16.8	17.9	18.0
(WY)	1974	1975	1974	1972	1972	1972	1971	1972	1981	1981	1981	1974

SUMMARY STATISTICS	FOR 2000 CALENDAR YEAR		FOR 2001 WATER YEAR		WATER YEARS 1970 - 2001	
ANNUAL TOTAL	39512		39371			
ANNUAL MEAN	108		108		132	
HIGHEST ANNUAL MEAN					416	1983
LOWEST ANNUAL MEAN					29.0	1975
HIGHEST DAILY MEAN	1920	Feb 21	1960	Jan 11	11500	Mar 2 1983
LOWEST DAILY MEAN	56	Aug 22	56	Aug 23	15	Sep 7 1980
ANNUAL SEVEN-DAY MINIMUM	62	Aug 17	62	Aug 22	16	Jul 1 1981
MAXIMUM PEAK FLOW			5370	Jan 11	31300	Feb 24 1998
MAXIMUM PEAK STAGE			10.17	Jan 11	20.23	Mar 4 1978
ANNUAL RUNOFF (AC-FT)	78370		78090		95830	
10 PERCENT EXCEEDS	117		113		191	
50 PERCENT EXCEEDS	92		92		66	
90 PERCENT EXCEEDS	70		69		23	

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, 26 mi downstream from Big Bear Lake, and 2.8 mi south of San Bernardino.

DRAINAGE AREA.—541 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.—March 1939 to September 1954, October 1966 to current year.

GAGE.—Water-stage recorder and crest-stage gage. 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 September 1954, water-stage recorder on both banks 0.4 mi upstream at datum 964.50 ft above sea level. October 1966 to September 1976, water-stage recorder on right bank 0.4 mi upstream at datum 954.50 ft above sea level. October 1976 to September 1977, gage was removed for channel construction. October 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. Flow partly regulated by Big Bear Lake (station 11049000) and, since November 1999, by Seven Oaks Flood-Control Reservoir, capacity, 145,600 acre-ft. 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 caused sustained flow past gage from 1967 to Mar. 21, 1996. See schematic diagram of Santa Ana River Basin.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 28,000 ft^3/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 and since Mar. 21, 1996.

EXTREMES FOR CURRENT YEAR.—Peak discharges greater than base discharge of 1,000 ft^3/s, from rating curve extended above 5,930 ft^3/s on basis of critical-depth computations, or maximum:

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Jan. 10	2230	2,600	5.19	Mar. 7	0300	1,670	4.87
Feb. 13	0600	1,950	4.98	Mar. 10	0315	1,690	4.88
Feb. 27	1515	1,670	4.87				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	4.0	3.3	.00	48	.00	.00	.00	.00	.89	.00
2	.00	.03	.35	2.4	.00	25	.00	.00	.00	.89	.00	.00
3	.00	.00	.13	2.8	.00	19	1.9	.00	1.3	.11	.00	.00
4	.00	.00	.28	2.7	.00	19	.01	.00	2.6	.00	.00	.00
5	.42	.15	.23	1.4	.00	15	.00	.00	.43	.83	.00	.20
6	1.5	.50	.26	.68	.00	29	.00	.00	.27	.02	.00	.00
7	.00	2.7	1.4	.24	.00	102	51	.00	.24	.00	.00	.00
8	.16	3.3	.74	5.7	.00	8.5	11	.00	.00	.00	.00	.00
9	.00	.00	.00	5.3	.00	5.5	82	.00	.00	.00	.00	.00
10	.99	4.0	.00	194	.00	241	17	.00	.00	.00	.06	.00
11	.92	2.8	.00	756	.00	29	3.0	.00	.00	.00	.00	.00
12	.11	.65	2.7	.01	158	19	3.5	.00	.00	.00	.00	.00
13	.00	.74	2.6	.00	472	13	4.3	.00	.00	.00	.00	.00
14	.20	1.3	2.8	.00	32	11	3.3	.00	.00	.00	.00	.00
15	.53	.88	.74	.00	33	9.9	3.1	.00	.00	.00	.47	.00
16	.00	.02	.00	.00	26	8.9	2.4	.00	.00	.00	2.6	.00
17	.00	.14	.00	.00	26	8.4	3.0	.00	.00	.00	1.9	.00
18	.00	.10	.00	.00	25	6.6	.96	.00	.00	1.9	1.5	.00
19	.00	.05	1.4	.00	20	7.0	1.9	.00	.00	1.0	.00	.00
20	.25	.24	3.5	.00	25	2.7	1.2	.00	.00	.00	.04	.18
21	.06	.57	3.3	.00	18	2.3	56	.00	.00	.11	.00	.24
22	2.4	.44	.67	.00	8.9	4.6	11	.98	.23	.99	.00	.42
23	.57	.15	.81	.00	14	1.8	6.8	.72	.00	.72	.00	.84
24	.36	.15	3.4	.00	15	2.8	.70	.00	.00	.00	.00	.85
25	.00	.18	1.0	.00	48	1.3	2.4	.00	.00	.14	.00	.57
26	2.8	.40	.39	1.8	73	.27	.00	1.9	.00	2.1	.00	.00
27	1.7	.12	.90	.25	236	.00	.00	.00	.00	.00	.00	.00
28	.00	.09	1.1	.03	208	.00	.00	.00	.00	.00	.00	1.3
29	5.4	.00	.10	.00	---	1.7	.00	.64	.00	.80	.00	.00
30	54	.39	.39	.00	---	.89	.00	.00	.00	1.2	.00	.00
31	.34	---	2.9	.00	---	.00	---	.00	---	.91	.00	---
TOTAL	72.71	20.09	36.09	976.61	1437.90	643.16	266.47	4.24	5.07	11.72	7.46	4.60
MEAN	2.35	.67	1.16	31.5	51.4	20.7	8.88	.14	.17	.38	.24	.15
MAX	54	4.0	4.0	756	472	241	82	1.9	2.6	2.1	2.6	1.3
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
AC-FT	144	40	72	1940	2850	1280	529	8.4	10	23	15	9.1

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 1954, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	.88	3.47	20.9	23.7	20.6	37.4	27.2	11.3	2.39	.93	.87	.63
MAX	3.35	21.3	117	109	72.2	183	237	145	31.2	9.87	8.37	6.32
(WY)	1942	1945	1946	1943	1945	1943	1941	1941	1941	1940	1940	1939
MIN	.000	.007	.000	1.90	2.41	1.70	1.14	.14	.000	.000	.000	.000
(WY)	1951	1952	1951	1948	1942	1951	1951	1942	1950	1950	1942	1948

SUMMARY STATISTICS	WATER YEARS 1939 - 1954	
ANNUAL MEAN	12.7	
HIGHEST ANNUAL MEAN	56.6	1941
LOWEST ANNUAL MEAN	.78	1951
HIGHEST DAILY MEAN	2350	Jan 23 1943
LOWEST DAILY MEAN	.00	Jun 19 1940
ANNUAL SEVEN-DAY MINIMUM	.00	Sep 10 1940
ANNUAL RUNOFF (AC-FT)	9190	
10 PERCENT EXCEEDS	16	
50 PERCENT EXCEEDS	1.0	
90 PERCENT EXCEEDS	.00	

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1995, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	33.9	43.3	77.4	158	232	253	132	103	63.9	40.8	36.8	34.6
MAX	117	191	469	1327	2096	1279	742	707	339	162	160	75.0
(WY)	1984	1984	1967	1993	1980	1980	1980	1983	1983	1969	1983	1983
MIN	12.4	13.2	14.8	13.2	11.6	10.6	12.5	9.35	13.0	9.08	9.97	9.93
(WY)	1968	1972	1970	1972	1968	1972	1972	1967	1971	1967	1967	1967

SUMMARY STATISTICS	WATER YEARS 1967 - 1995	
ANNUAL MEAN	100	
HIGHEST ANNUAL MEAN	441	1980
LOWEST ANNUAL MEAN	17.2	1968
HIGHEST DAILY MEAN	14800	Feb 25 1969
LOWEST DAILY MEAN	6.4	Jul 13 1967
ANNUAL SEVEN-DAY MINIMUM	8.1	Sep 16 1967
MAXIMUM PEAK FLOW	28000	Feb 25 1969
MAXIMUM PEAK STAGE	11.90	Feb 25 1969
ANNUAL RUNOFF (AC-FT)	72490	
10 PERCENT EXCEEDS	165	
50 PERCENT EXCEEDS	35	
90 PERCENT EXCEEDS	14	

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 2001, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	13.3	22.4	22.5	74.8	192	43.5	42.7	73.7	21.1	6.28	12.5	15.2
MAX	38.1	56.2	42.6	230	729	114	190	430	116	20.9	66.1	75.8
(WY)	1996	1997	1998	1997	1998	1998	1998	1998	1998	1999	1998	1998
MIN	2.35	.67	1.16	14.1	7.57	.10	.000	.000	.000	.000	.000	.000
(WY)	2001	2001	2001	2000	1997	1997	1997	1996	1996	1996	1996	1996

SUMMARY STATISTICS	FOR 2000 CALENDAR YEAR		FOR 2001 WATER YEAR		WATER YEARS 1996 - 2001	
ANNUAL TOTAL	5751.43		3486.12			
ANNUAL MEAN	15.7		9.55		44.2	
HIGHEST ANNUAL MEAN					152	1998
LOWEST ANNUAL MEAN					9.55	2001
HIGHEST DAILY MEAN	1230	Feb 21	756	Jan 11	5050	Feb 24 1998
LOWEST DAILY MEAN	.00	May 14	.00	Oct 1	.00	Mar 22 1996
ANNUAL SEVEN-DAY MINIMUM	.00	Sep 11	.00	Jan 13	.00	Mar 22 1996
MAXIMUM PEAK FLOW			2600	Jan 10	21100	Feb 23 1998
MAXIMUM PEAK STAGE			5.19	Jan 10	7.70	Feb 23 1998
ANNUAL RUNOFF (AC-FT)	11410		6910		31990	
10 PERCENT EXCEEDS	17		11		70	
50 PERCENT EXCEEDS	1.5		.03		3.6	
90 PERCENT EXCEEDS	.00		.00		.00	

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.—October 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).

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

REMARKS.—Records fair except for estimated daily discharges, which are poor. 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. See schematic diagram of Santa Ana River Basin.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 4,720 ft^3/s, Mar. 1, 1983, gage height, 11.67 ft, site and datum then in use, on basis of slope-conveyance study; 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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	10	12	12	1.9	10	9.6	10	11	12	2.6	9.1
2	12	5.8	11	13	2.0	4.5	11	11	11	13	3.7	9.4
3	12	11	11	12	1.9	2.8	13	10	11	13	6.6	9.2
4	12	11	12	12	1.7	2.4	14	10	12	11	13	9.7
5	12	7.6	13	13	4.1	2.2	14	11	12	38	13	11
6	13	14	13	13	8.5	26	13	10	13	15	16	11
7	13	12	13	12	9.9	5.0	76	10	12	14	17	11
8	13	14	14	21	12	1.7	10	9.5	16	10	18	11
9	13	14	14	11	13	11	18	9.7	18	7.9	21	9.9
10	18	18	14	90	27	10	10	10	19	9.2	25	12
11	9.8	19	15	238	17	1.4	10	11	19	11	27	9.8
12	7.7	12	15	9.7	287	1.3	10	10	22	11	28	10
13	8.2	12	15	3.4	113	1.4	10	12	26	11	28	11
14	7.4	12	13	2.6	5.2	1.7	11	13	25	11	19	11
15	7.9	12	15	14	3.5	1.5	11	16	18	10	11	14
16	10	13	16	4.4	2.7	1.4	11	17	12	11	7.9	12
17	11	13	16	2.5	2.5	1.6	11	18	12	11	7.2	14
18	11	13	15	2.8	2.8	1.7	12	19	11	11	6.9	13
19	13	11	16	2.5	31	1.8	12	20	11	7.7	6.1	11
20	14	14	17	2.3	9.5	1.9	12	24	12	8.3	4.1	13
21	14	15	13	2.3	2.1	2.2	39	15	13	8.2	2.1	15
22	12	14	16	2.5	1.9	2.7	18	13	12	7.4	4.4	15
23	10	14	14	2.7	23	2.1	18	11	12	6.0	7.3	14
24	13	13	15	12	18	2.1	18	10	12	6.6	8.1	15
25	14	14	14	2.6	142	2.1	15	11	11	8.2	7.8	15
26	15	15	14	76	63	2.7	9.5	10	13	9.8	7.9	15
27	38	15	12	3.3	95	7.8	13	9.5	12	9.0	8.4	14
28	6.6	13	15	2.1	58	12	11	9.1	12	7.7	7.6	e13
29	30	12	15	2.0	---	12	9.8	9.3	12	7.9	8.0	e13
30	16	12	14	1.8	---	12	9.7	9.9	13	8.9	8.4	e13
31	10	---	14	1.9	---	12	---	11	---	5.8	8.6	---
TOTAL	408.6	385.4	436	600.4	959.2	161.0	459.6	380.0	425	331.6	359.7	364.1
MEAN	13.2	12.8	14.1	19.4	34.3	5.19	15.3	12.3	14.2	10.7	11.6	12.1
MAX	38	19	17	238	287	26	76	24	26	38	28	15
MIN	6.6	5.8	11	1.8	1.7	1.3	9.5	9.1	11	5.8	2.1	9.1
AC-FT	810	764	865	1190	1900	319	912	754	843	658	713	722

e Estimated.

11072100 TEMESCAL CREEK ABOVE MAIN STREET, AT CORONA, CA—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1981 - 1990, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	7.62	15.1	23.8	23.0	14.5	40.9	13.1	12.0	9.35	7.15	6.45	6.99
MAX	16.1	55.9	126	116	25.5	237	39.3	43.7	30.0	10.9	13.4	11.3
(WY)	1986	1981	1981	1981	1981	1983	1983	1983	1983	1985	1990	1985
MIN	2.36	4.67	2.53	7.01	7.42	6.26	4.02	3.77	1.12	1.20	1.79	1.09
(WY)	1985	1987	1982	1989	1982	1990	1989	1982	1982	1982	1982	1981

SUMMARY STATISTICS	WATER YEARS 1981 - 1990	
ANNUAL MEAN	12.4	
HIGHEST ANNUAL MEAN	33.7	1981
LOWEST ANNUAL MEAN	6.10	1987
HIGHEST DAILY MEAN	1720	Mar 1 1983
LOWEST DAILY MEAN	.27	Sep 25 1981
ANNUAL SEVEN-DAY MINIMUM	.56	Sep 23 1981
MAXIMUM PEAK FLOW	4720	Mar 1 1983
MAXIMUM PEAK STAGE	11.67	Mar 1 1983
ANNUAL RUNOFF (AC-FT)	8990	
10 PERCENT EXCEEDS	27	
50 PERCENT EXCEEDS	6.1	
90 PERCENT EXCEEDS	2.7	

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1991 - 2001, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	12.1	14.0	16.5	44.9	93.5	67.9	38.0	23.4	15.5	13.3	12.2	12.4
MAX	16.3	24.3	26.4	161	351	349	190	100	34.3	24.9	20.1	15.1
(WY)	1997	1994	1993	1995	1993	1995	1995	1995	1995	1993	1993	1994
MIN	6.22	5.55	9.35	12.4	15.4	5.19	2.89	3.24	7.33	3.56	6.98	7.08
(WY)	1996	1996	1999	1998	1997	2001	1991	1992	1992	1994	1994	1995

SUMMARY STATISTICS	FOR 2000 CALENDAR YEAR		FOR 2001 WATER YEAR		WATER YEARS 1991 - 2001	
ANNUAL TOTAL	5811.5		5270.6			
ANNUAL MEAN	15.9		14.4		29.9	
HIGHEST ANNUAL MEAN					81.8	1995
LOWEST ANNUAL MEAN					12.8	1999
HIGHEST DAILY MEAN	222	Feb 21	287	Feb 12	2090	Feb 24 1998
LOWEST DAILY MEAN	2.2	Mar 19	1.3	Mar 12	.34	Jul 3 1992
ANNUAL SEVEN-DAY MINIMUM	2.8	Mar 13	1.5	Mar 11	.89	Jan 13 1992
MAXIMUM PEAK FLOW			1130	Jan 11	3660	Feb 24 1998
MAXIMUM PEAK STAGE			4.81	Jan 11	6.54	Feb 24 1998
ANNUAL RUNOFF (AC-FT)	11530		10450		21700	
10 PERCENT EXCEEDS	17		18		44	
50 PERCENT EXCEEDS	13		12		13	
90 PERCENT EXCEEDS	8.5		2.6		4.3	

11073495 CUCAMONGA CREEK NEAR MIRA LOMA, CA

LOCATION.—Lat 33°58'58", long 117°35'55", in SW 1/4 NE 1/4 sec.22, T.2 S., R.7 W., San Bernardino County, Hydrologic Unit 18070203, on right bank, 300 ft upstream from Merrill Avenue Bridge, and 4.6 mi west of Mira Loma.

DRAINAGE AREA.—75.8 mi^2.

PERIOD OF RECORD.—January 1968 to July 1977, January 1979 to current year.
CHEMICAL DATA: Water years 1999-2000.
SPECIFIC CONDUCTANCE: Water years 1999-2000.
WATER TEMPERATURE: Water years 1999-2000.
SEDIMENT DATA: Water years 1999-2000.

GAGE.—Water-stage recorder and concrete-lined flood-control channel. Elevation of gage is 660 ft above sea level, from topographic map. Prior to July 1977 at site 100 ft downstream at different datum.

REMARKS.—Records poor. Channel is a trapezoidal concrete floodway; records for low and medium flows prior to July 31, 1977, are not equivalent (channel concrete lined since July 31, 1977). Inland Empire Utilities Agency Tertiary Plant No. 1 began discharging effluent 3.3 mi upstream from station on May 8, 1985. See schematic diagram of Santa Ana River Basin.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 16,100 ft^3/s, Feb. 27, 1983, gage height, 7.85 ft, from floodmark, on basis of slope-conveyance study of peak flow; prior to operation of Plant No. 1, no flow for most of some years; minimum daily, since 1985, 2.5 ft^3/s, June 6, 1987.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	32	40	49	42	94	47	49	45	e44	45	41
2	33	34	41	43	45	80	51	47	44	e45	48	39
3	30	36	42	26	52	60	53	60	50	e46	39	41
4	30	36	46	44	43	56	44	59	49	e42	47	48
5	30	36	42	41	48	57	38	59	41	e45	40	42
6	28	40	39	45	49	216	38	52	42	e44	41	40
7	33	39	37	46	49	65	280	53	e44	44	44	35
8	34	37	37	49	49	53	50	47	e40	45	47	40
9	33	41	34	47	52	111	78	53	e48	42	44	40
10	39	45	41	358	82	124	48	49	e45	45	42	43
11	40	42	40	1090	45	35	42	45	e44	42	49	37
12	35	36	37	51	1180	37	46	45	e42	37	47	39
13	33	38	30	39	391	36	45	46	46	41	46	40
14	36	39	36	38	51	39	54	44	45	43	51	39
15	38	40	36	64	43	46	60	41	39	52	44	43
16	37	45	41	42	43	47	56	37	44	48	46	48
17	36	46	40	35	42	48	58	43	44	58	46	44
18	35	47	47	34	44	50	58	40	41	47	48	40
19	34	49	39	34	67	51	64	45	45	58	48	41
20	37	48	44	39	57	49	70	44	46	50	36	39
21	36	45	44	40	43	49	253	46	42	52	26	37
22	38	43	47	43	50	46	56	41	42	50	36	41
23	37	43	48	41	122	43	49	39	43	42	42	42
24	36	35	52	105	147	38	55	44	43	46	44	46
25	34	37	48	40	373	40	54	39	45	41	46	43
26	35	39	44	104	279	42	44	44	46	43	43	39
27	57	41	47	48	354	38	41	38	42	50	36	40
28	31	39	47	43	161	39	40	47	43	51	38	39
29	134	40	45	46	---	50	41	45	e43	52	37	43
30	51	40	42	44	---	51	53	45	e47	47	37	43
31	33	---	56	43	---	54	---	41	---	50	38	---
TOTAL	1208	1208	1309	2811	4003	1844	1966	1427	1320	1442	1321	1232
MEAN	39.0	40.3	42.2	90.7	143	59.5	65.5	46.0	44.0	46.5	42.6	41.1
MAX	134	49	56	1090	1180	216	280	60	50	58	51	48
MIN	28	32	30	26	42	35	38	37	39	37	26	35
AC-FT	2400	2400	2600	5580	7940	3660	3900	2830	2620	2860	2620	2440

e Estimated.

11073495 CUCAMONGA CREEK NEAR MIRA LOMA, CA—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1977, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	.021	1.15	1.55	18.2	4.65	1.91	1.35	.065	.001	.000	.000	.11
MAX	.19	6.07	7.91	149	30.7	7.94	13.1	.54	.007	.000	.000	1.03
(WY)	1972	1971	1972	1969	1969	1969	1969	1977	1969	1968	1968	1976
MIN	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
(WY)	1969	1969	1970	1975	1972	1972	1968	1968	1968	1968	1968	1968

SUMMARY STATISTICS — WATER YEARS 1968 - 1977

ANNUAL TOTAL		
ANNUAL MEAN	2.73	
HIGHEST ANNUAL MEAN	16.8	1969
LOWEST ANNUAL MEAN	.16	1976
HIGHEST DAILY MEAN	2600	Jan 25 1969
LOWEST DAILY MEAN	.00	Feb 1 1968
ANNUAL SEVEN-DAY MINIMUM	.00	Feb 1 1968
MAXIMUM PEAK FLOW	9100	Jan 25 1969
MAXIMUM PEAK STAGE	7.08	Jan 25 1969
ANNUAL RUNOFF (AC-FT)	1980	
10 PERCENT EXCEEDS	.10	
50 PERCENT EXCEEDS	.00	
90 PERCENT EXCEEDS	.00	

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1984, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	3.49	11.3	7.69	34.1	65.0	46.3	12.1	3.43	.48	.37	1.47	1.08
MAX	11.1	27.9	24.7	149	216	205	63.4	19.8	2.30	1.22	6.99	3.45
(WY)	1984	1983	1984	1983	1980	1983	1983	1983	1983	1983	1983	1983
MIN	.091	.002	.006	1.67	1.29	2.44	.056	.063	.008	.019	.009	.011
(WY)	1981	1980	1980	1984	1984	1984	1981	1979	1979	1981	1979	1979

SUMMARY STATISTICS — WATER YEARS 1979 - 1984

ANNUAL TOTAL		
ANNUAL MEAN	17.5	
HIGHEST ANNUAL MEAN	53.4	1983
LOWEST ANNUAL MEAN	1.51	1981
HIGHEST DAILY MEAN	2530	Mar 1 1983
LOWEST DAILY MEAN	.00	Feb 6 1979
ANNUAL SEVEN-DAY MINIMUM	.00	Feb 6 1979
MAXIMUM PEAK FLOW	16100	Feb 27 1983
MAXIMUM PEAK STAGE	7.85	Feb 27 1983
ANNUAL RUNOFF (AC-FT)	12700	
10 PERCENT EXCEEDS	10	
50 PERCENT EXCEEDS	.13	
90 PERCENT EXCEEDS	.01	

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1986 - 2001, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	35.4	37.6	43.5	78.8	96.5	63.1	40.2	32.6	32.8	31.2	31.3	35.6
MAX	52.9	65.7	83.0	265	304	198	65.5	63.0	57.1	46.5	51.8	52.0
(WY)	1988	1997	1993	1993	1998	1995	2001	1998	1992	2001	1992	1986
MIN	20.4	23.4	21.0	26.1	34.9	25.3	20.5	18.5	18.1	19.3	18.5	16.4
(WY)	1987	1989	1987	1989	1989	1988	1987	1988	1988	1987	1987	1988

SUMMARY STATISTICS	FOR 2000 CALENDAR YEAR		FOR 2001 WATER YEAR		WATER YEARS 1986 - 2001	
ANNUAL TOTAL	16776		21091			
ANNUAL MEAN	45.8		57.8		46.3	
HIGHEST ANNUAL MEAN					71.4	1993
LOWEST ANNUAL MEAN					26.6	1987
HIGHEST DAILY MEAN	475	Feb 21	1180	Feb 12	2490	Feb 20 1996
LOWEST DAILY MEAN	16	Mar 15	26	Jan 3	2.5	Jun 6 1987
ANNUAL SEVEN-DAY MINIMUM	31	Oct 2	31	Oct 2	12	Aug 25 1988
MAXIMUM PEAK FLOW			6200	Jan 11	10400	Jan 7 1993
MAXIMUM PEAK STAGE			4.50	Jan 11	5.40	Jan 7 1993
ANNUAL RUNOFF (AC-FT)	33280		41830		33530	
10 PERCENT EXCEEDS	47		57		54	
50 PERCENT EXCEEDS	38		44		33	
90 PERCENT EXCEEDS	33		36		20	

11073360 CHINO CREEK AT SCHAEFER AVENUE, NEAR CHINO, CA

LOCATION.—Lat 34°00'14", long 117°43'34", in Santa Ana del Chino Grant, San Bernardino County, Hydrologic Unit 18070203, on right bank, 300 ft downstream from Schaefer Avenue, 0.8 mi downstream from San Antonio Creek, and 1.5 mi southwest of Chino.

DRAINAGE AREA.—48.9 mi^2.

PERIOD OF RECORD.—October 1969 to current year.
CHEMICAL DATA: Water year 1998.
SEDIMENT DATA: Water year 1998.

REVISED RECORDS.—WDR CA-84-1: 1983(M). WDR CA-95-1: 1992, 1993.

GAGE.—Water-stage recorder and concrete-lined flood-control channel. Concrete dikes formed low-water control from October 1975 to Apr. 16, 1991. Elevation of gage is 685 ft above sea level, from topographic map.

REMARKS.—Records fair above 10 ft^3/s and poor below. Since 1997, due to construction in area of gage, Schaefer Avenue no longer extends to the Chino Creek crossing. The Schaefer Avenue Bridge, however, remains. Flow mostly regulated by San Antonio Flood-Control Reservoir, capacity, 7,700 acre-ft. Natural streamflow affected by extensive ground-water withdrawals, diversions for power, domestic use, irrigation, and return flow from irrigated areas. Releases of imported water are made to the basin by the California Water Project at times in some years, via San Antonio Creek from Rialto Pipeline below San Antonio Dam, at a site approximately 11 mi upstream. During the current year, 6,520 acre-ft was released. See schematic diagram of Santa Ana River Basin.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 12,700 ft^3/s, Feb. 27, 1983, gage height, 10.32 ft, from rating curve extended above 560 ft^3/s on basis of slope-conveyance study; no flow May 21, June 30, July 1, Oct. 30, Nov. 3, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD.—Flood of Jan. 25, 1969, reached a stage of 9.23 ft, present datum, discharge, 9,200 ft^3/s, on basis of contracted-opening measurement at site 6.1 mi downstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	2.2	2.2	2.2	1.7	4.3	3.3	3.0	2.7	2.4	1.8	1.9
2	2.0	33	2.3	2.4	1.6	3.2	3.5	2.7	2.9	2.4	1.8	1.8
3	2.0	106	3.2	2.6	2.0	2.8	2.9	2.8	3.6	2.7	2.0	2.0
4	2.2	105	2.3	2.4	1.5	2.8	3.0	2.8	3.3	2.5	2.0	1.6
5	2.1	107	2.1	3.3	1.7	2.9	2.9	2.8	2.7	41	1.9	1.4
6	2.2	107	2.1	3.6	1.7	48	2.8	2.7	2.6	3.2	2.1	1.5
7	2.3	101	2.4	2.4	1.8	5.6	106	2.6	2.5	3.3	2.1	1.6
8	2.2	93	2.4	11	2.5	3.1	5.1	2.3	2.6	2.7	2.1	1.4
9	2.2	93	2.3	3.1	1.7	14	5.9	2.4	2.5	2.6	2.0	1.7
10	2.1	93	2.4	210	27	19	2.9	2.4	2.4	3.8	2.0	1.7
11	2.6	94	2.3	495	2.1	2.8	2.7	2.4	2.4	2.8	2.0	1.5
12	1.9	92	2.2	6.8	624	2.8	3.6	2.7	2.5	2.7	2.0	1.4
13	1.7	94	2.1	3.5	196	3.0	5.1	2.7	2.8	2.6	2.1	1.4
14	1.5	94	2.5	2.9	14	2.4	3.0	2.5	2.6	2.6	2.1	1.3
15	1.7	100	2.4	10	3.2	2.7	2.4	2.6	2.4	2.5	2.1	1.4
16	32	99	2.5	6.4	2.4	2.8	5.2	2.6	2.4	2.7	1.7	1.8
17	104	99	2.4	3.9	2.1	2.5	2.8	2.5	2.3	2.8	1.4	2.0
18	93	99	2.7	2.6	2.1	2.9	4.1	2.4	2.4	3.1	1.5	1.4
19	101	98	2.4	1.8	17	2.7	5.5	3.0	2.6	2.6	1.6	1.5
20	100	98	2.6	1.8	4.6	2.7	8.9	3.3	2.3	2.4	1.6	1.4
21	101	100	2.6	1.9	2.1	3.1	62	3.1	2.7	2.3	1.6	1.6
22	103	45	3.2	1.7	2.1	3.4	2.9	2.7	2.7	2.1	1.8	1.1
23	102	2.5	2.5	1.8	27	2.8	2.7	2.6	2.4	2.3	2.0	1.1
24	105	2.3	2.4	45	41	2.8	2.5	2.5	2.3	2.2	1.8	1.2
25	109	2.2	2.4	2.0	181	2.8	2.7	2.8	2.5	2.5	1.8	1.1
26	101	2.2	2.3	40	56	2.9	2.9	5.6	2.4	2.2	1.7	.96
27	95	2.4	2.4	4.8	94	2.8	3.0	9.7	2.9	2.0	1.9	1.1
28	3.0	2.3	2.3	2.0	28	2.8	2.8	3.7	3.2	1.9	1.7	1.2
29	48	2.1	2.3	2.1	---	3.2	2.8	2.6	2.8	1.5	1.7	1.2
30	6.0	2.3	2.4	1.8	---	3.1	2.9	2.5	2.7	1.8	1.8	1.2
31	2.2	---	2.1	1.6	---	3.1	---	2.4	---	1.8	2.0	---
TOTAL	1236.2	1970.5	74.7	882.4	1341.9	165.8	268.8	93.4	79.1	116.0	57.7	43.46
MEAN	39.9	65.7	2.41	28.5	47.9	5.35	8.96	3.01	2.64	3.74	1.86	1.45
MAX	109	107	3.2	495	624	48	106	9.7	3.6	41	2.1	2.0
MIN	1.5	2.1	2.1	1.6	1.5	2.4	2.4	2.3	2.3	1.5	1.4	.96
AC-FT	2450	3910	148	1750	2660	329	533	185	157	230	114	86

11073360 CHINO CREEK AT SCHAEFER AVENUE, NEAR CHINO, CA—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 2001, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	16.9	17.1	27.1	34.8	39.2	29.2	10.2	13.4	19.4	19.7	16.1	14.3
MAX	126	113	189	186	193	257	68.6	104	184	176	191	198
(WY)	1979	1976	1976	1976	1980	1978	1974	1997	1976	1974	1974	1997
MIN	.061	.23	.53	.55	.33	.30	.14	.22	.062	.069	.14	.13
(WY)	1978	1978	1970	1972	1972	1972	1977	1973	1977	1977	1976	1977

SUMMARY STATISTICS	FOR 2000 CALENDAR YEAR		FOR 2001 WATER YEAR		WATER YEARS 1970 - 2001	
ANNUAL TOTAL	8204.1		6329.96			
ANNUAL MEAN	22.4		17.3		21.4	
HIGHEST ANNUAL MEAN					92.4	1974
LOWEST ANNUAL MEAN					3.24	1970
HIGHEST DAILY MEAN	300	Feb 21	624	Feb 12	2060	Mar 1 1978
LOWEST DAILY MEAN	1.1	Aug 18	.96	Sep 26	.00	May 21 1977
ANNUAL SEVEN-DAY MINIMUM	1.1	Aug 17	1.1	Sep 22	.02	Oct 28 1977
MAXIMUM PEAK FLOW			2890	Jan 11	12700	Feb 27 1983
MAXIMUM PEAK STAGE			6.78	Jan 11	10.32	Feb 27 1983
ANNUAL RUNOFF (AC-FT)	16270		12560		15490	
10 PERCENT EXCEEDS	94		92		80	
50 PERCENT EXCEEDS	2.5		2.5		1.2	
90 PERCENT EXCEEDS	1.4		1.7		.33	

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA—Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.—Water years 1967 to current year.
CHEMICAL DATA: Water years 1967 to current year.
SPECIFIC CONDUCTANCE: Water years 1970 to current year.
WATER TEMPERATURE: Water years 1970 to current year.
BIOLOGICAL DATA: Water years 1975–81.
SEDIMENT DATA: Water years 1974–94, 1999 to current year.
CHLORIDE: October 1970 to September 1971.
SUSPENDED-SEDIMENT DISCHARGE: October 1973 to June 1982.

PERIOD OF DAILY RECORD.—Water years 1970 to current year.
SPECIFIC CONDUCTANCE: October 1969 to current year.
WATER TEMPERATURE: October 1969 to current year.
CHLORIDE: October 1970 to September 1971.
SUSPENDED-SEDIMENT DISCHARGE: October 1973 to June 1982.

INSTRUMENTATION.—Water-quality monitor recording specific conductance and water temperature since October 1969.

REMARKS.—Specific conductance records rated fair except for Oct. 12 to Jan. 3 and Aug. 17 to Sept. 30, which are poor. Temperature records rated fair except for Dec. 15 to Feb. 2, which are poor, and Apr. 19 to Sept. 30, which are good. Specific conductance and water temperature values are affected by releases from Prado Dam. Interruptions in record at times due to malfunction of recording or sensing equipment. Sediment data and a portion of chemical data collected for the National Water-Quality Assessment (NAWQA) Program.

EXTREMES FOR PERIOD OF DAILY RECORD.—
SPECIFIC CONDUCTANCE: Maximum recorded, 1,830 microsiemens, Apr. 30, 1971; minimum recorded, 220 microsiemens, Feb. 20, 1978.
WATER TEMPERATURE: Maximum recorded, 36.0°C, Sept. 4, 1972, Sept. 8, 1984; minimum recorded, 2.5°C, Dec. 30, 1969.
SEDIMENT CONCENTRATION: Maximum daily mean, 2,870 mg/L, Mar. 5, 1978; minimum daily mean, 3 mg/L, Apr. 2, 1980, and several days during 1982.
SEDIMENT LOAD: Maximum daily, 18,900 tons, Mar. 5, 1978; minimum daily, 0.58 ton, Sept. 20, 1978.

EXTREMES FOR CURRENT YEAR.—
SPECIFIC CONDUCTANCE: Maximum recorded, 1,090 microsiemens, Dec. 7, Apr. 6; minimum recorded, 284 microsiemens, Feb. 14.
WATER TEMPERATURE: Maximum recorded, 28.5°C, June 19, July 1-4, 7, Aug. 7, 14, 18; minimum recorded, 10.0°C, Jan. 17, 19-20.

11074000 -- SANTA ANA R BL PRADO DAM CA

WATER-QUALITY DATA, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT					
06...	1130	133	995	21.5	612
12...	1255	495	940	20.0	563
19...	1000	312	835	19.0	501
NOV					
03...	1330	336	814	17.0	492
20...	1215	349	841	13.5	494
DEC					
01...	1145	251	965	14.5	606
13...	0930	304	968	12.0	603
15...	1040	196	987	14.0	616
JAN					
05...	1145	228	976	12.0	602
18...	1050	380	680	11.0	415
19...	1350	378	701	10.5	438
FEB					
02...	1150	412	800	11.5	498
21...	1200	416	716	13.5	453
21...	1245	416	729	13.5	449
MAR					
02...	1245	525	467	12.5	286
16...	1210	380	756	16.0	468
21...	1630	433	895	18.0	572
APR					
06...	1130	349	1040	18.5	648
19...	0930	307	1040	19.0	620
19...	1215	304	1010	19.5	682
MAY					
04...	1200	343	1020	19.5	656
16...	1300	200	1030	22.5	660
18...	1140	207	993	21.5	616
JUN					
01...	1115	202	988	23.0	614
13...	1420	211	1010	24.5	614
15...	1130	204	980	22.5	628
JUL					
09...	1115	192	985	24.0	614
12...	1000	188	975	21.0	610
19...	1030	194	980	22.0	600
AUG					
03...	1115	176	974	23.5	644
14...	1000	183	930	23.0	574
17...	1115	179	940	25.0	596
SEP					
07...	1100	179	979	23.0	609
12...	1440	202	983	24.0	601
18...	1115	200	966	22.0	613

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	HARD-NESS NONCARB DISSOLV FLD. AS CACO3 (MG/L) (00904)
OCT										
06...	1130	133	--	--	--	--	995	--	21.5	--
12...	1255	495	--	--	--	--	940	--	20.0	--
19...	1000	312	750	7.8	85.7	8.0	835	20.5	19.0	50
NOV										
03...	1330	336	--	--	--	--	814	--	17.0	--
20...	1215	349	--	--	--	--	841	--	13.5	--
DEC										
01...	1145	251	--	--	--	--	965	--	14.5	--
13...	0930	304	753	10.5	98.9	8.0	968	11.0	12.0	48
15...	1040	196	--	--	--	--	987	--	14.0	--
JAN										
05...	1145	228	--	--	--	--	976	--	12.0	--
18...	1050	380	758	10.8	98.6	7.7	680	11.5	11.0	42
19...	1350	378	--	--	--	--	701	--	10.5	--
FEB										
02...	1150	412	--	--	--	--	800	--	11.5	--
21...	1200	416	756	9.9	96.0	7.9	716	17.5	13.5	46
21...	1245	416	--	--	--	--	729	--	13.5	--
MAR										
02...	1245	525	--	--	--	--	467	--	12.5	--
16...	1210	380	--	--	--	--	756	--	16.0	--
21...	1630	433	749	8.2	88.4	7.9	895	20.0	18.0	46
APR										
06...	1130	349	--	--	--	--	1040	--	18.5	--
19...	0930	307	751	8.2	90.0	8.0	1040	14.0	19.0	64
19...	1215	304	--	--	--	--	1010	--	19.5	--
MAY										
04...	1200	343	--	--	--	--	1020	--	19.5	--
16...	1300	200	748	8.0	94.5	8.1	1030	25.5	22.5	75
18...	1140	207	--	--	--	--	993	--	21.5	--
JUN										
01...	1115	202	--	--	--	--	988	--	23.0	--
13...	1420	211	745	7.4	91.2	8.2	1010	26.0	24.5	62
15...	1130	204	--	--	--	--	980	--	22.5	--
JUL										
09...	1115	192	--	--	--	--	985	--	24.0	--
12...	1000	188	751	8.3	94.8	8.1	975	23.0	21.0	52
19...	1030	194	--	--	--	--	980	--	22.0	--
AUG										
03...	1115	176	--	--	--	--	974	--	23.5	--
14...	1000	183	749	7.8	92.9	8.0	930	30.5	23.0	48
17...	1115	179	--	--	--	--	940	--	25.0	--
SEP										
07...	1100	179	--	--	--	--	979	--	23.0	--
12...	1440	202	746	8.4	102	8.3	983	29.5	24.0	43
18...	1115	200	--	--	--	--	966	--	22.0	--

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DATE	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	SODIUM ADSORPTION RATIO (00931)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	ALKALINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	BICARBONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CARBONATE WATER DIS IT FIELD MG/L AS CO3 (00452)
OCT										
06...	--	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--	--
19...	226	63.4	16.3	8.56	2.29	79.0	42.1	175	214	--
NOV										
03...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
DEC										
01...	--	--	--	--	--	--	--	--	--	--
13...	259	75.2	17.3	10.2	2.60	96.1	43.5	211	257	--
15...	--	--	--	--	--	--	--	--	--	--
JAN										
05...	--	--	--	--	--	--	--	--	--	--
18...	191	55.8	12.5	9.63	1.78	56.5	37.7	148	181	--
19...	--	--	--	--	--	--	--	--	--	--
FEB										
02...	--	--	--	--	--	--	--	--	--	--
21...	200	57.7	13.5	11.1	1.86	60.5	38.1	154	188	--
21...	--	--	--	--	--	--	--	--	--	--
MAR										
02...	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--
21...	250	71.5	17.4	12.5	2.32	84.2	40.8	204	249	--
APR										
06...	--	--	--	--	--	--	--	--	--	--
19...	277	79.5	19.0	11.5	2.51	95.9	41.8	212	259	--
19...	--	--	--	--	--	--	--	--	--	--
MAY										
04...	--	--	--	--	--	--	--	--	--	--
16...	287	83.3	19.1	11.6	2.52	97.9	41.4	213	259	--
18...	--	--	--	--	--	--	--	--	--	--
JUN										
01...	--	--	--	--	--	--	--	--	--	--
13...	260	74.2	18.2	10.2	2.63	97.6	43.8	197	241	--
15...	--	--	--	--	--	--	--	--	--	--
JUL										
09...	--	--	--	--	--	--	--	--	--	--
12...	256	72.7	18.0	10.9	2.68	98.4	44.3	203	248	--
19...	--	--	--	--	--	--	--	--	--	--
AUG										
03...	--	--	--	--	--	--	--	--	--	--
14...	240	67.8	17.1	11.0	2.69	95.7	45.1	192	234	--
17...	--	--	--	--	--	--	--	--	--	--
SEP										
07...	--	--	--	--	--	--	--	--	--	--
12...	243	69.4	17.0	9.57	2.64	94.6	44.6	200	238	3
18...	--	--	--	--	--	--	--	--	--	--

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT										
06...	--	--	--	--	--	612	--	--	--	--
12...	--	--	--	--	--	563	--	--	--	--
19...	86.8	.4	18.1	87.6	.7	501	487	.083	.53	1.2
NOV										
03...	--	--	--	--	--	492	--	--	--	--
20...	--	--	--	--	--	494	--	--	--	--
DEC										
01...	--	--	--	--	--	606	--	--	--	--
13...	105	.5	23.5	98.6	.8	603	584	<.041	.59	.86
15...	--	--	--	--	--	616	--	--	--	--
JAN										
05...	--	--	--	--	--	602	--	--	--	--
18...	65.2	.3	14.3	69.8	.6	415	393	.162	.79	1.1
19...	--	--	--	--	--	438	--	--	--	--
FEB										
02...	--	--	--	--	--	498	--	--	--	--
21...	75.9	.4	14.3	80.6	.6	453	429	.643	1.5	1.6
21...	--	--	--	--	--	449	--	--	--	--
MAR										
02...	--	--	--	--	--	286	--	--	--	--
16...	--	--	--	--	--	468	--	--	--	--
21...	102	.5	12.5	99.3	.8	572	544	.397	1.2	1.4
APR										
06...	--	--	--	--	--	648	--	--	--	--
19...	114	.5	18.3	109	.8	620	605	.428	1.3	1.6
19...	--	--	--	--	--	682	--	--	--	--
MAY										
04...	--	--	--	--	--	656	--	--	--	--
16...	109	.5	22.9	108	.9	660	607	.082	.63	1.3
18...	--	--	--	--	--	616	--	--	--	--
JUN										
01...	--	--	--	--	--	614	--	--	--	--
13...	115	.4	24.0	107	.8	614	593	<.040	.71	.97
15...	--	--	--	--	--	628	--	--	--	--
JUL										
09...	--	--	--	--	--	614	--	--	--	--
12...	114	.5	22.2	103	.8	610	585	<.040	.63	1.3
19...	--	--	--	--	--	600	--	--	--	--
AUG										
03...	--	--	--	--	--	644	--	--	--	--
14...	111	.4	21.9	103	.8	574	567	.086	.61	1.4
17...	--	--	--	--	--	596	--	--	--	--
SEP										
07...	--	--	--	--	--	609	--	--	--	--
12...	109	.5	22.4	99.5	.8	601	567	.148	.71	1.6
18...	--	--	--	--	--	613	--	--	--	--

< Actual value is known to be less than the value shown.

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC PARTIC-ULATE TOTAL (MG/L AS C) (00689)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
OCT										
06...	--	--	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--	--
19...	4.53	.052	.527	.499	.949	4.1	6.0	10	72.1	e11
NOV										
03...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
DEC										
01...	--	--	--	--	--	--	--	--	--	--
13...	6.45	.097	1.01	.781	1.07	3.8	1.6	20	67.3	e14
15...	--	--	--	--	--	--	--	--	--	--
JAN										
05...	--	--	--	--	--	--	--	--	--	--
18...	3.93	.111	.672	.666	.801	6.5	1.1	20	58.4	<20
19...	--	--	--	--	--	--	--	--	--	--
FEB										
02...	--	--	--	--	--	--	--	--	--	--
21...	4.36	.149	.759	.755	.803	6.1	.9	20	45.0	e13
21...	--	--	--	--	--	--	--	--	--	--
MAR										
02...	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--
21...	4.22	.147	.876	.859	.940	6.2	.4	30	119	<20
APR										
06...	--	--	--	--	--	--	--	--	--	--
19...	6.07	.179	.856	.760	.964	4.9	2.5	10	150	e13
19...	--	--	--	--	--	--	--	--	--	--
MAY										
04...	--	--	--	--	--	--	--	--	--	--
16...	5.41	.081	.848	.853	1.18	4.4	5.0	10	113	e19
18...	--	--	--	--	--	--	--	--	--	--
JUN										
01...	--	--	--	--	--	--	--	--	--	--
13...	5.72	.113	.818	.759	1.00	4.5	3.3	m	62.3	e16
15...	--	--	--	--	--	--	--	--	--	--
JUL										
09...	--	--	--	--	--	--	--	--	--	--
12...	4.69	.074	.764	.754	1.01	4.7	3.4	10	73.4	e18
19...	--	--	--	--	--	--	--	--	--	--
AUG										
03...	--	--	--	--	--	--	--	--	--	--
14...	4.86	.093	.790	.821	1.01	3.8	3.3	<10	39.7	<20
17...	--	--	--	--	--	--	--	--	--	--
SEP										
07...	--	--	--	--	--	--	--	--	--	--
12...	5.09	.074	.851	.790	1.08	4.1	5.9	m	38.3	<20
18...	--	--	--	--	--	--	--	--	--	--

e Estimated.
m Presence verified, not quantified.
< Actual value is known to be less than the value shown.

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA—Continued

PARTICLE-SIZE DISTRIBUTION OF SUSPENDED SEDIMENT, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	TEMPER-ATURE WATER (DEG C) (00010)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)
OCT						
19...N	1000	312	19.0	81	213	179
DEC						
13...N	0930	304	12.0	88	55	45
JAN						
18...N	1050	380	11.0	92	24	25
FEB						
21...N	1200	416	13.5	96	14	16
MAR						
21...N	1630	433	18.0	79	7	8.2
APR						
19...N	0930	307	19.0	88	36	30
MAY						
16...N	1300	200	22.5	94	128	69
JUN						
13...N	1420	211	24.5	94	79	45
JUL						
12...N	1000	188	21.0	84	79	40
AUG						
14...N	1000	183	23.0	79	86	42
SEP						
12...N	1440	202	24.0	83	109	59

N Suspended-sediment data determined from sample collected and processed according to National Water-Quality Assessment (NAWQA) Program protocol.

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA—Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	1030	995	939	886	1000	963	1020	995	871	815	463	378
2	1010	980	928	872	994	975	1030	1000	854	799	486	426
3	999	956	916	753	985	964	1060	1010	881	827	515	481
4	1000	958	758	693	997	948	1030	991	943	856	571	500
5	1040	984	742	710	972	948	1020	986	884	847	650	567
6	1020	979	769	720	980	961	1000	956	912	870	709	639
7	989	962	795	727	1090	941	998	981	945	908	741	682
8	965	925	806	744	979	924	999	950	1010	937	781	738
9	952	908	839	794	996	915	967	882	1040	913	788	729
10	962	914	852	797	994	917	994	543	1010	975	837	746
11	955	914	855	824	1010	930	554	301	1000	963	836	802
12	967	933	860	816	1010	983	493	360	983	646	809	772
13	980	949	867	837	1020	986	578	479	646	286	805	775
14	1060	977	891	854	1010	984	584	513	405	284	801	773
15	1000	947	878	847	1010	987	665	545	436	355	797	771
16	971	935	868	836	993	968	735	597	473	404	802	763
17	935	808	860	846	1000	959	771	560	516	458	813	778
18	828	802	860	818	992	959	791	659	594	478	843	795
19	820	772	840	790	1000	958	736	660	628	550	874	822
20	814	739	841	786	982	949	707	649	732	628	905	858
21	795	691	854	785	983	943	702	655	775	685	959	898
22	691	656	900	756	980	933	746	648	758	677	970	929
23	660	651	942	881	979	949	739	630	781	702	1000	961
24	668	651	952	885	1030	933	820	682	871	781	1030	985
25	681	649	934	901	1020	996	866	743	855	742	1020	995
26	684	654	947	907	1030	997	832	752	753	504	1030	1010
27	740	619	1000	947	1010	982	942	815	549	469	1040	1020
28	869	740	---	---	1030	999	872	798	519	357	1050	1020
29	917	823	---	---	1030	1010	831	757	---	---	1050	1010
30	823	499	1000	970	1050	1010	896	759	---	---	1060	1030
31	900	794	---	---	1020	997	923	833	---	---	1060	1030
MONTH	1060	499	---	---	1090	915	1060	301	1040	284	1060	378
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1060	1040	995	955	1050	932	928	880	989	946	969	933
2	1080	997	989	960	950	914	932	876	986	965	990	957
3	1060	1040	1040	959	958	876	966	907	1020	962	996	964
4	1060	1040	1050	1020	945	863	984	935	974	893	993	972
5	1060	1040	1060	1020	927	899	971	720	946	892	997	985
6	1090	1040	1020	984	909	881	965	791	918	889	1020	985
7	1070	652	999	978	893	865	955	891	929	900	1000	954
8	662	566	1060	984	874	858	974	914	925	886	988	950
9	740	559	1050	1030	891	836	1000	942	913	880	1010	953
10	862	716	1070	1020	954	877	987	930	904	869	986	962
11	882	812	1040	1010	962	908	987	944	938	859	981	954
12	909	843	1040	997	987	944	1000	965	977	916	983	946
13	977	905	1030	990	993	952	992	942	957	909	973	943
14	1020	970	1030	1010	1010	935	991	930	962	921	999	950
15	1030	992	1020	1000	999	959	988	922	978	941	1040	967
16	1030	994	1010	992	985	932	975	936	1000	927	1020	973
17	1030	994	1010	991	972	892	967	931	1010	949	997	969
18	1030	992	1020	1000	969	925	984	950	991	941	998	918
19	1070	990	1030	987	1010	901	997	941	958	918	968	898
20	1060	1010	1020	986	1000	959	964	878	939	911	920	884
21	1030	673	1000	979	977	929	931	855	953	917	907	873
22	774	675	1000	971	961	934	903	850	917	884	926	868
23	859	690	1020	975	947	917	885	840	898	874	903	868
24	959	844	1030	981	950	916	886	820	886	867	900	870
25	1010	931	1010	972	946	914	890	859	886	855	931	876
26	1010	924	1010	976	948	921	879	840	889	850	941	901
27	1000	924	1010	969	936	917	880	832	937	852	940	898
28	1000	957	997	961	934	906	939	839	948	924	965	908
29	1000	962	1000	963	932	905	950	905	942	925	984	937
30	1000	955	1010	981	922	880	981	892	949	926	995	944
31	---	---	1060	993	---	---	982	942	952	933	---	---
MONTH	1090	559	1070	955	1050	836	1000	720	1020	850	1040	868

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA---Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	21.5	20.5	19.5	16.0	16.0	14.0	15.5	12.0	12.0	11.5	12.5	12.0
2	22.0	21.0	19.5	16.5	17.0	14.5	14.0	11.5	12.5	11.5	13.0	12.0
3	22.0	21.0	18.0	16.0	17.0	14.0	14.0	11.5	12.5	12.0	12.5	12.0
4	21.5	21.0	18.5	15.0	17.0	13.5	15.0	11.0	13.5	12.5	13.0	12.0
5	22.0	21.0	18.0	15.0	17.5	15.0	14.0	11.5	13.0	12.5	13.5	12.5
6	21.5	21.0	18.0	17.0	16.5	15.0	15.5	12.5	14.0	13.0	14.0	13.5
7	21.0	21.0	17.5	15.5	17.5	15.0	15.0	12.0	14.5	14.0	14.5	14.0
8	21.5	20.0	17.0	14.0	17.0	16.0	14.5	13.0	14.5	14.0	15.0	14.5
9	21.0	20.0	17.0	14.5	17.5	15.5	15.0	13.0	14.5	13.5	15.0	14.5
10	21.0	20.5	16.5	14.5	17.5	16.0	14.5	12.0	13.5	13.0	15.5	14.5
11	20.5	20.0	16.5	14.5	17.0	15.0	13.5	10.5	13.0	12.5	15.5	15.0
12	20.0	19.5	16.5	13.5	16.0	14.5	10.5	10.5	13.0	12.0	16.0	15.0
13	20.0	19.0	16.0	13.0	15.0	12.5	11.0	10.5	12.5	11.0	15.5	15.0
14	22.0	18.5	15.5	12.5	16.0	13.0	11.0	10.5	11.0	10.5	15.5	15.0
15	22.0	18.5	15.5	13.0	16.0	13.5	11.0	10.5	11.0	10.5	16.0	15.0
16	22.5	19.0	15.5	12.5	16.0	13.0	11.5	10.5	11.5	11.0	16.0	15.5
17	22.5	19.0	15.0	13.0	16.0	12.5	11.5	10.0	12.0	11.0	16.5	16.0
18	22.5	20.0	16.0	12.5	15.0	13.0	11.0	10.5	12.0	11.0	17.0	16.5
19	23.0	20.5	16.5	12.0	15.0	12.0	10.5	10.0	12.0	11.5	17.5	17.0
20	22.5	20.0	16.5	12.5	14.5	11.5	11.0	10.0	13.0	12.0	18.0	17.5
21	22.5	20.5	16.5	14.0	15.0	11.5	10.5	10.5	13.5	12.5	18.5	17.5
22	21.5	19.5	16.0	13.5	15.0	11.5	11.0	10.5	13.5	12.5	19.0	18.5
23	20.5	18.5	17.0	13.5	14.5	11.5	11.0	10.5	13.5	12.5	19.0	19.0
24	21.5	19.0	17.0	13.5	15.0	11.5	11.5	10.5	13.5	13.5	19.5	19.0
25	21.5	18.5	17.5	13.5	14.0	11.5	11.5	11.0	13.5	13.0	19.5	19.0
26	21.0	18.5	17.5	14.0	14.0	11.0	11.5	11.0	13.0	13.0	19.5	19.0
27	19.5	18.0	17.0	14.0	14.5	11.0	12.0	11.5	13.5	13.0	19.5	19.0
28	19.5	18.0	---	---	14.5	11.0	12.0	11.5	13.5	12.0	20.0	19.5
29	19.5	18.5	---	---	15.0	11.0	12.0	11.5	---	---	20.5	20.0
30	19.0	17.0	17.0	14.5	15.0	11.0	13.0	11.5	---	---	21.0	20.0
31	18.5	17.0	---	---	15.0	11.5	12.5	11.5	---	---	21.0	20.5
MONTH	23.0	17.0	---	---	17.5	11.0	15.5	10.0	14.5	10.5	21.0	12.0
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	21.0	20.5	22.0	21.5	25.5	22.0	28.5	23.5	27.0	22.0	27.0	22.0
2	20.5	20.5	22.0	21.0	24.0	21.5	28.5	23.5	27.0	22.5	27.5	23.0
3	20.5	20.0	21.0	19.5	23.5	20.5	28.5	24.0	27.0	22.0	27.0	23.5
4	20.0	18.5	21.5	19.5	25.0	20.0	28.5	24.5	27.0	22.0	27.5	23.0
5	18.5	18.0	23.5	19.5	25.0	20.0	27.5	24.0	27.5	22.0	26.5	23.0
6	18.5	18.0	25.0	19.5	26.0	21.0	27.5	24.5	27.5	22.5	25.5	23.0
7	18.5	16.0	25.5	20.0	27.0	22.0	28.5	24.0	28.5	23.5	25.5	22.5
8	16.0	15.0	26.5	21.0	27.5	22.0	28.0	23.0	28.0	23.5	25.0	22.0
9	16.0	15.5	27.0	21.5	27.5	22.5	28.0	23.0	27.5	23.0	24.5	21.5
10	15.5	15.0	26.5	21.0	27.0	22.5	27.0	22.0	27.5	22.5	24.5	21.5
11	16.0	15.5	26.0	21.5	27.0	22.0	26.5	21.5	28.0	22.5	25.0	21.5
12	16.5	15.5	24.0	21.0	25.0	22.0	26.5	21.0	27.5	23.0	25.5	21.5
13	17.5	16.5	24.0	20.5	26.0	21.0	27.5	21.5	28.0	23.0	25.0	20.5
14	18.5	17.5	24.0	19.0	27.0	21.0	27.0	22.0	28.5	23.0	25.5	21.0
15	19.5	18.5	24.0	19.5	27.5	21.5	26.5	22.5	28.0	23.0	25.5	21.5
16	20.0	19.0	25.0	20.5	27.5	22.0	26.5	22.0	28.0	23.0	25.0	21.0
17	20.0	19.5	25.5	21.0	27.5	22.0	26.5	21.0	28.0	23.0	24.5	21.0
18	20.5	19.5	25.0	21.0	27.5	22.0	26.5	21.5	28.5	23.5	24.5	21.0
19	20.0	19.0	24.0	21.0	28.5	22.5	27.0	21.5	28.0	23.5	24.5	21.0
20	19.5	18.5	25.0	20.5	28.0	22.0	26.5	21.5	27.5	23.5	24.5	20.5
21	19.0	16.0	25.0	21.5	27.5	22.5	27.0	21.5	26.5	22.5	25.0	20.5
22	16.5	15.5	27.0	21.5	27.5	22.5	27.0	21.5	26.0	22.5	25.0	21.0
23	18.0	16.5	28.0	22.0	27.5	22.5	26.5	21.5	26.0	21.5	25.0	21.0
24	20.0	18.0	26.5	22.5	27.0	21.5	26.0	21.5	27.0	22.0	26.0	21.0
25	20.5	19.5	27.0	22.5	27.0	22.0	26.5	22.0	27.5	22.5	25.5	21.5
26	21.5	20.5	24.5	22.0	27.0	21.5	27.0	21.5	27.5	23.0	25.5	21.0
27	22.0	21.0	23.0	21.0	27.0	21.5	27.5	22.5	27.0	22.5	25.0	21.5
28	21.5	20.5	22.5	20.5	27.5	21.0	28.0	22.5	26.5	22.5	24.5	21.0
29	21.0	20.5	25.5	20.0	28.0	22.0	27.5	22.5	25.5	22.0	25.5	20.5
30	21.5	20.5	26.5	21.0	28.0	23.0	26.5	22.5	26.0	22.0	26.0	21.5
31	---	---	27.0	21.5	---	---	27.0	22.0	26.0	21.5	---	---
MONTH	22.0	15.0	28.0	19.0	28.5	20.0	28.5	21.0	28.5	21.5	27.5	20.5

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

WATER-QUALITY RECORDS

PERIOD OF RECORD.—Water years 1970 to current year.
CHEMICAL DATA: Water years 1970 to current year.
SPECIFIC CONDUCTANCE: Water years 1970–78, 1999-2000.
WATER TEMPERATURE: Water years 1999-2000.
SEDIMENT DATA: Water years 1999-2000.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2000 TO SEPTEMBER 2001

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE WATER (DEG C) (00010)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)
OCT					
02...	1025	80	930	21.5	561
18...	1400	99	872	23.0	545
NOV					
01...	0930	104	870	18.0	534
22...	0805	91	902	13.5	559
DEC					
07...	0855	101	904	17.0	561
20...	0805	107	877	13.0	548
JAN					
03...	0720	88	870	12.5	571
23...	0950	94	877	14.5	557
FEB					
02...	0950	93	858	14.5	574
14...	1015	209	721	13.5	421
MAR					
01...	0835	217	606	13.5	388
15...	0835	90	947	16.5	598
APR					
02...	0850	99	884	16.5	552
24...	0910	93	930	18.0	596
MAY					
01...	0840	82	900	17.0	564
17...	0750	82	886	19.0	574
JUN					
04...	0810	88	902	18.5	562
12...	0835	80	895	19.5	552
JUL					
02...	0810	76	905	21.0	572
10...	1215	72	922	27.5	574
AUG					
06...	1110	77	909	25.0	588
21...	1115	77	915	24.0	586
SEP					
05...	1420	72	893	24.0	568
17...	1430	65	926	24.0	550

APPENDIX B

DAILY PRECIPITATION DATA
ESTIMATED FOR SAN BERNARDINO

WATER YEAR 2000-01

TABLE B-1

DAILY PRECIPITATION CALCULATED FOR MISSING/QUESTIONABLE DATA
FOR STATION 2146-A AT SAN BERNARDINO
(inches)

	2000			2001								
Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0	0	0	0	0	0.11	0.02	0	0	0	0	0
2	0	0	0	0	0	0	0.11	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0.01	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0.03	0	0	0.01	0	0	0.09	0	0
6	0	0	0	0	0	0.34	0	0	0	0.01	0	0
7	0	0	0	0	0	0.19	0.63	0	0	0	0	0
8	0	0	0	0.27	0	0	0.03	0	0	0	0	0
9	0	0	0.02	0.01	0	0.37	0.27	0	0	0	0	0
10	0.04	0.08	0	1.58	0.27	0.22	0.19	0	0	0	0	0
11	0	0	0	1.68	0	0.01	0.01	0	0	0	0	0
12	0	0	0.07	0.02	2.16	0	0.02	0.03	0.01	0	0	0
13	0	0	0	0	0.97	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0.13	0	0	0	0	0	0	0	0
16	0	0	0	0	0.38	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0.01	0	0	0	0	0	0	0
19	0	0	0	0	0.24	0	0	0	0	0	0	0
20	0	0	0	0	0.19	0	0.04	0	0	0	0	0
21	0.04	0	0	0	0	0	0.55	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0.38	0	0	0	0	0	0	0
24	0	0	0	0.20	0.20	0	0	0	0	0	0	0
25	0	0	0	0	0.61	0	0	0	0	0	0	0
26	0	0	0	0.53	0.31	0	0	0	0	0	0	0
27	0.07	0	0	0.07	0.85	0	0	0.03	0	0	0	0
28	0	0	0	0.01	0.58	0	0	0	0	0	0	0
29	0.81	0	0	0		0.01	0	0	0	0	0	0
30	0.01	0	0	0		0	0	0	0	0	0	0
31	0		0	0		0		0		0	0	
Total	0.98	0.08	0.09	4.53	7.15	1.25	1.88	0.06	0.01	0.10	0.00	0.00

Total Rainfall = 16.13 Inches

Data Source:

Calculated from San Bernardino Flood Control District Precipitation Stations 2001B3, 2015, and 2357 using the method described in the following memo dated Feb. 4, 2002.

MEMORANDUM

DATE: February 4, 2002
TO: SAR Watermaster
FROM: Gwen Sharp, Roy Herndon

SUBJECT: CALCULATION OF 2000-01 PRECIPITATION FOR MISSING/QUESTIONABLE DATA FOR STATION 2146-A AT SAN BERNARDINO COUNTY HOSPITAL

The Santa Ana River Watermaster has historically used precipitation recorded at the San Bernardino County Hospital Station 2146 as a means of determining when storm flow occurs in the Santa Ana River. Data from a standard, or manually measured, station was used until that station was abandoned after 1998. Thereafter, data from the automatic station, 2146-A, which was established in 1984, has been used. As review of the data for the 2000-01 Watermaster Report began, it was noted that the total precipitation recorded at Station 2146-A was very low, 2.44 inches, and that there were 58 days of missing data. Forty-seven of the missing days were during February and March, historically two of the wettest months of the year. At a meeting in November 2001, the Watermaster committee instructed staff to investigate calculating precipitation for that site using the double-mass curve method.

Staff obtained and reviewed a copy of the USGS paper, "Double-Mass Curves," by James K. Searcy and Clayton H. Hardison, (1960), from Manual of Hydrology: Part 1. General Surface-Water Techniques, Geological Survey Water-Supply Paper 1541-B, a copy of which is enclosed. Our review found that the primary purpose of the double-mass method was for data quality or trend analysis of a flow or precipitation station rather than to replace a missing year of record. Searcy and Hardison suggested the method used by the U.S. Weather Bureau as a simpler and more suitable method to use in a case where one year of data was missing or poor. The authors state that "The double-mass curve can also be used to estimate missing precipitation data, but the method is generally more laborious and no more accurate than the U.S. Weather Bureau method."

The paper described the Weather Bureau method (page 39) of using data from three adjacent stations to calculate missing data. If the three adjacent stations have precipitation ratios within 10% of the missing station, an average of the three stations is used. If the ratios are not all within 10% of the missing station, the normal-ratio method is used. "In this method, the precipitation at each of the three stations is multiplied by

the ratio of the normal annual precipitation at the interpolation [missing or poor-quality] station to the normal annual precipitation at each station. The weighted precipitation of the three stations is averaged to obtain the estimate for the interpolation station." Based on this information, staff proceeded to follow the U.S. Weather Bureau method.

Nearby precipitation stations were reviewed for proximity to Station 2146-A and completeness of records. Station 2001B3 located approximately one and one-half miles south of 2146, Station 2015 located three miles north and one mile east of 2146, and Station 2357 located two and one-quarter miles north and one mile west of 2146 were determined to be the best stations for this purpose due to their proximity to 2146-A (see location map attached) and for having from 22 to over 40 years of continuous data.

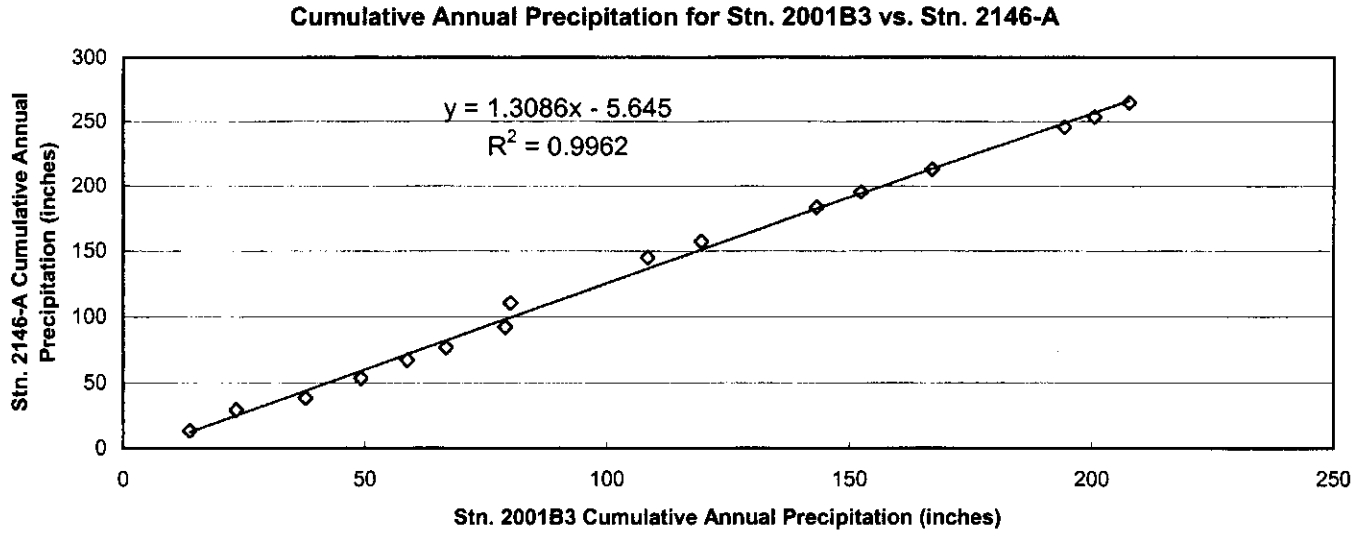
The cumulative annual, monthly, and daily precipitation from 1984-85 through 1999-00 for each of the adjacent stations was graphed against like data for the same time period from Station 2146-A. A trend line through the points on the graph gave the ratio of each station's precipitation to that of Station 2146-A. The ratios obtained for annual, monthly, and daily data at each station varied very little (see attached graphs). The R^2 values for all of the trend lines were greater than 0.996, showing excellent correlation. The ratios did, however, vary between 0.9 and 1.3 (greater than 10%), so it was necessary to apply the normal-ratio method.

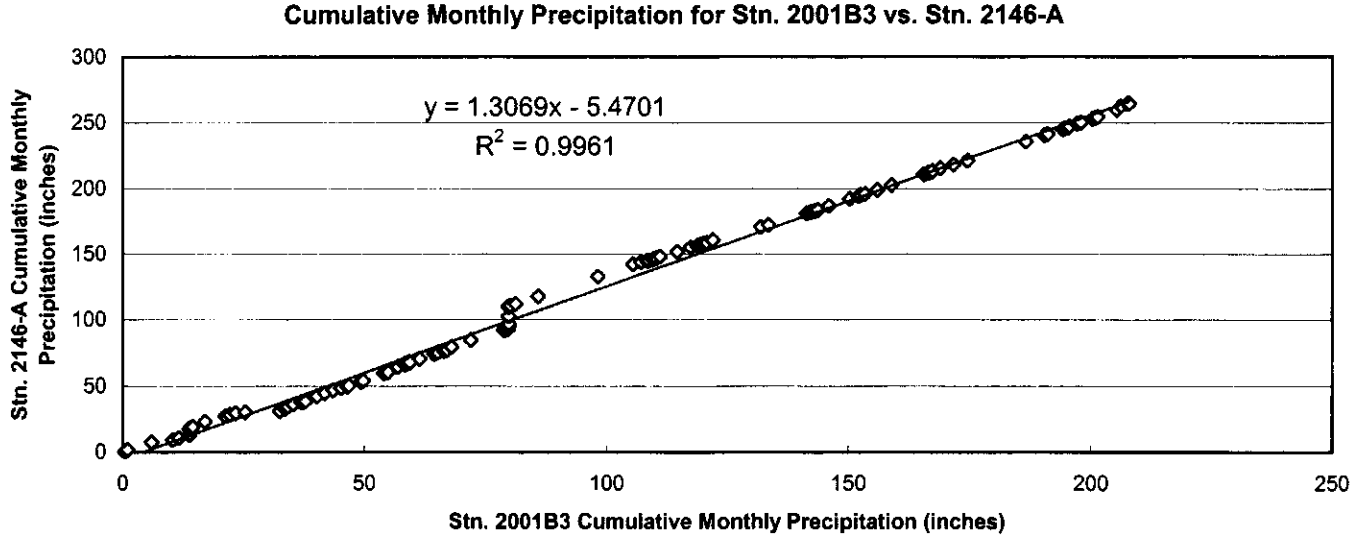
The historical annual precipitation ratio of each station to 2146-A was applied to the 2000-01 daily precipitation for each of the three adjacent stations and then averaged to estimate the daily precipitation for Station 2146-A, using the following equation:

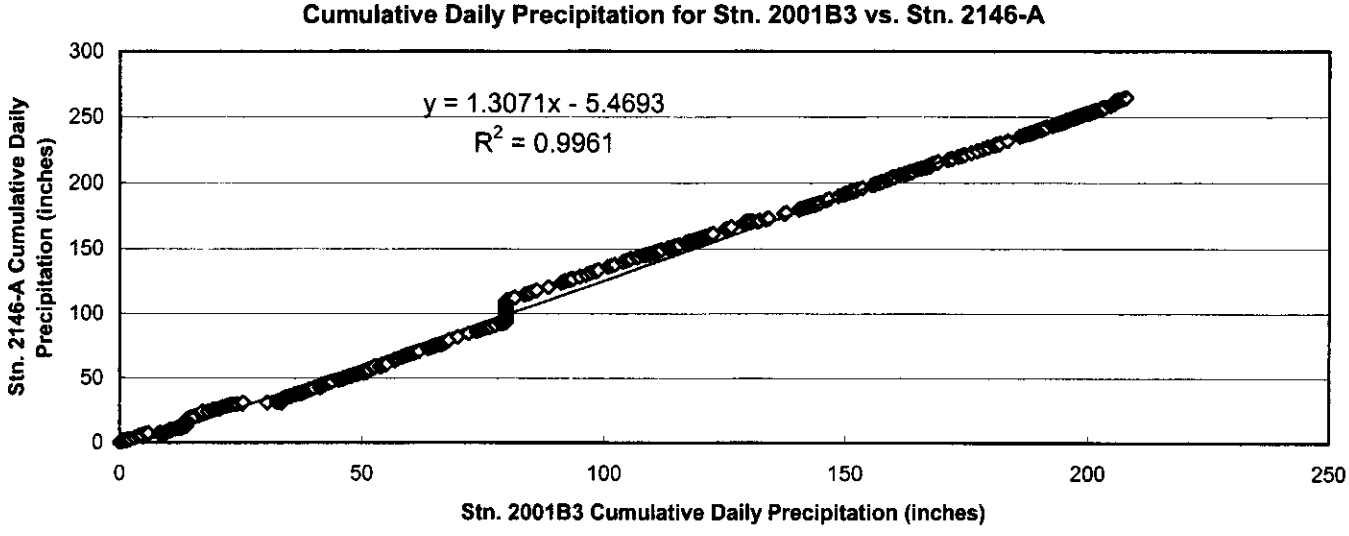
$$P_{2146\text{-}A} = (R_1P_1 + R_2P_2 + R_3P_3)/3$$

where: $P_{2146\text{-}A}$ = calculated daily precipitation for Station 2146-A
R_x = historical annual precipitation ratio of Station X to Station 2146-A
P_x = daily precipitation for Station X

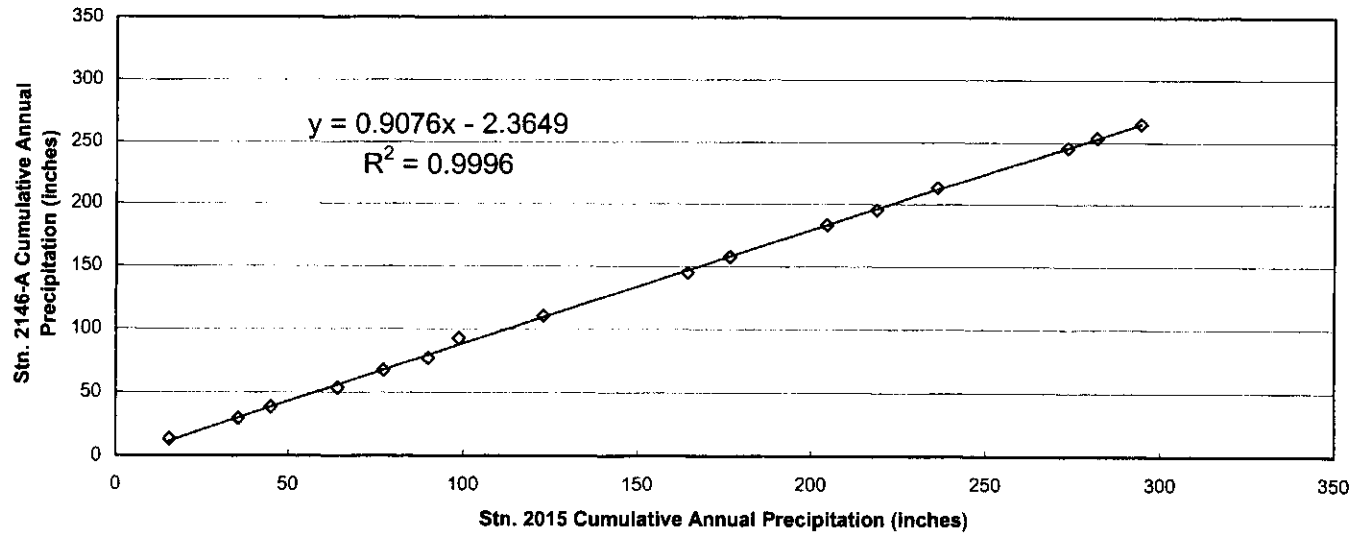
As seen in the attached table, the calculated total 2000-01 precipitation for Station 2146-A was 16.13 inches. Precipitation graphs for the calculated Station 2146-A and the measured amounts at the adjacent stations are enclosed in the packet.


Cumulative Annual Precipitation for Stn. 2001B3 vs. Stn. 2146-A
y = 1.3086x - 5.645
R2 = 0.9962
Stn. 2146-A Cumulative Annual Precipitation (inches)
Stn. 2001B3 Cumulative Annual Precipitation (inches)
0
50
100
150
200
250
300

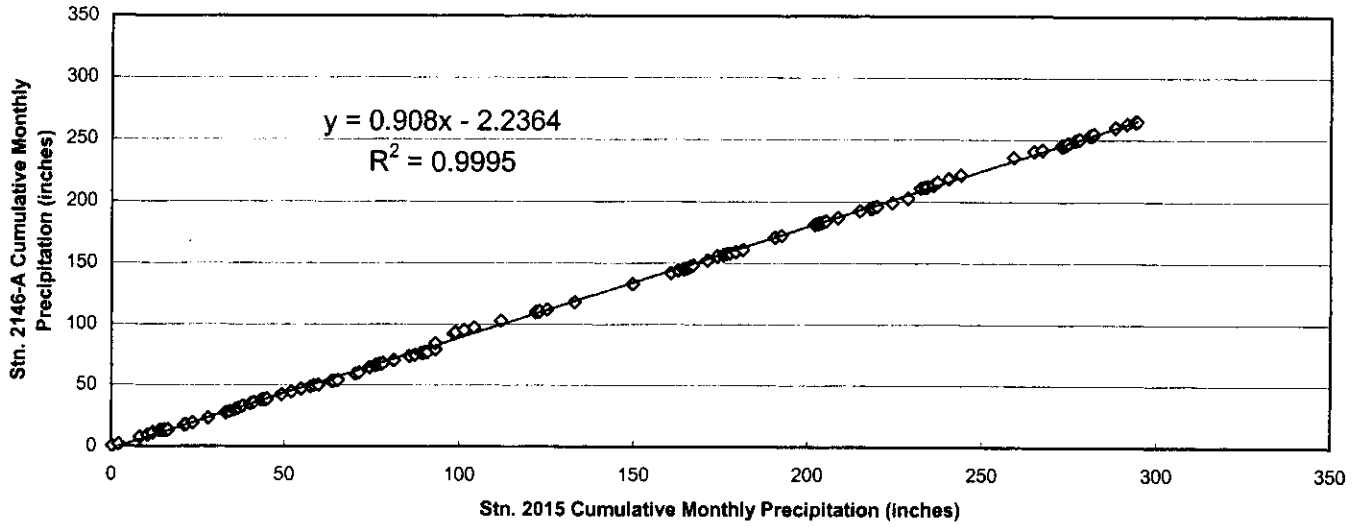

Cumulative Monthly Precipitation for Stn. 2001B3 vs. Stn. 2146-A
y = 1.3069x - 5.4701
R2 = 0.9961
Stn. 2146-A Cumulative Monthly Precipitation (inches)
Stn. 2001B3 Cumulative Monthly Precipitation (inches)
0
50
100
150
200
250
300


Cumulative Daily Precipitation for Stn. 2001B3 vs. Stn. 2146-A
y = 1.3071x - 5.4693
R2 = 0.9961
Stn. 2146-A Cumulative Daily Precipitation (inches)
Stn. 2001B3 Cumulative Daily Precipitation (inches)
0
50
100
150
200
250
300

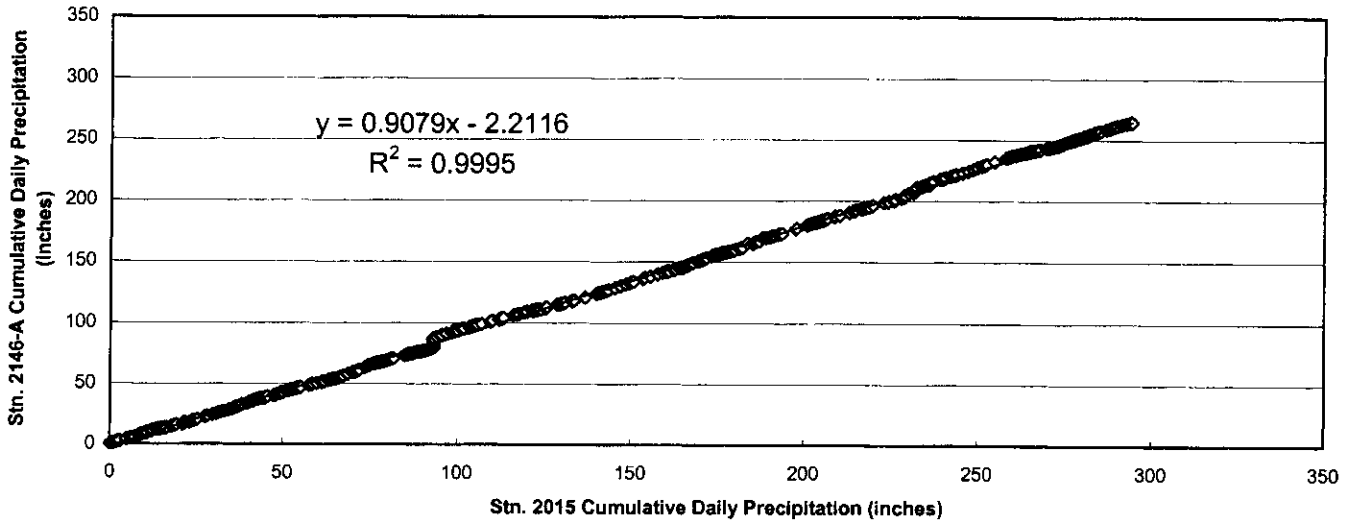
Cumulative Annual Precipitation for Stn. 2015 vs. Stn. 2146-A



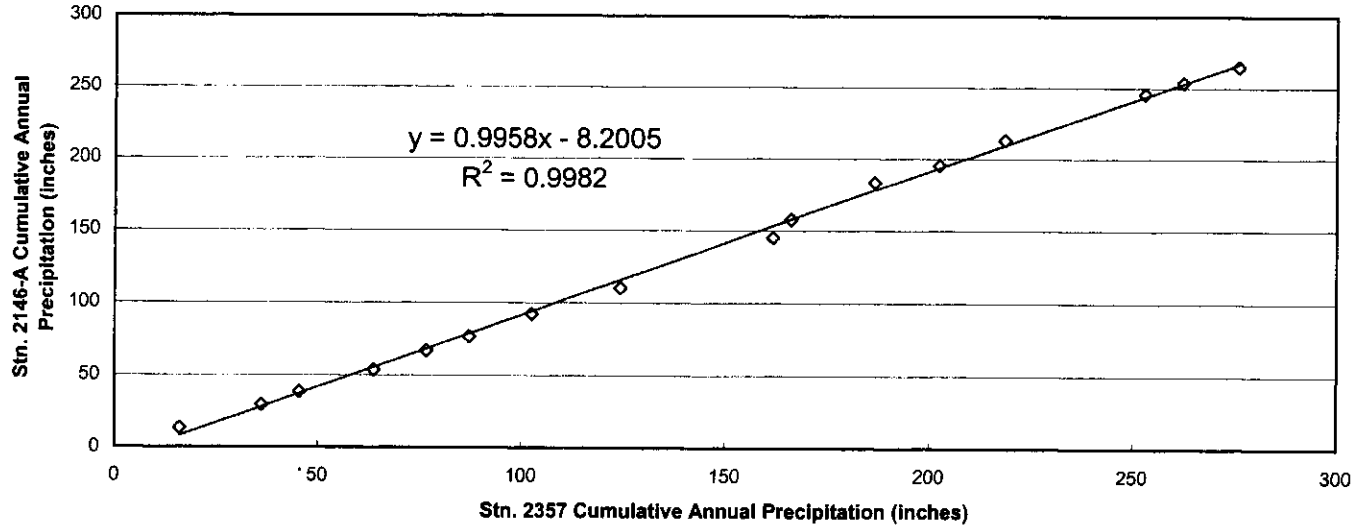
Cumulative Monthly Precipitation for Stn. 2015 vs. Stn. 2146-A



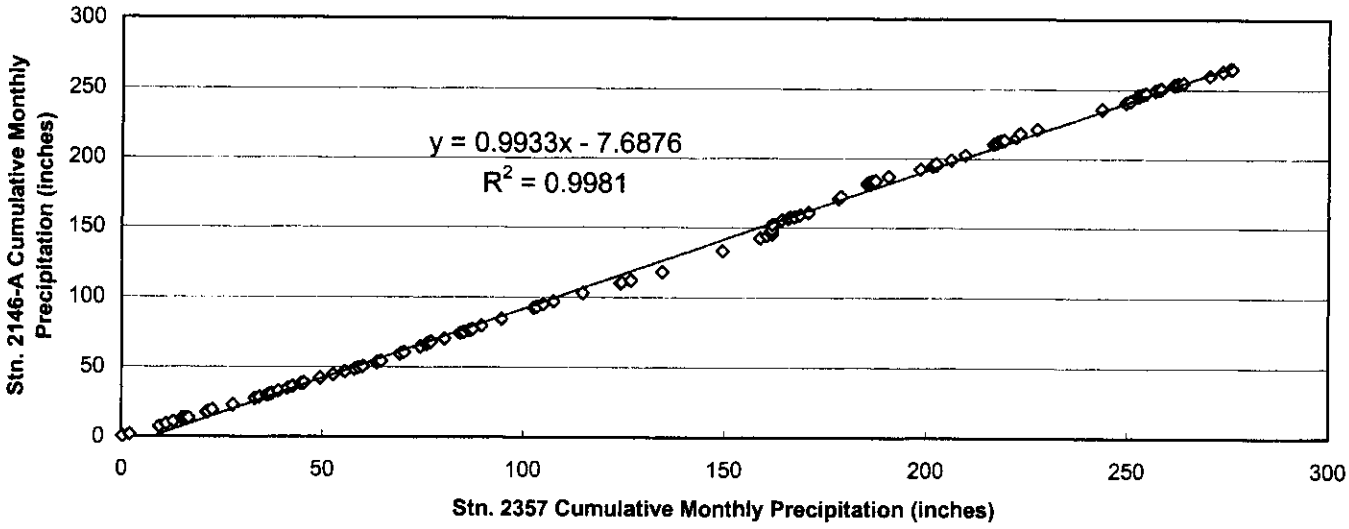
Cumulative Daily Precipitation for Stn. 2015 vs. Stn. 2146-A



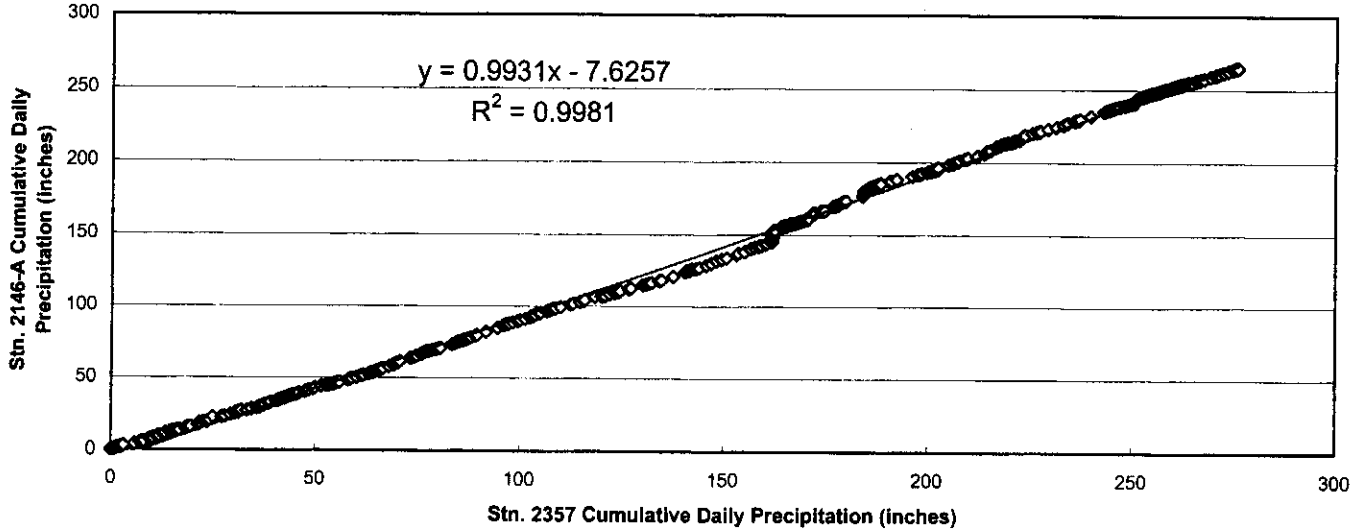
Cumulative Annual Precipitation for Stn. 2357 vs. Stn. 2146-A



Cumulative Monthly Precipitation for Stn. 2357 vs. Stn. 2146-A



Cumulative Daily Precipitation for Stn. 2357 vs. Stn. 2146-A



OCT-00 - SEPT-01 MISSING RECORDS FOR STATION 2146-A CALCULATED FROM ADJACENT STATIONS 2001B3, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations							
		2001B3	2015	2357	(2001B3 X	(2015 X	(2357 X		Monthly
Ratio Adjacent Stn. to 2146-A =		1.3086	0.9076	0.9958	1.3086)	0.9076)	0.9958)	Average	Total
10/1/00	0	0	0	0	0	0	0	0	
10/2/00	0	0	0	0	0	0	0	0	
10/3/00	0	0	0	0	0	0	0	0	
10/4/00	0	0	0.02	0	0	0.02	0	0.01	
10/5/00	0	0	0	0	0	0	0	0	
10/6/00	0	0	0	0	0	0	0	0	
10/7/00	0	0	0	0	0	0	0	0	
10/8/00	0	0	0	0	0	0	0	0	
10/9/00	0	0	0.01	0	0	0.01	0	0	
10/10/00	0.07	0.02	0.09	0.02	0.03	0.08	0.02	0.04	
10/11/00	0	0.01	0	0	0.01	0	0	0	
10/12/00	0	0	0	0	0	0	0	0	
10/13/00	0	0	0	0	0	0	0	0	
10/14/00	0	0	0	0	0	0	0	0	
10/15/00	0	0	0	0	0	0	0	0	
10/16/00	0	0	0	0	0	0	0	0	
10/17/00	0	0	0	0	0	0	0	0	
10/18/00	0	0	0	0	0	0	0	0	
10/19/00	0	0	0	0	0	0	0	0	
10/20/00	0	0	0	0	0	0	0	0	
10/21/00	0.02	0.05	0.02	0.04	0.07	0.02	0.04	0.04	
10/22/00	0	0	0	0	0	0	0	0	
10/23/00	0	0	0	0	0	0	0	0	
10/24/00	0	0	0	0	0	0	0	0	
10/25/00	0	0	0	0	0	0	0	0	
10/26/00	0	0	0	0	0	0	0	0	
10/27/00	0	0.01	0.06	0.15	0.01	0.05	0.15	0.07	
10/28/00	0	0.01	0	0	0.01	0	0	0	
10/29/00	0.04	0.65	0.84	0.81	0.85	0.76	0.81	0.81	
10/30/00	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
10/31/00	0	0	0	0	0	0	0	0	0.98
11/1/00	0.01	0	0	0	0	0	0	0	
11/2/00	0	0	0	0	0	0	0	0	
11/3/00	0	0	0	0	0	0	0	0	
11/4/00	0	0	0	0	0	0	0	0	
11/5/00	0	0	0	0	0	0	0	0	
11/6/00	0	0	0	0	0	0	0	0	
11/7/00	0	0	0	0	0	0	0	0	
11/8/00	0	0	0	0	0	0	0	0	
11/9/00	0	0	0	0	0	0	0	0	
11/10/00	0	0	0.08	0.16	0	0.07	0.16	0.08	
11/11/00	0	0	0	0	0	0	0	0	
11/12/00	0	0	0	0	0	0	0	0	
11/13/00	0	0	0	0	0	0	0	0	
11/14/00	0	0	0	0	0	0	0	0	
11/15/00	0	0	0	0	0	0	0	0	
11/16/00	0	0	0	0	0	0	0	0	
11/17/00	0	0	0	0	0	0	0	0	

OCT-00 - SEPT-01 MISSING RECORDS FOR STATION 2146-A CALCULATED FROM ADJACENT STATIONS 2001B3, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations							
		2001B3	2015	2357	(2001B3 X	(2015 X	(2357 X		Monthly
Ratio Adjacent Stn. to 2146-A =		1.3086	0.9076	0.9958	1.3086)	0.9076)	0.9958)	Average	Total
11/18/00	0	0	0	0	0	0	0	0	
11/19/00	0	0	0	0	0	0	0	0	
11/20/00	0	0	0	0	0	0	0	0	
11/21/00	0	0	0	0	0	0	0	0	
11/22/00	0	0	0	0	0	0	0	0	
11/23/00	0	0	0	0	0	0	0	0	
11/24/00	0	0	0	0	0	0	0	0	
11/25/00	0	0	0	0	0	0	0	0	
11/26/00	0	0	0	0	0	0	0	0	
11/27/00	0	0	0	0	0	0	0	0	
11/28/00	0	0	0	0	0	0	0	0	
11/29/00	0	0	0	0	0	0	0	0	
11/30/00	0	0	0	0	0	0	0	0	0.08
12/1/00	0	0	0	0	0	0	0	0	
12/2/00	0	0	0	0	0	0	0	0	
12/3/00	0	0	0	0	0	0	0	0	
12/4/00	0	0	0	0	0	0	0	0	
12/5/00	0	0	0	0	0	0	0	0	
12/6/00	0	0	0	0	0	0	0	0	
12/7/00	0	0	0	0	0	0	0	0	
12/8/00	0	0	0	0	0	0	0	0	
12/9/00	0	0	0.02	0.03	0	0.02	0.03	0.02	
12/10/00	0	0	0	0	0	0	0	0	
12/11/00	0	0	0	0	0	0	0	0	
12/12/00	0.03	0.07	0.07	0.05	0.09	0.06	0.05	0.07	
12/13/00	0	0	0	0	0	0	0	0	
12/14/00	0	0	0	0	0	0	0	0	
12/15/00	0	0	0	0	0	0	0	0	
12/16/00	0	0	0	0	0	0	0	0	
12/17/00	0	0	0	0	0	0	0	0	
12/18/00	0	0	0	0	0	0	0	0	
12/19/00	0	0	0	0	0	0	0	0	
12/20/00	0	0	0	0	0	0	0	0	
12/21/00	0	0	0	0	0	0	0	0	
12/22/00	0	0	0	0	0	0	0	0	
12/23/00	0	0	0	0	0	0	0	0	
12/24/00	0	0	0	0	0	0	0	0	
12/25/00	0	0	0	0	0	0	0	0	
12/26/00	0	0	0	0	0	0	0	0	
12/27/00	0	0	0	0	0	0	0	0	
12/28/00	0	0	0	0	0	0	0	0	
12/29/00	0	0	0	0	0	0	0	0	
12/30/00	0	0	0	0	0	0	0	0	
12/31/00	0	0	0	0	0	0	0	0	0.09
1/1/01	0	0	0	0	0	0	0	0	
1/2/01	0	0	0	0	0	0	0	0	
1/3/01	0	0	0	0	0	0	0	0	
1/4/01	0	0	0	0	0	0	0	0	
1/5/01	0.02	0.01	0.04	0.05	0.01	0.04	0.05	0.03	

OCT-00 - SEPT-01 MISSING RECORDS FOR STATION 2146-A CALCULATED FROM ADJACENT STATIONS 2001B3, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations							
		2001B3	2015	2357	(2001B3 X	(2015 X	(2357 X		Monthly
Ratio Adjacent Stn. to 2146-A =		1.3086	0.9076	0.9958	1.3086)	0.9076)	0.9958)	Average	Total
1/6/01	0	0	0	0	0	0	0	0	
1/7/01	0	0	0	0	0	0	0	0	
1/8/01	0.01	0.24	0.26	0.25	0.31	0.24	0.25	0.27	
1/9/01	0.01	0	0.01	0.01	0	0.01	0.01	0.01	
1/10/01	0.17	1.4	1.48	1.57	1.83	1.34	1.56	1.58	
1/11/01	0.41	1.25	1.74	1.83	1.64	1.58	1.82	1.68	
1/12/01	0	0.03	0.01	0.02	0.04	0.01	0.02	0.02	
1/13/01	0	0	0	0	0	0	0	0	
1/14/01	0	0.01	0	0	0.01	0	0	0	
1/15/01	0.1	0.22	0.04	0.08	0.29	0.04	0.08	0.13	
1/16/01	0.01	0	0	0	0	0	0	0	
1/17/01	0	0	0	0	0	0	0	0	
1/18/01	0	0	0	0	0	0	0	0	
1/19/01	0	0	0	0	0	0	0	0	
1/20/01	0	0	0	0	0	0	0	0	
1/21/01	0	0	0	0	0	0	0	0	
1/22/01	0	0	0	0	0	0	0	0	
1/23/01	0	0	0	0	0	0	0	0	
1/24/01	0.11	0	0.36	0.28	0	0.33	0.28	0.20	
1/25/01	0.02	0	0	0	0	0	0	0	
1/26/01	0.18	0.58	0.45	0.41	0.76	0.41	0.41	0.53	
1/27/01	0.04	0.04	0.07	0.08	0.05	0.06	0.08	0.07	
1/28/01	0	0.01	0	0.01	0.01	0	0.01	0.01	
1/29/01	0	0	0	0	0	0	0	0	
1/30/01	0	0	0	0	0	0	0	0	
1/31/01	0	0	0	0	0	0	0	0	4.53
2/1/01	0.01	0	0	0	0	0	0	0	
2/2/01	0	0	0	0	0	0	0	0	
2/3/01	0	0	0	0	0	0	0	0	
2/4/01	0	0	0	0	0	0	0	0	
2/5/01	0	0	0	0	0	0	0	0	
2/6/01	0	0	0	0	0	0	0	0	
2/7/01	0	0	0.01	0	0	0.01	0	0	
2/8/01	0	0	0	0	0	0	0	0	
2/9/01	0	0	0	0	0	0	0	0	
2/10/01	0.24	0.18	0.29	0.32	0.24	0.26	0.32	0.27	
2/11/01	0.01	0.01	0	0	0.01	0	0	0	
2/12/01	0.62	1.66	2.13	2.37	2.17	1.93	2.36	2.16	
2/13/01	0	0.84	1	0.92	1.10	0.91	0.92	0.97	
2/14/01	0	0	0	0	0	0	0	0	
2/15/01	0	0	0	0	0	0	0	0	
2/16/01	0	0	0	1.15	0	0	1.15	0.38	
2/17/01	0	0	0	0	0	0	0	0	
2/18/01	0	0.01	0.01	0.02	0.01	0.01	0.02	0.01	
2/19/01	0.06	0.25	0.41	0.03	0.33	0.37	0.03	0.24	
2/20/01	0	0.04	0.07	0.46	0.05	0.06	0.46	0.19	
2/21/01	0	0	0	0	0	0	0	0	
2/22/01	0	0	0	0	0	0	0	0	
2/23/01	0.11	0.32	0.42	0.34	0.42	0.38	0.34	0.38	

OCT-00 - SEPT-01 MISSING RECORDS FOR STATION 2146-A CALCULATED FROM ADJACENT STATIONS 2001B3, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations							
		2001B3	2015	2357	(2001B3 X	(2015 X	(2357 X		Monthly
Ratio Adjacent Stn. to 2146-A =		1.3086	0.9076	0.9958	1.3086)	0.9076)	0.9958)	Average	Total
2/24/01	0	0.22	0.19	0.14	0.29	0.17	0.14	0.20	
2/25/01	0	0.6	0.64	0.46	0.79	0.58	0.46	0.61	
2/26/01	0	0.24	0.17	0.45	0.31	0.15	0.45	0.31	
2/27/01	0	0.84	0.81	0.73	1.10	0.74	0.73	0.85	
2/28/01	0	0.63	0.5	0.47	0.82	0.45	0.47	0.58	7.15
3/1/01	0	0.01	0	0.31	0.01	0	0.31	0.11	
3/2/01	0	0	0	0	0	0	0	0	
3/3/01	0	0	0	0	0	0	0	0	
3/4/01	0	0	0	0	0	0	0	0	
3/5/01	0	0	0	0	0	0	0	0	
3/6/01	0.1	0.24	0.45	0.3	0.31	0.41	0.30	0.34	
3/7/01	0	0.16	0.14	0.24	0.21	0.13	0.24	0.19	
3/8/01	[ ]M	0	0	0	0	0	0	0	
3/9/01	[ ]M	0.32	0.68	0.07	0.42	0.62	0.07	0.37	
3/10/01	[ ]M	0.36	0.19	0.03	0.47	0.17	0.03	0.22	
3/11/01	[ ]M	0	0.02	0.01	0	0.02	0.01	0.01	
3/12/01	[ ]M	0	0	0	0	0	0	0	
3/13/01	[ ]M	0	0	0	0	0	0	0	
3/14/01	[ ]M	0	0	0	0	0	0	0	
3/15/01	[ ]M	0	0	0	0	0	0	0	
3/16/01	[ ]M	0	0	0	0	0	0	0	
3/17/01	[ ]M	0	0	0	0	0	0	0	
3/18/01	[ ]M	0	0	0	0	0	0	0	
3/19/01	[ ]M	0	0	0	0	0	0	0	
3/20/01	[ ]M	0	0	0	0	0	0	0	
3/21/01	[ ]M	0	0	0	0	0	0	0	
3/22/01	[ ]M	0	0	0	0	0	0	0	
3/23/01	[ ]M	0	0	0	0	0	0	0	
3/24/01	[ ]M	0	0	0	0	0	0	0	
3/25/01	[ ]M	0	0	0	0	0	0	0	
3/26/01	[ ]M	0	0	0	0	0	0	0	
3/27/01	[ ]M	0	0	0	0	0	0	0	
3/28/01	[ ]M	0	0	0	0	0	0	0	
3/29/01	[ ]M	0.01	0	0.01	0.01	0	0.01	0.01	
3/30/01	[ ]M	0	0	0	0	0	0	0	
3/31/01	[ ]M	0	0	0	0	0	0	0	1.25
4/1/01	[ ]M	0	0.07	0.01	0	0.06	0.01	0.02	
4/2/01	[ ]M	0.04	0.18	0.12	0.05	0.16	0.12	0.11	
4/3/01	[ ]M	0	0	0	0	0	0	0	
4/4/01	[ ]M	0	0	0	0	0	0	0	
4/5/01	[ ]M	0	0.02	0	0	0.02	0	0.01	
4/6/01	[ ]M	0	0	0	0	0	0	0.00	
4/7/01	[ ]M	0.46	1.04	0.34	0.60	0.94	0.34	0.63	
4/8/01	[ ]M	0	0	0.08	0	0	0.08	0.03	
4/9/01	[ ]M	0.29	0.47	0.01	0.38	0.43	0.01	0.27	
4/10/01	[ ]M	0.01	0.03	0.54	0.01	0.03	0.54	0.19	
4/11/01	[ ]M	0	0.02	0	0	0.02	0	0.01	
4/12/01	[ ]M	0.02	0.04	0.01	0.03	0.04	0.01	0.02	
4/13/01	[ ]M	0	0	0	0	0	0	0	

OCT-00 - SEPT-01 MISSING RECORDS FOR STATION 2146-A CALCULATED FROM ADJACENT STATIONS 2001B3, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations							
		2001B3	2015	2357	(2001B3 X	(2015 X	(2357 X		Monthly
Ratio Adjacent Stn. to 2146-A =		1.3086	0.9076	0.9958	1.3086)	0.9076)	0.9958)	Average	Total
4/14/01	[ ]M	0	0	0	0	0	0	0	
4/15/01	[ ]M	0	0	0	0	0	0	0	
4/16/01	[ ]M	0	0	0	0	0	0	0	
4/17/01	[ ]M	0	0	0	0	0	0	0	
4/18/01	[ ]M	0	0	0	0	0	0	0	
4/19/01	[ ]M	0	0	0	0	0	0	0	
4/20/01	[ ]M	0.03	0.06	0.02	0.04	0.05	0.02	0.04	
4/21/01	[ ]M	0.44	0.62	0.51	0.58	0.56	0.51	0.55	
4/22/01	[ ]M	0.01	0	0	0.01	0	0	0	
4/23/01	[ ]M	0	0	0	0	0	0	0	
4/24/01	0	0	0	0	0	0	0	0	
4/25/01	0	0	0	0	0	0	0	0	
4/26/01	0	0	0	0	0	0	0	0	
4/27/01	0	0	0	0	0	0	0	0	
4/28/01	0	0	0	0	0	0	0	0	
4/29/01	0	0	0	0	0	0	0	0	
4/30/01	0	0	0	0	0	0	0	0	1.88
5/1/01	0	0	0	0	0	0	0	0	
5/2/01	0	0	0	0	0	0	0	0	
5/3/01	0	0	0	0	0	0	0	0	
5/4/01	0	0	0	0	0	0	0	0	
5/5/01	0	0	0	0	0	0	0	0	
5/6/01	0	0	0	0	0	0	0	0	
5/7/01	0	0	0	0	0	0	0	0	
5/8/01	0	0	0	0	0	0	0	0	
5/9/01	0	0	0	0	0	0	0	0	
5/10/01	0	0	0	0	0	0	0	0	
5/11/01	0	0	0	0	0	0	0	0	
5/12/01	0.02	0	0.05	0.03	0	0.05	0.03	0.03	
5/13/01	0	0	0	0	0	0	0	0	
5/14/01	0	0	0	0	0	0	0	0	
5/15/01	0	0	0	0	0	0	0	0	
5/16/01	0	0	0	0	0	0	0	0	
5/17/01	0	0	0	0	0	0	0	0	
5/18/01	0	0	0	0	0	0	0	0	
5/19/01	0	0	0	0	0	0	0	0	
5/20/01	0	0	0	0	0	0	0	0	
5/21/01	0	0	0	0	0	0	0	0	
5/22/01	0	0	0	0	0	0	0	0	
5/23/01	0	0	0	0	0	0	0	0	
5/24/01	0	0	0	0	0	0	0	0	
5/25/01	0	0	0	0	0	0	0	0	
5/26/01	0	0	0	0	0	0	0	0	
5/27/01	0	0	0.09	0.01	0	0.08	0.01	0.03	
5/28/01	0	0	0.01	0	0	0.01	0	0	
5/29/01	0	0	0	0	0	0	0	0	
5/30/01	0	0	0	0	0	0	0	0	
5/31/01	0	0	0	0	0	0	0	0	0.06
6/1/01	0	0	0	0	0	0	0	0	

OCT-00 - SEPT-01 MISSING RECORDS FOR STATION 2146-A CALCULATED FROM ADJACENT STATIONS 2001B3, 2015, AND 2357 (Inches)

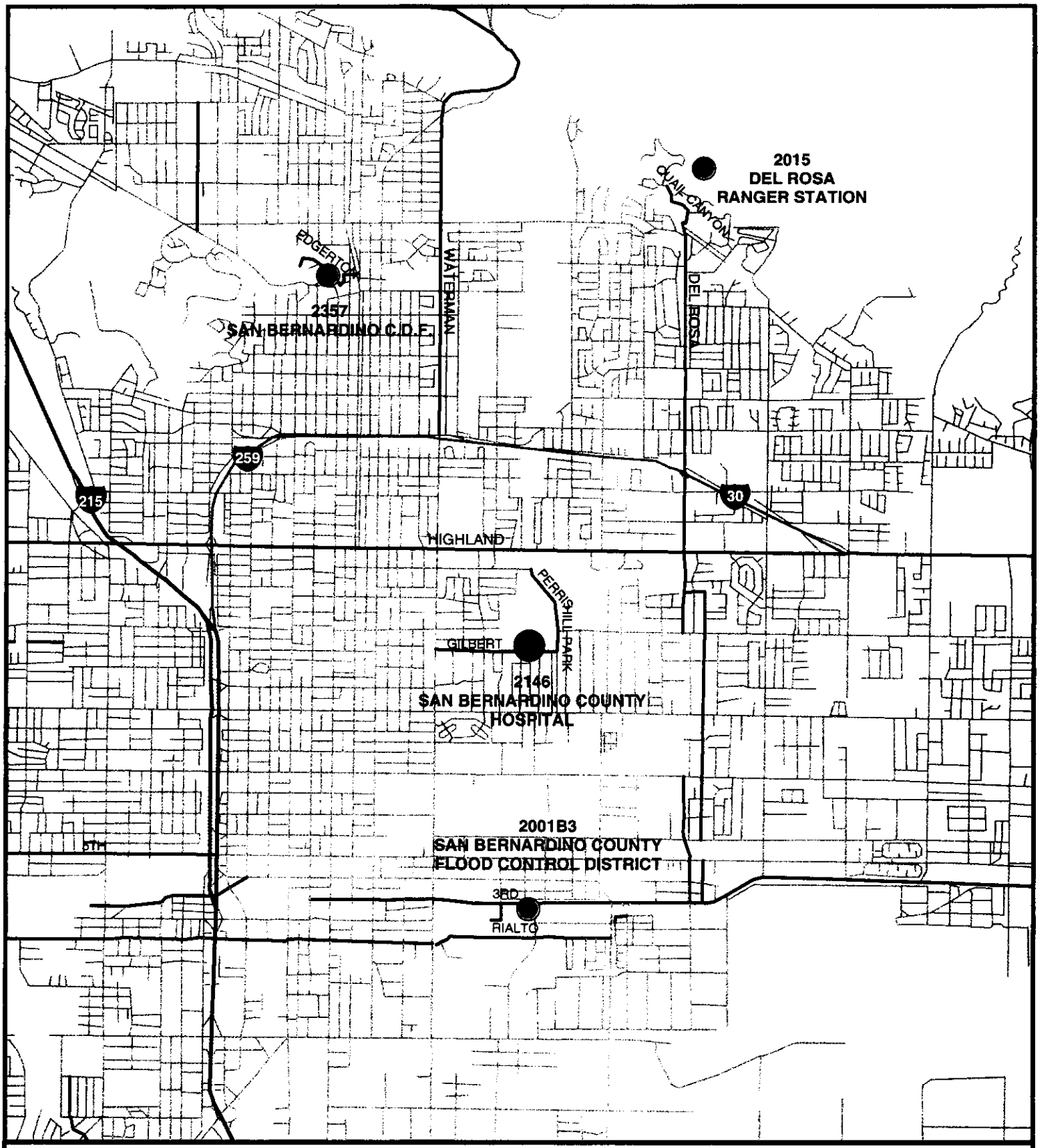
	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations							
		2001B3	2015	2357	(2001B3 X	(2015 X	(2357 X		Monthly
Ratio Adjacent Stn. to 2146-A =		1.3086	0.9076	0.9958	1.3086)	0.9076)	0.9958)	Average	Total
6/2/01	0	0	0	0	0	0	0	0	
6/3/01	0	0	0	0	0	0	0	0	
6/4/01	0	0	0	0	0	0	0	0	
6/5/01	0	0	0	0	0	0	0	0	
6/6/01	0	0	0	0	0	0	0	0	
6/7/01	0	0	0	0	0	0	0	0	
6/8/01	0	0	0	0	0	0	0	0	
6/9/01	0	0	0	0	0	0	0	0	
6/10/01	0	0	0	0	0	0	0	0	
6/11/01	0	0	0	0	0	0	0	0	
6/12/01	0	0	0.02	0	0	0.02	0	0.01	
6/13/01	0	0	0	0	0	0	0	0	
6/14/01	0	0	0	0	0	0	0	0	
6/15/01	0	0	0	0	0	0	0	0	
6/16/01	0	0	0	0	0	0	0	0	
6/17/01	0	0	0	0	0	0	0	0	
6/18/01	0	0	0	0	0	0	0	0	
6/19/01	0	0	0	0	0	0	0	0	
6/20/01	0	0	0	0	0	0	0	0	
6/21/01	0	0	0	0	0	0	0	0	
6/22/01	0	0	0	0	0	0	0	0	
6/23/01	0	0	0	0	0	0	0	0	
6/24/01	0	0	0	0	0	0	0	0	
6/25/01	0	0	0	0	0	0	0	0	
6/26/01	0	0	0	0	0	0	0	0	
6/27/01	0	0	0	0	0	0	0	0	
6/28/01	0	0	0	0	0	0	0	0	
6/29/01	0	0	0	0	0	0	0	0	
6/30/01	0	0	0	0	0	0	0	0	0.01
7/1/01	0	0	0	0	0	0	0	0	
7/2/01	0	0	0	0	0	0	0	0	
7/3/01	0.01	0	0	0	0	0	0	0	
7/4/01	0	0	0	0	0	0	0	0	
7/5/01	0	0	0.07	0.21	0	0.06	0.21	0.09	
7/6/01	0	0	0	0.03	0	0	0.03	0.01	
7/7/01	0	0	0	0	0	0	0	0	
7/8/01	0	0	0	0	0	0	0	0	
7/9/01	0	0	0	0	0	0	0	0	
7/10/01	0	0	0	0	0	0	0	0	
7/11/01	0	0	0	0	0	0	0	0	
7/12/01	0	0	0	0	0	0	0	0	
7/13/01	0	0	0	0	0	0	0	0	
7/14/01	0	0	0	0	0	0	0	0	
7/15/01	0	0	0	0	0	0	0	0	
7/16/01	0	0	0	0	0	0	0	0	
7/17/01	0	0	0	0	0	0	0	0	
7/18/01	0	0	0	0	0	0	0	0	
7/19/01	0	0	0	0	0	0	0	0	
7/20/01	0	0	0	0	0	0	0	0	

OCT-00 - SEPT-01 MISSING RECORDS FOR STATION 2146-A CALCULATED FROM ADJACENT STATIONS 2001B3, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations							
		2001B3	2015	2357	(2001B3 X	(2015 X	(2357 X		Monthly
Ratio Adjacent Stn. to 2146-A =		1.3086	0.9076	0.9958	1.3086)	0.9076)	0.9958)	Average	Total
7/21/01	0	0	0	0	0	0	0	0	
7/22/01	0	0	0	0	0	0	0	0	
7/23/01	0	0	0	0	0	0	0	0	
7/24/01	0	0	0	0	0	0	0	0	
7/25/01	0	0	0	0	0	0	0	0	
7/26/01	0	0	0	0	0	0	0	0	
7/27/01	0	0	0	0	0	0	0	0	
7/28/01	0	0	0	0	0	0	0	0	
7/29/01	0	0	0	0	0	0	0	0	
7/30/01	0	0	0	0	0	0	0	0	
7/31/01	0	0	0	0	0	0	0	0	0.10
8/1/01	0	0	0	0	0	0	0	0	
8/2/01	0	0	0	0	0	0	0	0	
8/3/01	0	0	0	0	0	0	0	0	
8/4/01	0	0	0	0	0	0	0	0	
8/5/01	0	0	0	0	0	0	0	0	
8/6/01	0	0	0	0	0	0	0	0	
8/7/01	0	0	0	0	0	0	0	0	
8/8/01	0	0	0	0	0	0	0	0	
8/9/01	0	0	0	0	0	0	0	0	
8/10/01	0	0	0	0	0	0	0	0	
8/11/01	0	0	0	0	0	0	0	0	
8/12/01	0	0	0	0	0	0	0	0	
8/13/01	0	0	0	0	0	0	0	0	
8/14/01	0	0	0	0	0	0	0	0	
8/15/01	0	0	0	0	0	0	0	0	
8/16/01	0	0	0	0	0	0	0	0	
8/17/01	0	0	0	0	0	0	0	0	
8/18/01	0	0	0	0	0	0	0	0	
8/19/01	0	0	0	0	0	0	0	0	
8/20/01	0	0	0	0	0	0	0	0	
8/21/01	0	0	0	0	0	0	0	0	
8/22/01	0	0	0	0	0	0	0	0	
8/23/01	0	0	0	0	0	0	0	0	
8/24/01	0	0	0	0	0	0	0	0	
8/25/01	0	0	0	0	0	0	0	0	
8/26/01	0	0	0	0	0	0	0	0	
8/27/01	0	0	0	0	0	0	0	0	
8/28/01	0	0	0	0	0	0	0	0	
8/29/01	0	0	0	0	0	0	0	0	
8/30/01	0	0	0	0	0	0	0	0	
8/31/01	0	0	0	0	0	0	0	0	0
9/1/01	0.01	0	0	0	0	0	0	0	
9/2/01	0	0	0	0	0	0	0	0	
9/3/01	0	0	0	0	0	0	0	0	
9/4/01	0	0	0	0	0	0	0	0	
9/5/01	0	0	0	0	0	0	0	0	
9/6/01	0	0	0	0	0	0	0	0	
9/7/01	0	0	0	0	0	0	0	0	

OCT-00 - SEPT-01 MISSING RECORDS FOR STATION 2146-A CALCULATED FROM ADJACENT STATIONS 2001B3, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations							
		2001B3	2015	2357	(2001B3 X	(2015 X	(2357 X		Monthly
Ratio Adjacent Stn. to 2146-A =		1.3086	0.9076	0.9958	1.3086)	0.9076)	0.9958)	Average	Total
9/8/01	0	0	0	0	0	0	0	0	
9/9/01	0	0	0	0	0	0	0	0	
9/10/01	0	0	0	0	0	0	0	0	
9/11/01	0	0	0	0	0	0	0	0	
9/12/01	0	0	0	0	0	0	0	0	
9/13/01	0	0	0	0	0	0	0	0	
9/14/01	0	0	0	0	0	0	0	0	
9/15/01	0	0	0	0	0	0	0	0	
9/16/01	0	0	0	0	0	0	0	0	
9/17/01	0	0	0	0	0	0	0	0	
9/18/01	0	0	0	0	0	0	0	0	
9/19/01	0	0	0	0	0	0	0	0	
9/20/01	[ ]	0	0	0	0	0	0	0	
9/21/01	[ ]	0	0	0	0	0	0	0	
9/22/01	[ ]	0	0	0	0	0	0	0	
9/23/01	[ ]	0	0	0	0	0	0	0	
9/24/01	[ ]	0	0	0	0	0	0	0	
9/25/01	[ ]	0	0	0	0	0	0	0	
9/26/01	[ ]	0	0	0	0	0	0	0	
9/27/01	[ ]	0	0	0	0	0	0	0	
9/28/01	[ ]	0	0	0	0	0	0	0	
9/29/01	[ ]	0	0	0	0	0	0	0	
9/30/01	[ ]	0	0	0	0	0	0	0	0
ANNUAL	2.44	12.86	16.60	16.61	16.83	15.07	16.54	16.13	16.13



Precipitation Station 2146, San Bernardino County Hospital and Adjacent Rain Stations 2001B3, 2015, and 2357

- Precipitation Station 2146 San Bernardino County Hospital
- Rain Station
- Freeway
- Highway
- Streets

N W E S

0 0.25 0.5 1 1.5 2 Miles

SINCE 1933 ORANGE COUNTY WATER DISTRICT A TRADITION OF INNOVATION

v:\vdrive\maps\projects\sawpa\precip_stations_012502.mxd

APPENDIX C

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

WATER YEAR 2000-01

ORANGE COUNTY WATER DISTRICT

April 23,2002

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

Gentlemen:

I have reviewed and prepared the attached statement of assets and liabilities comprised of cash transactions for Santa Ana River Watermaster, and the related statement of revenue, expenses, and changes in fund balance for year ended June 30, 2001. This review includes examining evidence that supports the amounts and disclosures in the financial statements. I have reviewed minutes of meetings as well as Bank of America Checking and Savings Accounts' transactions and statements, and have concluded that all transactions were properly recorded.

Very truly yours,

ORANGE COUNTY WATER DISTRICT

Laura R. Li
Internal Auditor

Cc: Andrew V. Czorny, CFO, OCWD

SANTA ANA RIVER WATERMASTER

FINANCIAL STATEMENTS

JUNE 30, 2001

SANTA ANA RIVER WATER MASTER

STATEMENT OF ASSETS AND LIABILITIES ARISING FROM CASH TRANSACTIONS

June 30, 2001

ASSETS

Cash in checking account (Notes 3)	$8,248
Cash in savings account (Notes 3)	2,432
TOTAL ASSETS	$10,680

FUND BALANCE

Fund balance	$10,680

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

SANTA ANA RIVER WATER MASTER

STATEMENT OF ASSETS AND LIABILITIES ARISING FROM CASH TRANSACTIONS

June 30, 2001

	Actual	Budget	Variance-Favorable (Unfavorable)
REVENUE COLLECTED:			
Water district contributions (Note 2):			
Orange County Water District	$ 8,000	$ 4,000	$ 4,000
Chino Basin Municipal Water District	4,000	2,000	2,000
San Bernardino Valley Municipal Water District	4,000	2,000	2,000
Western Municipal Water District	4,000	2,000	2,000
Interest from Savings Account	24	0	24
TOTAL REVENUE COLLECTED	$ 20,024	$ 10,000	$ 10,024
EXPENSES PAID:			
Professional Engineering Service	$ 14,520	$ 9,500	$ 5,020
Administrative Expenses:			
Auditing Services	0	0	0
Annual Reports	1,963	2,500	(537)
TOTAL EXPENSES PAID	$ 16,483	$ 12,000	$ 4,483
EXCESS OF REVENUE COLLECTED OVER (UNDER) EXPENSES PAID	3,541	(2,000)	5,541
FUND BALANCE AT JULY 1, 2000	7,139		
FUND BALANCE AT JUNE 30, 2001	$ 10,680		

See independent auditor's report and notes to financial statements.

SANTA ANA RIVER WATERMASTER

NOTES TO FINANCIAL STATEMENTS

June 30, 2001

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, 2001 consisted of the following:

Bank of America:	
Checking account	$ 8,248
Savings account	$ 2,432
	$ 10,680

All cash is fully insured by the FDIC.

See independent auditor's report.

APPENDIX D

SAN BERNARDINO
HIGH GROUNDWATER MITIGATION PROJECT WATER
DISCHARGED TO THE SANTA ANA RIVER
ABOVE RIVERSIDE NARROWS

WATER YEAR 2000-01

TABLE D-1

SAN BERNARDINO HIGH GROUNDWATER MITIGATION PROJECT WATER DISCHARGED TO THE SANTA ANA RIVER
WATER YEAR 2000-01
(acre-feet)

Month	Discharged Above Riverside Narrows[1]	Flow Arriving At Riverside Narrows[2]	Flow Arriving At Prado Dam[3]
2000			
October	752	744	730
November	851	843	826
December	1,185	1,173	1,149
2001			
January	0	0	0
February	0	0	0
March	0	0	0
April	0	0	0
May	0	0	0
June	0	0	0
July	0	0	0
August	0	0	0
September	0	0	0
Total	2,788	2,760	2,705

(1) Water discharged from RIX in excess of 125% of average daily inflows to deliver San Bernardino High Groundwater Mitigation Project Water that percolated in Colton and Riverside basins during 1998-99 and 1999-00 water years.
(2) Adjusted for a 1% evapotranspiration loss above Riverside Narrows.
(3) Adjusted for a 2% evapotranspiration loss between Riverside Narrows and Prado.

TABLE D-2

SAN BERNARDINO HIGH GROUNDWATER MITIGATION PROJECT WATER
DISCHARGED TO THE SANTA ANA RIVER
WATER YEAR 2000-01
October 2000

Day	Discharged Above Riverside Narrows[1] (cfs)	Flow Arriving At Riverside Narrows[2] (cfs)	Flow Arriving At Prado Dam[3] (cfs)
1	12.23	12.10	11.86
2	12.23	12.10	11.86
3	12.23	12.10	11.86
4	12.23	12.10	11.86
5	12.23	12.10	11.86
6	12.23	12.10	11.86
7	12.23	12.10	11.86
8	12.23	12.10	11.86
9	12.23	12.10	11.86
10	12.23	12.10	11.86
11	12.23	12.10	11.86
12	12.23	12.10	11.86
13	12.23	12.10	11.86
14	12.23	12.10	11.86
15	12.23	12.10	11.86
16	12.23	12.10	11.86
17	12.23	12.10	11.86
18	12.23	12.10	11.86
19	12.23	12.10	11.86
20	12.23	12.10	11.86
21	12.23	12.10	11.86
22	12.23	12.10	11.86
23	12.23	12.10	11.86
24	12.23	12.10	11.86
25	12.23	12.10	11.86
26	12.23	12.10	11.86
27	12.23	12.10	11.86
28	12.23	12.10	11.86
29	12.23	12.10	11.86
30	12.23	12.10	11.86
31	12.23	12.10	11.86
Total in cfs-days	379.03	375.24	367.73
Total in AF	752	744	730

(1) Water discharged from RIX in excess of 125% of average daily inflows to deliver San Bernardino High Groundwater Mitigation Project Water that percolated in Colton and Riverside basins during 1998-99 and 1999-00 water years.
(2) Adjusted for a 1% evapotranspiration loss above Riverside Narrows.
(3) Adjusted for a 2% evapotranspiration loss between Riverside Narrows and Prado.

TABLE D-2 (continued)

SAN BERNARDINO HIGH GROUNDWATER MITIGATION PROJECT WATER
DISCHARGED TO THE SANTA ANA RIVER
WATER YEAR 2000-01
November 2000

Day	Discharged Above Riverside Narrows[1] (cfs)	Flow Arriving At Riverside Narrows[2] (cfs)	Flow Arriving At Prado Dam[3] (cfs)
1	14.30	14.16	13.88
2	14.30	14.16	13.88
3	14.30	14.16	13.88
4	14.30	14.16	13.88
5	14.30	14.16	13.88
6	14.30	14.16	13.88
7	14.30	14.16	13.88
8	14.30	14.16	13.88
9	14.30	14.16	13.88
10	14.30	14.16	13.88
11	14.30	14.16	13.88
12	14.30	14.16	13.88
13	14.30	14.16	13.88
14	14.30	14.16	13.88
15	14.30	14.16	13.88
16	14.30	14.16	13.88
17	14.30	14.16	13.88
18	14.30	14.16	13.88
19	14.30	14.16	13.88
20	14.30	14.16	13.88
21	14.30	14.16	13.88
22	14.30	14.16	13.88
23	14.30	14.16	13.88
24	14.30	14.16	13.88
25	14.30	14.16	13.88
26	14.30	14.16	13.88
27	14.30	14.16	13.88
28	14.30	14.16	13.88
29	14.30	14.16	13.88
30	14.30	14.16	13.88
Total in cfs-days	429.14	424.85	416.35
Total in AF	851	843	826

(1) Water discharged from RIX in excess of 125% of average daily inflows to deliver San Bernardino High Groundwater Mitigation Project Water that percolated in Colton and Riverside basins during 1998-99 and 1999-00 water years.
(2) Adjusted for a 1% evapotranspiration loss above Riverside Narrows.
(3) Adjusted for a 2% evapotranspiration loss between Riverside Narrows and Prado.

TABLE D-2 (continued)

SAN BERNARDINO HIGH GROUNDWATER MITIGATION PROJECT WATER
DISCHARGED TO THE SANTA ANA RIVER
WATER YEAR 2000-01
December 2000

Day	Discharged Above Riverside Narrows[1] (cfs)	Flow Arriving At Riverside Narrows[2] (cfs)	Flow Arriving At Prado Dam[3] (cfs)
1	19.27	19.07	18.69
2	19.27	19.07	18.69
3	19.27	19.07	18.69
4	19.27	19.07	18.69
5	19.27	19.07	18.69
6	19.27	19.07	18.69
7	19.27	19.07	18.69
8	19.27	19.07	18.69
9	19.27	19.07	18.69
10	19.27	19.07	18.69
11	19.27	19.07	18.69
12	19.27	19.07	18.69
13	19.27	19.07	18.69
14	19.27	19.07	18.69
15	19.27	19.07	18.69
16	19.27	19.07	18.69
17	19.27	19.07	18.69
18	19.27	19.07	18.69
19	19.27	19.07	18.69
20	19.27	19.07	18.69
21	19.27	19.07	18.69
22	19.27	19.07	18.69
23	19.27	19.07	18.69
24	19.27	19.07	18.69
25	19.27	19.07	18.69
26	19.27	19.07	18.69
27	19.27	19.07	18.69
28	19.27	19.07	18.69
29	19.27	19.07	18.69
30	19.27	19.07	18.69
31	19.27	19.07	18.69
Total in cfs-days	597.25	591.28	579.45
Total in AF	1,185	1,173	1,149

(1) Water discharged from RIX in excess of 125% of average daily inflows to deliver San Bernardino High Groundwater Mitigation Project Water that percolated in Colton and Riverside basins during 1998-99 and 1999-00 water years.
(2) Adjusted for a 1% evapotranspiration loss above Riverside Narrows.
(3) Adjusted for a 2% evapotranspiration loss between Riverside Narrows and Prado.

TABLE D-3

SUMMARY OF FLOW-WEIGHTED TDS OF RIX WATER
DISCHARGED TO THE SANTA ANA RIVER

OCTOBER 2000

Day	RIX Discharge[1] (cfs)	Daily EC (microsiemens/cm)	Computed TDS [2] (mg/L)	Outflow X TDS
1	12.23	820	505	6,177
2	12.23	810	499	6,102
3	12.23	790	487	5,951
4	12.23	800	493	6,027
5	12.23	830	511	6,253
6	12.23	810	499	6,102
7	12.23	780	481	5,876
8	12.23	780	481	5,876
9	12.23	790	487	5,951
10	12.23	820	505	6,177
11	12.23	790	487	5,951
12	12.23	800	493	6,027
13	12.23	820	505	6,177
14	12.23	830	511	6,253
15	12.23	810	499	6,102
16	12.23	820	505	6,177
17	12.23	780	481	5,876
18	12.23	810	499	6,102
19	12.23	800	493	6,027
20	12.23	800	493	6,027
21	12.23	800	493	6,027
22	12.23	800	493	6,027
23	12.23	800	493	6,027
24	12.23	800	493	6,027
25	12.23	790	487	5,951
26	12.23	810	499	6,102
27	12.23	760	468	5,725
28	12.23	770	474	5,801
29	12.23	780	481	5,876
30	12.23	740	456	5,575
31	12.23	770	474	5,801
Total	379.03			186,150
	Monthly Flow-Weighted TDS	=	491 mg/L	

(1) Water discharged from RIX in excess of 125% of average daily inflows to deliver San Bernardino High Groundwater Mitigation Project Water that percolated in Colton and Riverside basins during 1998-99 and 1999-00 water years.
(2) TDS = EC X 0.616142

TABLE D-3 (continued)

SUMMARY OF FLOW-WEIGHTED TDS OF RIX WATER
DISCHARGED TO THE SANTA ANA RIVER

NOVEMBER 2000

Day	RIX Discharge[1] (cfs)	Daily EC (microsiemens/cm)	Computed TDS [2]	Outflow X TDS
1	14.30	770	474	6,787
2	14.30	810	499	7,139
3	14.30	750	462	6,610
4	14.30	780	481	6,875
5	14.30	760	468	6,698
6	14.30	790	487	6,963
7	14.30	820	505	7,227
8	14.30	800	493	7,051
9	14.30	820	505	7,227
10	14.30	800	493	7,051
11	14.30	800	493	7,051
12	14.30	790	487	6,963
13	14.30	800	493	7,051
14	14.30	820	505	7,227
15	14.30	790	487	6,963
16	14.30	810	499	7,139
17	14.30	800	493	7,051
18	14.30	800	493	7,051
19	14.30	770	474	6,787
20	14.30	800	493	7,051
21	14.30	830	511	7,315
22	14.30	800	493	7,051
23	14.30	810	499	7,139
24	14.30	800	493	7,051
25	14.30	810	499	7,139
26	14.30	800	493	7,051
27	14.30	800	493	7,051
28	14.30	800	493	7,051
29	14.30	800	493	7,051
30	14.30	790	487	6,963
Total	429.14			210,822
	Monthly Flow-Weighted TDS	=	491 mg/L	

(1) Water discharged from RIX in excess of 125% of average daily inflows to deliver San Bernardino High Groundwater Mitigation Project Water that percolated in Colton and Riverside basins during 1998-99 and 1999-00 water years.
(2) TDS = EC X 0.616142

TABLE D-3 (continued)

SUMMARY OF FLOW-WEIGHTED TDS OF RIX WATER
DISCHARGED TO THE SANTA ANA RIVER

DECEMBER 2000

Day	RIX Discharge[1] (cfs)	Daily EC (microsiemens/cm)	Computed TDS [2]	Outflow X TDS
1	19.27	800	493	9,497
2	19.27	790	487	9,378
3	19.27	800	493	9,497
4	19.27	790	487	9,378
5	19.27	760	468	9,022
6	19.27	790	487	9,378
7	19.27	820	505	9,734
8	19.27	790	487	9,378
9	19.27	810	499	9,615
10	19.27	790	487	9,378
11	19.27	800	493	9,497
12	19.27	810	499	9,615
13	19.27	800	493	9,497
14	19.27	840	518	9,971
15	19.27	800	493	9,497
16	19.27	800	493	9,497
17	19.27	790	487	9,378
18	19.27	790	487	9,378
19	19.27	840	518	9,971
20	19.27	800	493	9,497
21	19.27	830	511	9,853
22	19.27	800	493	9,497
23	19.27	810	499	9,615
24	19.27	810	499	9,615
25	19.27	810	499	9,615
26	19.27	800	493	9,497
27	19.27	790	487	9,378
28	19.27	800	493	9,497
29	19.27	800	493	9,497
30	19.27	780	481	9,259
31	19.27	760	468	9,022
Total	597.25			294,394
	Monthly Flow-Weighted TDS	=	493 mg/L	

(1) Water discharged from RIX in excess of 125% of average daily inflows to deliver San Bernardino High Groundwater Mitigation Project Water that percolated in Colton and Riverside basins during 1998-99 and 1999-00 water years.
(2) TDS = EC X 0.616142

TABLE D-4

SAN BERNARDINO HIGH GROUNDWATER MITIGATION PROJECT WATER
DISCHARGED TO THE SANTA ANA RIVER
WATER YEAR 2000-01

Month	RIX Discharge[1] (acre-feet)	TDS[2] (mg/L)	Discharge x TDS	RIX Flow At Riverside Narrows[3] (acre-feet)	RIX Flow At Prado[4] (acre-feet)
2000					
October	752	491	369,232	744	730
November	851	491	417,929	843	826
December	1,185	493	584,023	1,173	1,149
2001					
January	0	0	0	0	0
February	0	0	0	0	0
March	0	0	0	0	0
April	0	0	0	0	0
May	0	0	0	0	0
June	0	0	0	0	0
July	0	0	0	0	0
August	0	0	0	0	0
September	0	0	0	0	0
Total	2,788		1,371,184	2,760	2,705

Flow-weighted TDS of pumped groundwater releases to the Santa Ana River :

At Riverside Narrows: $\frac{1,371,184}{2,760} = 497$ mg/L

At Prado: $\frac{1,371,184}{2,705} = 507$ mg/L

(1) Water discharged from RIX in excess of 125% of average daily inflows to deliver San Bernardino High Groundwater Mitigation Project Water that percolated in Colton and Riverside basins during 1998-99 and 1999-00 water years.
(2) Average monthly TDS.
(3) Adjusted for a 1% evapotranspiration loss above Riverside Narrows.
(4) Adjusted for a 2% evapotranspiration loss between Riverside Narrows and Prado.

APPENDIX E

WATER QUALITY AND DISCHARGE OF WATER RELEASED BY MWDSC TO SAN ANTONIO CREEK NEAR UPLAND (CONNECTION OC-59)

WATER YEAR 2000-01

PREPARED BY

WILLIAM R. MILLS, JR.

TABLE E-1

NONTRIBUTARY WATER FROM OC-59

MONTHLY TOTALS

(acre-feet)

WATER YEAR 2000-01

Month	Released at OC-59	12-Hour Delay [1]	Evaporation Losses [2]	Calculated Flow at Prado
2000				
October	2,121	2,121	15	2,106
November	3,915	3,915	27	3,888
December	0	0	0	0
2001				
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
Total	6,036	6,036	42	5,994

(1) Released nontributary water is delayed 12 hours to reflect the estimated travel time between OC-59 and Prado Dam.

(2) Monthly evapotranspiration losses calculated per the procedures referenced in the Twelfth Annual Watermaster Report, Appendix C and shown in Table E-3.

TABLE E-2

NONTRIBUTARY WATER FROM OC-59
October 2000
(cfs)

Day	Released at OC-59	12-Hour Delay	Calculated Flow At Prado Dam [1]
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	39	20	19
17	101	70	70
18	100	101	100
19	100	100	99
20	100	100	99
21	98	99	98
22	99	98	98
23	98	98	98
24	99	98	98
25	100	99	99
26	100	100	99
27	36	68	67
28	0	18	18
29	0	0	0
30	0	0	0
31	0	0	0
Total (cfs-days)	1,069	1,069	1,062
(AF)	2,121	2,121	2,106

(1) Includes the monthly evapotranspiration loss listed in Table E-3.

TABLE E-2

NONTRIBUTARY WATER FROM OC-59
November 2000
(cfs)

Day	Released at OC-59	12-Hour Delay	Calculated Flow At Prado Dam [1]
1	0	0	0
2	34	17	17
3	100	67	67
4	100	100	100
5	101	101	100
6	100	101	100
7	100	100	99
8	100	100	99
9	100	100	99
10	101	101	100
11	100	101	100
12	100	100	99
13	100	100	99
14	99	99	99
15	99	99	98
16	100	100	99
17	100	100	99
18	100	100	99
19	100	100	99
20	100	100	99
21	99	99	99
22	40	69	69
23	0	20	20
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
Total (cfs-days)	1,974	1,974	1,960
(AF)	3,915	3,915	3,888

(1) Includes the monthly evapotranspiration loss listed in Table E-3.

TABLE E-3

EVAPOTRANSPIRATION LOSSES OF STATE PROJECT WATER FROM OC-59
WATER YEAR 2000-01
SUM OF ALL CHANNEL REACHES
(acre-feet)

Month	State Water Released with 12-hour delay	Rialto Pipeline to Los Serranos Road	Los Serranos to Prado Dam w/o vegetation	Los Serranos to Prado Dam w/ vegetation	Total Evapo-transpiration	Percent of Monthly Release
2000						
October	2,120.5	5.5	9.35	0.0	14.8	0.7%
November	3,915.4	9.6	16.46	0.8	26.9	0.7%
December	0	0	0	0	0	0%
2001						
January	0	0	0	0	0	0%
February	0	0	0	0	0	0%
March	0	0	0	0	0	0%
April	0	0	0	0	0	0%
May	0	0	0	0	0	0%
June	0	0	0	0	0	0%
July	0	0	0	0	0	0%
August	0	0	0	0	0	0%
September	0	0	0	0	0	0%
Total	6,035.9	15.1	25.82	0.8	41.7	

Percent of Annual Releases : 0.7%

TABLE E-3.1

EVAPOTRANSPIRATION LOSSES OF STATE PROJECT WATER FROM OC-59
WATER YEAR 2000-01
RIALTO PIPELINE TO LOS SERRANOS ROAD

Month	State Water Released with 12-hour delay (AF)	Days of Evaporation	Evapo-transpiration (in) [a]	Computed Evaporation Losses[b]	
				(AF)	(% of release)
[1]	[2]	[3]	[4]	[5]	[6]
2000					
October	2,120.5	12	3.0	5.5	0.3%
November	3,915.4	21	2.9	9.6	0.2%
December	0	0	---	0	0%
2001					
January	0	0	---	0	0%
February	0	0	---	0	0%
March	0	0	---	0	0%
April	0	0	---	0	0%
May	0	0	---	0	0%
June	0	0	---	0	0%
July	0	0	---	0	0%
August	0	0	---	0	0%
September	0	0	---	0	0%

(a) At UCR Evapotranspiration Station #44
(b) Evaporation losses=[4]/(days/month)x[3]x(Pan Factor of 1.0)x(area of 56.1 acres)x(1 foot/12 inches)

TABLE E-3.2

EVAPOTRANSPIRATION LOSSES OF STATE PROJECT WATER FROM OC-59
WATER YEAR 2000-01
LOS SERRANOS ROAD TO PRADO DAM (WITHOUT VEGETATION COVER)

Month	State Water Released with 12-hour delay (AF)	Days of Evaporation (+7 days)[a]	Evapo-transpiration (in)[b]	Average Wetted Area (AF)[c]	Computed Evaporation Losses[d]	
					(AF)	(% of release)
[1]	[2]	[3]	[4]	[5]	[6]	[7]
2000						
October	2,120.5	16	3.02	72	9.4	0.4%
November	3,915.4	28	2.94	72	16.5	0.4%
December	0	0	---	0	0	0%
2001						
January	0	0	---	0	0	0%
February	0	0	---	0	0	0%
March	0	0	---	0	0	0%
April	0	0	---	0	0	0%
May	0	0	---	0	0	0%
June	0	0	---	0	0	0%
July	0	0	---	0	0	0%
August	0	0	---	0	0	0%
September	0	0	---	0	0	0%

(a) Period of delivery plus 7 days after stoppage of delivery.
(b) At UCR Evapotranspiration Station #44.
(c) Equals 1/2 of 144 acres if the maximum flow rate of the month is less than 200 cfs and 1/2 of 369 acres if the maximum flow rate is greater or equal to 200 cfs.
(d) Evaporation losses=[3]x[4]/(days/month)x[5]x(1 foot/12 inches)

TABLE E-3.3

EVAPOTRANSPIRATION LOSSES OF STATE PROJECT WATER FROM OC-59
WATER YEAR 2000-01
LOS SERRANOS ROAD TO PRADO DAM (WITH VEGETATION COVER)

Month	State Water Released with 12-hour delay (AF)	Days of Evaporation[a]	Evapo-transpiration (in)[b]	Normal Evaporation (in)[c]	Average Wetted Area (AF)[d]	Computed Evaporation Losses[e]	
						(AF)	(% of release)
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
2000							
October	2,120.5	16	3.02	3.5	72	0.0	0.0%
November	3,915.4	28	2.94	2.8	72	0.8	0.0%
December	0	0	---	---	0	0	0%
2001							
January	0	0	---	---	0	0	0%
February	0	0	---	---	0	0	0%
March	0	0	---	---	0	0	0%
April	0	0	---	---	0	0	0%
May	0	0	---	---	0	0	0%
June	0	0	---	---	0	0	0%
July	0	0	---	---	0	0	0%
August	0	0	---	---	0	0	0%
September	0	0	---	---	0	0	0%

(a) Period of delivery plus 7 days after stoppage of delivery.
(b) At UCI At UCR Evapotranspiration Station #44
(c) Referenced in the 1983 report "Nontributary Losses of State Water Released at OC-59 and Final Adjustments to Base Flows".
(d) Equals 1/2 of 144 acres if the maximum flow rate of the month is less than 200 cfs and 1/2 of 369 acres if the maximum flow rate is greater or equal to 200 cfs.
(e) Evaporation losses=[3]x([4]-[5])/(days/month)x[6]x(1 foot/12 inches)

TABLE E-4

CALCULATION OF WEIGHTED TDS OF
OC-59 RELEASES

WATER YEAR 2000-01

Month	OC-59 Discharge (acre-feet)	TDS at Release[1] (mg/L)	Discharge X TDS at Release	Calculated OC-59 Flow at Prado (acre-feet)	TDS at Prado[2] (mg/L)	Flow at Prado X TDS at Prado
2000						
October	2,121	176	373,210	2,106	272	572,748
November	3,915	217	849,644	3,888	328	1,275,423
December	0	-	0	0	-	0
2001						
January	0	-	0	0	-	0
February	0	-	0	0	-	0
March	0	-	0	0	-	0
April	0	-	0	0	-	0
May	0	-	0	0	-	0
June	0	-	0	0	-	0
July	0	-	0	0	-	0
August	0	-	0	0	-	0
September	0	-	0	0	-	0
Total	6,036		1,222,854	5,994		1,848,171

At Discharge:
Flow-Weighted TDS = $\frac{1,222,854}{6,036}$ = 203 mg/L

At Prado:
Flow-Weighted TDS = $\frac{1,848,171}{5,994}$ = 308 mg/L

(1) Monthly average TDS values for State Water Project water at Devil Canyon Power Plant.
(2) TDS values for OC-59 releases arriving at Prado were adjusted based on mass balance using known flow and quality components, as described in Table E-5.

TABLE E-5

TDS ADJUSTMENT OF OC-59 DISCHARGE
WATER YEAR 2000-01

This section describes the methodology used to adjust TDS concentrations in flows of OC-59 water as it arrived at Prado Dam. Because no direct TDS measurements were available as the water arrived at Prado, the adjusted TDS concentrations of OC-59 water were estimated from mass balance calculations using flows and TDS values of the Prado flow components for the period of delivery.

The TDS of the OC-59 water reaching Prado Dam is estimated using the two methods described below. Method 1 is essentially the same as that described in Appendix C of the Twelfth Annual Report. It uses the following equation that depends on assumed *annual average* TDS concentrations of Base Flow and Storm Flow at Prado, which are not measured values:

Method 1:

$$Q_p q_p = Q_{bf} q_{bf} + Q_{sf} q_{sf} + Q_{ad} q_{ad} + Q_{rix} q_{rix} + Q_{59} \mathbf{q_{59}}$$

where:	Q_p	= total inflow at Prado	= 221,926 af
	q_p	= total inflow TDS at Prado	= 517 mg/L
	Q_{bf}	= base flow at Prado	= 153,914 af
	q_{bf}	= base flow TDS at Prado	= 600 mg/L*
	Q_{sf}	= storm flow at Prado	= 54,621 af
	q_{sf}	= storm flow TDS at Prado	= 350 mg/L*
	Q_{ad}	= Arlington Desalter flow	= 4,692 af
	q_{ad}	= Arlington Desalter TDS	= 423 mg/L
	Q_{rix}	= RIX flow greater than 125%	= 2,705 af
	q_{rix}	= RIX flow TDS	= 507 mg/L
	Q_{59}	= OC-59 flow reaching Prado	= 5,994 af
	$\mathbf{q_{59}}$	= OC-59 flow TDS reaching Prado	

Note: All values are annualized.

*Assumed value

Solving for $\mathbf{q_{59}}$:

$$\mathbf{q_{59}} = \frac{Q_p q_p - Q_{bf} q_{bf} - Q_{sf} q_{sf} - Q_{ad} q_{ad} - Q_{rix} q_{rix}}{Q_{59}}$$

= -14 mg/L

The value of $\mathbf{q_{59}}$ is very sensitive to the assumed values of Prado base flow and storm flow TDS. As shown above, the fairly low TDS of the total flow resulted in the calculated q_{59} being negative. Therefore, this method of calculation was ineffectual this year. Since very small changes in assumed or calculated figures cause significant differences in estimated $\mathbf{q_{59}}$ values, the following method was developed to reduce this uncertainty.

TABLE E-5

TDS ADJUSTMENT OF OC-59 DISCHARGE
WATER YEAR 2000-01

Method 2

The TDS of Base Flow water reaching Prado Dam is a key element for the second method of calculating q_{59}. This year there was no month with no water purchases and no storm flow included in the total flow at Prado. Therefore, q_{bf} must be calculated before calculating q_{59}.

The months of August and September were chosen to calculate q_{bf} because they had the *least* amount of interference of the months during which there were no OC-59 deliveries. The following equation was used to calculate the TDS of base flow water reaching Prado Dam:

$$Q_p q_p = Q_{bf} \mathbf{q_{bf}} + Q_{ad} q_{ad}$$

where:

Q_p	= total flow at Prado[1]	= 34,699 af
q_p	= total flow TDS at Prado[2]	= 588 mg/L
Q_{ad}	= Arlington Desalter flow[1]	= 1,200 af
q_{ad}	= Arlington Desalter TDS[2]	= 395 mg/L
Q_{bf}	= base flow at Prado[1]	= 33,499 af
$\mathbf{q_{bf}}$	= base flow TDS at Prado	

[1]For August and September 2001.
[2]Flow-weighted average TDS for August and September 2001.

Solving for $\mathbf{q_{bf}}$

$$\mathbf{q_{bf}} = \frac{Q_p q_p - Q_{ad} q_{ad}}{Q_{bf}}$$

$$\mathbf{q_{bf} = 595\ mg/L}$$

Method 2 uses essentially the same equation as Method 1, except the time period of flow measurements is based on the period during which OC-59 deliveries were made, October and November 2000. Because the TDS of State Project Water at Devil Canyon Power Plant (the closest measurement point to the release point) varied from 176 mg/L in October to 217 mg/L November, separate TDS was calculated for each month. The following equation was used to estimate the TDS of OC-59 water reaching Prado Dam:

TABLE E-5

TDS ADJUSTMENT OF OC-59 DISCHARGE
WATER YEAR 2000-01

$$Q_p q_p = Q_{bf} q_{bf} + Q_{sf} q_{sf} + Q_{rix} q_{rix} + Q_{ad} q_{ad} + Q_{59} \mathbf{q_{59}}$$

where:

		October	November
Q_p	= total flow at Prado[1]	16,691 af	18,595 af
q_p	= total flow TDS at Prado[2]	527 mg/L	527 mg/L
Q_{bf}	= base flow at Prado[1]	12,152 af	13,181 af
q_{bf}	= base flow TDS at Prado[3]	595 mg/L	595 mg/L
Q_{sf}	= storm flow at Prado[1]	1,215 af	182 af
q_{sf}	= storm flow TDS at Prado	350 mg/L*	350 mg/L*
Q_{ad}	= Arlington Desalter flow[1]	489 af	517 af
q_{ad}	= Arlington Desalter TDS[2]	429 mg/L	425 mg/L
Q_{rix}	= RIX flow greater than 125%[1]	729 af	826 af
Q_{rix}	= Rix flow TDS [2]	491 mg/L	491 mg/L
Q_{59}	= OC-59 flow reaching Prado[1]	2,106 af	3,888 af
$\mathbf{q_{59}}$	= OC-59 flow TDS reaching Prado		

*Assumed value

[1]For given month in 2001
[2]Flow-weighted average TDS for given month.
[3]As calculated above for the months of August and September 2001.

Solving for $\mathbf{q_{59}}$:

$$\mathbf{q_{59}} = \frac{Q_p q_p - Q_{bf} q_{bf} - Q_{sf} q_{sf} - Q_{ad} q_{ad} - Q_{rix} q_{rix}}{Q_{59}}$$

For October: $\mathbf{q_{59}}$ **= 272 mg/L**
For November: $\mathbf{q_{59}}$ **= 328 mg/L**

By using the calculated base flow TDS concentration, this method more accurately reflects the TDS concentration of the OC-59 water reaching Prado Dam. *Therefore, the above values were used to calculate annual base and storm flow TDS at Prado in the report.*

APPENDIX F

WATER QUALITY AND DISCHARGE FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN

WATER YEAR 2000-01

PREPARED BY

WILLIAM R. MILLS, JR.

TABLE F-1

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

OCTOBER 2000

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	8.78	17.4	647	405	3,557
2	8.75	17.3	681	426	3,727
3	3.37	6.7	663	415	1,401
4	8.89	17.6	648	405	3,603
5	8.02	15.9	655	410	3,287
6	8.90	17.6	650	407	3,619
7	8.90	17.6	649	406	3,614
8	8.89	17.6	648	406	3,607
9	8.89	17.6	648	406	3,607
10	5.23	10.4	386	241	1,263
11	5.82	11.5	359	225	1,307
12	6.80	13.5	773	484	3,290
13	6.80	13.5	773	484	3,288
14	6.80	13.5	772	483	3,284
15	6.95	13.8	701	439	3,049
16	8.84	17.5	640	401	3,543
17	8.84	17.5	640	401	3,544
18	8.84	17.5	640	401	3,542
19	8.83	17.5	641	401	3,543
20	8.83	17.5	641	401	3,541
21	8.82	17.5	641	401	3,540
22	8.81	17.5	639	400	3,526
23	6.78	13.4	673	421	2,855
24	9.41	18.7	695	435	4,092
25	9.36	18.6	690	432	4,038
26	9.34	18.5	688	431	4,024
27	6.35	12.6	688	431	2,733
28	4.81	9.5	709	444	2,135
29	9.81	19.5	698	437	4,289
30	7.75	15.4	1475	923	7,158
31	9.37	18.6	693	434	4,066
Total	247	489			105,670
		Monthly Flow Weighted TDS		429	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

NOVEMBER 2000

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	9.36	18.6	692	433	4,050
2	4.23	8.4	741	464	1,961
3	9.35	18.5	694	435	4,062
4	7.31	14.5	692	433	3,164
5	6.04	12.0	704	441	2,660
6	9.35	18.5	693	434	4,058
7	8.28	16.4	652	408	3,378
8	9.04	17.9	669	419	3,788
9	9.30	18.4	688	430	4,003
10	9.28	18.4	685	429	3,979
11	9.28	18.4	685	429	3,979
12	9.27	18.4	684	428	3,970
13	9.26	18.4	684	428	3,964
14	9.26	18.4	683	428	3,962
15	9.26	18.4	683	427	3,957
16	9.25	18.4	683	428	3,957
17	9.25	18.4	683	427	3,954
18	9.25	18.3	683	427	3,951
19	7.04	14.0	695	435	3,065
20	9.31	18.5	690	432	4,017
21	8.88	17.6	676	423	3,759
22	8.90	17.7	659	412	3,671
23	8.90	17.6	658	412	3,667
24	8.90	17.6	658	412	3,667
25	8.89	17.6	660	413	3,671
26	8.89	17.6	660	413	3,670
27	9.20	18.2	687	430	3,956
28	8.45	16.8	677	424	3,579
29	8.76	17.4	647	405	3,548
30	8.76	17.4	646	404	3,539
Total	260	517			110,605
	Monthly Flow Weighted TDS			425	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

DECEMBER 2000

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	8.75	17.4	647	405	3,543
2	8.75	17.4	646	404	3,538
3	8.75	17.3	646	405	3,538
4	8.76	17.4	645	404	3,538
5	8.78	17.4	643	402	3,534
6	8.78	17.4	643	403	3,535
7	8.78	17.4	643	402	3,534
8	8.75	17.4	642	402	3,515
9	8.74	17.3	641	401	3,503
10	8.74	17.3	641	401	3,508
11	8.75	17.4	641	401	3,509
12	8.75	17.3	640	400	3,502
13	8.74	17.3	639	400	3,497
14	7.01	13.9	660	413	2,896
15	8.80	17.4	649	406	3,571
16	8.79	17.4	647	405	3,564
17	8.79	17.4	647	405	3,562
18	8.79	17.4	648	406	3,564
19	8.78	17.4	647	405	3,558
20	8.78	17.4	647	405	3,557
21	8.80	17.4	649	406	3,571
22	8.88	17.6	660	413	3,667
23	8.88	17.6	660	413	3,666
24	8.87	17.6	660	413	3,663
25	8.87	17.6	660	413	3,664
26	8.87	17.6	659	412	3,657
27	8.88	17.6	660	413	3,667
28	8.87	17.6	661	414	3,672
29	8.87	17.6	662	415	3,677
30	8.87	17.6	662	414	3,672
31	8.87	17.6	661	414	3,668
Total	271	537			110,306
	Monthly Flow Weighted TDS			407	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

JANUARY 2001

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	8.87	17.6	661	414	3,668
2	8.86	17.6	661	414	3,667
3	8.86	17.6	661	414	3,666
4	8.86	17.6	661	414	3,665
5	8.86	17.6	661	414	3,665
6	8.86	17.6	661	414	3,666
7	8.85	17.6	661	414	3,662
8	8.85	17.6	661	414	3,664
9	8.85	17.6	661	414	3,661
10	8.85	17.6	661	414	3,660
11	3.68	7.3	872	546	2,011
12	0.00	0	0	0	0
13	0.00	0	0	0	0
14	0.00	0	0	0	0
15	0.00	0	0	0	0
16	0.02	0.0	1643	1028	16
17	0.00	0	0	0	0
18	0.00	0	0	0	0
19	0.00	0	0	0	0
20	0.00	0	0	0	0
21	0.00	0	0	0	0
22	0.00	0	0	0	0
23	0.00	0	0	0	0
24	0.00	0	0	0	0
25	0.00	0	0	0	0
26	0.00	0	0	0	0
27	0.00	0	0	0	0
28	0.00	0	0	0	0
29	0.00	0	0	0	0
30	0.00	0	0	0	0
31	0.00	0	0	0	0
Total	92	183			38,672
	Monthly Flow Weighted TDS			419	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

FEBRUARY 2001

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	0.00	0	0	0	0
2	0.00	0	0	0	0
3	0.00	0	0	0	0
4	0.00	0	0	0	0
5	3.08	6.1	700	438	1,349
6	5.09	10.1	692	433	2,207
7	8.25	16.4	737	461	3,804
8	9.68	19.2	732	458	4,437
9	9.67	19.2	732	458	4,432
10	9.67	19.2	733	459	4,434
11	9.66	19.2	732	458	4,429
12	3.81	7.6	733	459	1,746
13	0.00	0	0	0	0
14	0.00	0	0	0	0
15	0.00	0	0	0	0
16	0.00	0	0	0	0
17	0.00	0	0	0	0
18	0.00	0	0	0	0
19	0.00	0	0	0	0
20	0.00	0	0	0	0
21	0.02	0.0	1582	990	15
22	0.00	0	0	0	0
23	0.00	0	0	0	0
24	0.00	0	0	0	0
25	0.00	0	0	0	0
26	0.00	0	0	0	0
27	0.00	0	0	0	0
28	0.00	0	0	0	0
Total	59	117			26,853
	Monthly Flow Weighted TDS			456	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

MARCH 2001

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	0.00	0	0	0	0
2	0.00	0	0	0	0
3	0.00	0	0	0	0
4	0.00	0	0	0	0
5	0.00	0	0	0	0
6	0.00	0	0	0	0
7	0.00	0	0	0	0
8	0.00	0	0	0	0
9	0.00	0	0	0	0
10	0.00	0	0	0	0
11	0.00	0	0	0	0
12	0.00	0	0	0	0
13	0.00	0	0	0	0
14	0.00	0	0	0	0
15	0.00	0	0	0	0
16	0.00	0	0	0	0
17	0.00	0	0	0	0
18	0.00	0	0	0	0
19	0.00	0	0	0	0
20	0.00	0	0	0	0
21	0.00	0	0	0	0
22	0.00	0	0	0	0
23	0.00	0	0	0	0
24	0.00	0	0	0	0
25	0.00	0	0	0	0
26	0.00	0	0	0	0
27	5.87	12	753	471	2,765
28	9.68	19	742	465	4,500
29	9.67	19	741	464	4,485
30	9.66	19	741	464	4,476
31	9.65	19	741	464	4,479
Total	45	88			20,707
	Monthly Flow Weighted TDS			465	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

APRIL 2000

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	6.67	13.23	778	487	3,251
2	8.23	16.33	830	519	4,277
3	9.67	19.19	746	467	4,517
4	9.68	19.19	746	467	4,520
5	9.67	19.18	746	467	4,514
6	9.66	19.16	747	467	4,515
7	9.66	19.16	746	467	4,511
8	9.66	19.16	745	467	4,507
9	9.65	19.15	746	467	4,509
10	9.65	19.14	745	466	4,498
11	9.65	19.13	746	467	4,502
12	9.64	19.12	747	467	4,505
13	9.64	19.11	747	467	4,504
14	9.63	19.10	746	467	4,495
15	9.63	19.09	746	467	4,493
16	9.62	19.09	745	466	4,487
17	9.62	19.08	745	466	4,483
18	9.61	19.07	746	467	4,487
19	9.61	19.06	745	467	4,484
20	9.60	19.04	745	466	4,475
21	9.59	19.03	744	466	4,470
22	9.60	19.03	745	466	4,474
23	9.60	19.04	743	465	4,463
24	9.59	19.02	742	465	4,455
25	6.95	13.78	747	468	3,252
26	6.42	12.74	757	474	3,044
27	9.60	19.05	751	470	4,514
28	9.60	19.04	749	469	4,502
29	9.60	19.03	749	469	4,500
30	9.58	19.01	749	469	4,493
Total	279	553			130,701
	Monthly Flow Weighted TDS			469	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

MAY 2000

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	9.58	19.01	748	468	4,489
2	9.58	19.00	748	469	4,487
3	9.57	18.98	747	467	4,473
4	9.13	18.11	765	479	4,372
5	9.57	18.97	750	469	4,489
6	9.56	18.97	749	469	4,485
7	9.56	18.96	750	469	4,486
8	9.55	18.93	749	469	4,475
9	9.55	18.94	749	469	4,475
10	9.54	18.93	749	469	4,475
11	9.54	18.92	750	469	4,478
12	9.54	18.92	749	469	4,472
13	9.53	18.91	749	469	4,471
14	9.53	18.91	749	469	4,467
15	9.52	18.88	749	469	4,462
16	9.51	18.87	748	468	4,457
17	9.52	18.88	748	468	4,457
18	9.52	18.88	748	468	4,457
19	9.52	18.88	748	468	4,454
20	9.51	18.87	748	468	4,454
21	9.52	18.87	748	468	4,455
22	9.51	18.87	748	468	4,455
23	9.51	18.86	749	469	4,455
24	9.51	18.86	749	469	4,456
25	9.50	18.85	748	468	4,452
26	9.49	18.83	747	468	4,440
27	9.50	18.84	747	467	4,440
28	9.38	18.60	751	470	4,409
29	9.50	18.83	748	469	4,449
30	9.49	18.82	748	468	4,444
31	9.49	18.82	748	468	4,441
Total	295	585			138,232
	Monthly Flow Weighted TDS			469	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

JUNE 2000

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	9.49	18.82	748	468	4,444
2	9.49	18.82	748	469	4,445
3	9.49	18.82	748	468	4,441
4	9.44	18.73	741	464	4,380
5	9.38	18.60	726	455	4,263
6	5.00	9.92	724	453	2,267
7	8.03	15.93	729	456	3,666
8	9.37	18.58	724	453	4,245
9	9.36	18.57	724	453	4,245
10	8.65	17.16	724	453	3,920
11	9.22	18.30	726	455	4,195
12	8.61	17.07	691	433	3,723
13	8.96	17.77	681	426	3,818
14	8.96	17.77	681	426	3,818
15	9.33	18.51	725	454	4,236
16	5.76	11.42	730	457	2,632
17	9.34	18.52	723	452	4,224
18	9.28	18.41	716	448	4,161
19	9.26	18.38	716	448	4,150
20	9.26	18.36	714	447	4,136
21	9.25	18.35	714	447	4,133
22	8.53	16.92	769	481	4,104
23	9.25	18.34	715	447	4,136
24	9.24	18.32	714	447	4,127
25	7.66	15.20	721	451	3,459
26	9.25	18.35	717	449	4,152
27	9.24	18.32	715	448	4,135
28	9.22	18.28	714	447	4,121
29	9.21	18.28	713	446	4,113
30	9.21	18.28	713	446	4,110
Total	266	527			119,999
	Monthly Flow Weighted TDS			452	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

JULY 2000

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	9.21	18.27	711	445	4,102
2	9.21	18.26	711	445	4,099
3	9.20	18.25	712	446	4,100
4	6.95	13.78	768	481	3,343
5	5.60	11.11	501	313	1,756
6	5.29	10.50	230	144	763
7	3.39	6.72	269	168	571
8	2.24	4.45	255	160	358
9	2.32	4.61	498	311	723
10	3.34	6.63	349	219	731
11	5.65	11.21	315	197	1,114
12	6.53	12.94	304	190	1,242
13	6.52	12.93	302	189	1,234
14	6.52	12.93	302	189	1,230
15	6.52	12.92	301	188	1,226
16	6.38	12.65	306	192	1,222
17	6.73	13.35	428	268	1,802
18	6.21	12.31	451	282	1,751
19	4.61	9.14	152	95	439
20	4.63	9.18	151	95	438
21	4.63	9.18	151	95	438
22	4.58	9.09	151	94	432
23	4.63	9.19	150	94	436
24	4.73	9.39	150	94	444
25	5.44	10.79	408	256	1,390
26	6.01	11.92	648	406	2,437
27	5.97	11.85	642	402	2,401
28	5.95	11.80	638	399	2,374
29	5.93	11.76	634	397	2,351
30	5.93	11.76	629	394	2,333
31	2.12	4.21	620	388	823
Total	173	343			48,104
	Monthly Flow Weighted TDS			278	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

AUGUST 2000

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	0	0	0	0	0
2	0	0	0	0	0
3	2.17	4.30	686	429	930
4	5.92	11.75	631	395	2,341
5	5.88	11.66	621	388	2,283
6	5.85	11.60	615	385	2,250
7	5.81	11.53	609	381	2,215
8	5.78	11.47	602	377	2,179
9	5.78	11.47	602	377	2,179
10	5.73	11.36	591	370	2,117
11	5.71	11.33	585	366	2,093
12	5.68	11.27	580	363	2,062
13	5.65	11.21	573	359	2,029
14	5.05	10.01	717	449	2,266
15	6.09	12.08	678	424	2,585
16	6.07	12.04	675	423	2,565
17	6.05	12.00	673	421	2,550
18	6.05	12.00	671	420	2,541
19	6.04	11.97	668	418	2,524
20	1.30	2.58	666	417	542
21	0.12	0.25	1,075	673	83
22	3.73	7.40	720	451	1,681
23	6.13	12.16	681	426	2,611
24	6.08	12.05	671	420	2,554
25	6.05	11.99	665	416	2,517
26	6.03	11.95	663	415	2,499
27	6.01	11.91	660	413	2,481
28	5.98	11.86	655	410	2,450
29	5.95	11.81	650	407	2,424
30	5.93	11.76	643	403	2,387
31	5.89	11.68	637	398	2,347
Total	154	306			62,288
	Monthly Flow Weighted TDS			403	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-1 (continued)

SUMMARY OF DISCHARGE AND WEIGHTED TDS
FROM THE ARLINGTON DESALTER TO THE ARLINGTON VALLEY DRAIN
WATER YEAR 2000-01

SEPTEMBER 2000

Day	Arlington Discharge (cfs)	Arlington Discharge (acre-feet)	Daily Mean EC (microsiemens/cm)	Computed TDS (mg/L) [1]	Outflow X TDS
1	5.85	11.60	628	393	2,299
2	5.84	11.58	625	391	2,284
3	5.83	11.56	623	390	2,274
4	5.82	11.55	622	390	2,268
5	5.82	11.55	623	390	2,271
6	5.82	11.54	623	390	2,268
7	5.82	11.54	617	386	2,247
8	5.82	11.53	606	379	2,205
9	5.77	11.45	596	373	2,153
10	6.24	12.37	532	333	2,079
11	5.74	11.39	168	105	603
12	3.61	7.15	161	101	363
13	6.54	12.97	161	101	657
14	7.45	14.77	343	215	1,600
15	7.60	15.07	659	413	3,137
16	5.62	11.14	132	83	466
17	8.16	16.18	529	331	2,703
18	8.33	16.52	838	524	4,367
19	7.34	14.55	887	555	4,072
20	8.44	16.73	817	511	4,312
21	9.77	19.37	712	446	4,354
22	9.77	19.37	711	445	4,348
23	9.82	19.49	704	441	4,331
24	9.82	19.47	704	441	4,327
25	9.70	19.25	708	443	4,303
26	9.81	19.46	702	440	4,314
27	9.81	19.45	701	439	4,305
28	9.81	19.45	699	438	4,291
29	9.80	19.44	699	437	4,287
30	9.80	19.44	699	438	4,288
Total	225	447			87,777
	Monthly Flow Weighted TDS			390	

1. TDS = EC x 0.625965
2. EC interpolated from the relationship between EC and the blend ratio of the reverse osmosis product water to the total flow discharged.

TABLE F-2

QUALITY OF WATER DISCHARGED
FROM THE ARLINGTON DESALTER
TO THE ARLINGTON VALLEY DRAIN

WATER YEAR 2000-01

Month	Discharge (acre-feet)	Weighted TDS (mg/L)	Discharge X TDS
2000			
October	489	429	209,594
November	517	425	219,382
December	537	407	218,521
2001			
January	183	419	76,705
February	117	456	53,262
March	88	465	41,071
April	553	469	259,242
May	585	469	274,179
June	527	452	238,014
July	343	278	95,412
August	306	403	123,545
September	447	390	174,103
Total	4,692		1,983,030
	Yearly Flow Weighted TDS =	423	

APPENDIX G

WATER QUALITY AND DISCHARGE FROM THE SAN JACINTO WATERSHED

WATER YEAR 2000-01

PREPARED BY

WILLIAM R. MILLS, JR.

No discharges into the Santa Ana River watershed from Lake Elsinore occurred during the 1995-96 water year.

APPENDIX H

WATER QUALITY AND DISCHARGE OF THE SANTA ANA RIVER BELOW PRADO DAM

WATER YEAR 2000-01

PREPARED BY

WILLIAM R. MILLS, JR

TABLE H-1

WATER QUALITY SAMPLES BELOW PRADO DAM
FOR WATER YEAR 2000-01

Date	EC (microsiemens/cm)	TDS (mg/L)	Source
10/06/00	995	612	USGS
10/12/00	940	563	USGS
10/23/00	784	506	OCWD*
11/03/00	814	492	USGS
11/13/00	822	482	OCWD*
11/20/00	841	494	USGS
12/01/00	965	606	USGS
12/15/00	987	616	USGS
12/18/00	989	636	OCWD*
01/05/01	976	602	USGS
01/19/01	701	438	USGS
01/22/01	669	436	OCWD*
02/02/01	800	498	USGS
02/13/01	302	196	OCWD*
02/21/01	729	449	USGS
03/02/01	467	286	USGS
03/16/01	756	468	USGS
03/19/01	844	586	OCWD*
04/06/01	1040	648	USGS
04/16/01	1020	616	OCWD*
04/19/01	1010	682	USGS
05/04/01	1020	656	USGS
05/14/01	1000	626	OCWD*
05/18/01	993	616	USGS
06/01/01	988	614	USGS
06/11/01	965	616	OCWD*
06/15/01	980	628	USGS
07/09/01	985	614	USGS
07/16/01	997	598	OCWD*
07/19/01	980	600	USGS
08/03/01	974	644	USGS
08/13/01	986	608	OCWD*
08/17/01	940	596	USGS
09/07/01	979	609	USGS
09/13/01	967	580	OCWD*
09/18/01	966	613	USGS

* Not used in calculation of the best fit equation TDS = EC x 0.625894

TABLE H-2

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

OCTOBER 2000

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	127	1020	638	81,078
2	128	996	623	79,794
3	130	980	613	79,739
4	131	985	617	80,762
5	131	1010	632	82,812
6	133	996	623	82,911
7	134	971	608	81,438
8	136	943	590	80,270
9	280	933	584	163,509
10	339	930	582	197,326
11	334	931	583	194,624
12	438	948	593	259,886
13	476	959	600	285,711
14	344	1010	632	217,461
15	247	975	610	150,731
16	252	948	593	149,524
17	304	836	523	159,067
18	317	810	507	160,711
19	321	796	498	159,926
20	326	778	487	158,744
21	327	755	473	154,524
22	325	672	421	136,695
23	323	656	411	132,620
24	320	660	413	132,189
25	308	664	416	128,003
26	320	669	419	133,991
27	312	679	425	132,594
28	317	835	523	165,671
29	294	882	552	162,299
30	397	664	416	164,991
31	443	867	543	240,394
Total	8,714			4,589,996
		Monthly Flow Weighted TDS =	527	mg/L

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

NOVEMBER 2000

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	275	914	572	157,319
2	240	891	558	133,841
3	327	815	510	166,804
4	319	737	461	147,150
5	331	723	453	149,785
6	355	747	468	165,978
7	343	757	474	162,514
8	327	759	475	155,343
9	330	814	509	168,128
10	343	829	519	177,971
11	357	843	528	188,364
12	365	840	526	191,899
13	378	849	531	200,863
14	372	867	543	201,866
15	359	865	541	194,362
16	349	852	533	186,108
17	341	851	533	181,629
18	336	844	528	177,494
19	343	831	520	178,401
20	348	830	519	180,783
21	342	829	519	177,452
22	331	803	503	166,358
23	256	911	570	145,969
24	246	911	570	140,267
25	250	917	574	143,486
26	250	929	581	145,364
27	253	970	607	153,601
28	202	nd	---	---
29	232	nd	---	---
30	294	984	616	181,069
Total	8,960			4,720,167
		Monthly Flow Weighted TDS =	527	mg/L

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

DECEMBER 2000

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	259	977	611	158,378
2	255	984	616	157,049
3	255	975	610	155,613
4	251	966	605	151,758
5	257	957	599	153,938
6	249	970	607	151,172
7	248	975	610	151,341
8	251	950	595	149,245
9	252	952	596	150,155
10	263	951	595	156,544
11	264	994	622	164,245
12	268	995	623	166,901
13	296	998	625	184,894
14	260	994	622	161,756
15	206	1000	626	128,934
16	235	980	613	144,143
17	249	973	609	151,640
18	257	975	610	156,834
19	245	976	611	149,664
20	251	965	604	151,601
21	250	966	605	151,154
22	250	960	601	150,215
23	254	959	600	152,459
24	258	983	615	158,736
25	247	1010	632	156,142
26	236	1020	638	150,665
27	241	999	625	150,690
28	240	1020	638	153,219
29	240	1020	638	153,219
30	244	1030	645	157,300
31	249	1010	632	157,406
Total	7,780			4,787,010

Monthly Flow Weighted TDS = 615 mg/L

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

JANUARY 2001

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	245	1000	626	153,344
2	239	1010	632	151,085
3	217	1030	645	139,894
4	228	1000	626	142,704
5	235	997	624	146,644
6	251	982	615	154,272
7	250	988	618	154,596
8	230	978	612	140,789
9	286	935	585	167,370
10	253	941	589	149,009
11	1,220	398	249	303,909
12	1,070	391	245	261,855
13	333	514	322	107,129
14	330	540	338	111,534
15	327	584	366	119,526
16	367	662	414	152,064
17	385	659	412	158,799
18	382	715	448	170,951
19	379	706	442	167,473
20	374	679	425	158,943
21	372	673	421	156,696
22	371	689	431	159,991
23	368	685	429	157,775
24	368	744	466	171,365
25	368	784	491	180,578
26	368	787	493	181,269
27	370	894	560	207,033
28	369	821	514	189,614
29	368	791	495	182,190
30	362	813	509	184,204
31	368	877	549	201,999
Total	11,653			5,184,605
		Monthly Flow Weighted TDS =	445	mg/L

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

FEBRUARY 2001

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	386	836	523	201,974
2	414	826	517	214,033
3	410	849	531	217,868
4	405	892	558	226,111
5	415	863	540	224,161
6	425	888	556	236,213
7	421	925	579	243,739
8	417	966	605	252,124
9	413	989	619	255,651
10	407	986	617	251,173
11	404	986	617	249,321
12	399	861	539	215,019
13	4,780	337	211	1,008,228
14	1,270	319	200	253,569
15	493	384	240	118,489
16	428	446	279	119,476
17	422	492	308	129,951
18	419	525	329	137,681
19	416	596	373	155,182
20	416	686	429	178,615
21	416	721	451	187,728
22	416	711	445	185,125
23	416	744	466	193,717
24	416	817	511	212,724
25	1,060	776	486	514,836
26	2,040	636	398	812,061
27	955	499	312	298,267
28	1,490	446	279	415,932
Total	20,769			7,708,966

Monthly Flow Weighted TDS = 371 mg/L

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

MARCH 2001

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	533	422	264	140,780
2	524	458	287	150,210
3	520	500	313	162,733
4	520	546	342	177,704
5	515	613	384	197,592
6	515	672	421	216,610
7	517	710	444	229,747
8	520	763	478	248,330
9	435	750	469	204,198
10	367	788	493	181,006
11	369	817	511	188,690
12	450	793	496	223,350
13	325	789	494	160,495
14	339	785	491	166,560
15	372	783	490	182,308
16	383	778	487	186,500
17	385	790	494	190,366
18	387	813	509	196,926
19	390	853	534	208,216
20	396	876	548	217,120
21	419	918	575	240,745
22	446	944	591	263,517
23	451	981	614	276,915
24	448	1000	626	280,401
25	447	1010	632	282,573
26	444	1020	638	283,455
27	452	1030	645	291,391
28	455	1040	651	296,173
29	450	1030	645	290,102
30	443	1040	651	288,362
31	431	1050	657	283,249
Total	13,648			6,906,324

Monthly Flow Weighted TDS = 506 mg/L

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

APRIL 2001

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	416	1050	657	273,391
2	410	1060	663	272,014
3	397	1050	657	260,904
4	376	1050	657	247,103
5	361	1050	657	237,245
6	348	1060	663	230,880
7	344	963	603	207,341
8	366	619	387	141,799
9	362	669	419	151,578
10	365	816	511	186,416
11	362	842	527	190,775
12	355	876	548	194,641
13	350	946	592	207,234
14	347	996	623	216,317
15	342	1010	632	216,196
16	294	1010	632	185,853
17	266	1010	632	168,153
18	266	1010	632	168,153
19	294	1020	638	187,693
20	300	1030	645	193,401
21	273	892	558	152,415
22	235	717	449	105,460
23	256	805	504	128,984
24	260	915	573	148,900
25	257	966	605	155,386
26	262	974	610	159,721
27	263	978	612	160,989
28	265	986	617	163,540
29	264	984	616	162,592
30	299	980	613	183,400
Total	9,555			5,658,475
	Monthly Flow Weighted TDS =		592 mg/L	

1. TDS = EC x 0.62589447

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

MAY 2001

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	319	975	610	194,669
2	347	974	610	211,539
3	356	995	623	221,704
4	341	1040	651	221,967
5	312	1040	651	203,090
6	268	1010	632	169,417
7	250	987	618	154,439
8	253	1030	645	163,102
9	233	1040	651	151,667
10	232	1040	651	151,016
11	216	1030	645	139,249
12	207	1020	638	132,151
13	213	1010	632	134,649
14	212	1010	632	134,017
15	205	1010	632	129,591
16	208	1000	626	130,186
17	210	1000	626	131,438
18	211	1010	632	133,384
19	210	1010	632	132,752
20	211	1000	626	132,064
21	216	993	622	134,247
22	212	983	615	130,434
23	209	1010	632	132,120
24	209	1010	632	132,120
25	205	991	620	127,154
26	205	994	622	127,539
27	211	991	620	130,875
28	212	983	615	130,434
29	213	980	613	130,649
30	209	996	623	130,289
31	203	1020	638	129,598
Total	7,318			4,607,549
	Monthly Flow Weighted TDS =		630 mg/L	

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

JUNE 2001

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	202	980	613	123,902
2	206	933	584	120,296
3	208	931	583	121,203
4	211	920	576	121,499
5	213	915	573	121,984
6	209	894	560	116,946
7	211	877	549	115,820
8	206	864	541	111,399
9	211	863	540	113,971
10	209	924	578	120,870
11	205	938	587	120,353
12	203	964	603	122,483
13	208	975	610	126,931
14	210	961	601	126,312
15	203	975	610	123,880
16	201	967	605	121,653
17	201	940	588	118,257
18	195	942	590	114,971
19	196	963	603	118,136
20	193	985	617	118,986
21	192	956	598	114,884
22	192	946	592	113,682
23	194	932	583	113,167
24	191	932	583	111,417
25	195	934	585	113,994
26	189	935	585	110,605
27	187	927	580	108,498
28	186	917	574	106,754
29	187	922	577	107,913
30	192	903	565	108,515
Total	6,006			3,509,280
		Monthly Flow Weighted TDS =	584	mg/L

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

JULY 2001

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	194	904	566	109,767
2	195	917	574	111,919
3	198	928	581	115,004
4	190	955	598	113,569
5	216	876	548	118,429
6	217	913	571	124,003
7	206	924	578	119,135
8	200	942	590	117,919
9	192	970	607	116,567
10	188	962	602	113,197
11	188	972	608	114,373
12	183	980	613	112,248
13	184	968	606	111,479
14	186	954	597	111,061
15	186	963	603	112,109
16	186	951	595	110,712
17	187	948	593	110,956
18	189	967	605	114,390
19	193	973	609	117,536
20	184	936	586	107,794
21	185	898	562	103,980
22	181	877	549	99,353
23	175	866	542	94,854
24	180	867	543	97,677
25	178	876	548	97,594
26	176	864	541	95,176
27	179	864	541	96,798
28	175	901	564	98,688
29	175	921	576	100,879
30	182	951	595	108,331
31	184	965	604	111,134
Total	5,832			3,386,632
		Monthly Flow Weighted TDS =	581	mg/L

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

AUGUST 2001

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	179	967	605	108,338
2	179	973	609	109,010
3	172	986	617	106,147
4	186	942	590	109,664
5	181	916	573	103,771
6	179	905	566	101,392
7	177	914	572	101,256
8	177	910	570	100,813
9	176	900	563	99,142
10	176	888	556	97,820
11	179	899	563	100,720
12	179	949	594	106,321
13	180	935	585	105,338
14	182	938	587	106,850
15	173	957	599	103,624
16	175	972	608	106,465
17	179	970	607	108,674
18	180	968	606	109,056
19	179	942	590	105,537
20	179	927	580	103,857
21	167	932	583	97,417
22	178	902	565	100,491
23	187	887	555	103,816
24	186	877	549	102,097
25	186	870	545	101,282
26	184	864	541	99,502
27	183	890	557	101,939
28	182	936	586	106,622
29	186	934	585	108,733
30	188	935	585	110,020
31	188	940	588	110,608
Total	5,582			3,236,321
		Monthly Flow Weighted TDS =	580	mg/L

1. TDS = EC x 0.625894

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
FOR WATER YEAR 2000-01

SEPTEMBER 2001

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS [1]	Outflow X TDS
1	194	950	595	115,352
2	194	974	610	118,267
3	194	982	615	119,238
4	199	981	614	122,186
5	194	991	620	120,331
6	195	998	625	121,805
7	182	982	615	111,862
8	184	964	603	111,019
9	197	979	613	120,712
10	203	970	607	123,245
11	200	969	606	121,298
12	200	964	603	120,672
13	202	954	597	120,615
14	198	965	604	119,590
15	197	997	624	122,931
16	202	994	622	125,672
17	207	979	613	126,839
18	201	973	609	122,408
19	205	935	585	119,968
20	204	901	564	115,042
21	207	891	558	115,438
22	207	886	555	114,790
23	208	884	553	115,084
24	208	879	550	114,434
25	201	911	570	114,608
26	193	915	573	110,530
27	194	919	575	111,588
28	191	935	585	111,775
29	195	954	597	116,435
30	200	965	604	120,798
Total	5,956			3,544,534
	Monthly Flow Weighted TDS =		595	mg/L

1. TDS = EC x 0.625894

TABLE H-3

ANNUAL SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM

FOR WATER YEAR 2000-01

Month	Monthly Flow (cfs-days)	Monthly Weighted TDS (mg/L)	Monthly Flow x TDS
2000			
October	8,714	527	4,589,996
November	8,960	527	4,720,167
December	7,780	615	4,787,010
2001			
January	11,653	445	5,184,605
February	20,769	371	7,708,966
March	13,648	506	6,906,324
April	9,555	592	5,658,475
May	7,318	630	4,607,549
June	6,006	584	3,509,280
July	5,832	581	3,386,632
August	5,582	580	3,236,321
September	5,956	595	3,544,534
Total	111,773		57,839,859
Yearly Flow Weighted TDS =		517	

APPENDIX I

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

WATER YEAR 2000-01

PREPARED BY

DONALD L. HARRIGER

TABLE I-1

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

WATER YEAR 2000-01

MONTH	Discharge (acre -feet)	TDS (mg/L)	Discharge xTDS
2000			
October	195	628	122,478
November	187	644	120,361
December	191	620	118,559
2001			
January	189	612	115,864
February	174	580	100,675
March	193	640	123,601
April	183	656	120,188
May	189	692	131,010
June	187	656	122,604
July	194	628	121,881
August	194	624	121,104
September	190	616	116,830
Total	2,266		1,435,155

Flow weighted TDS = 633 mg/L

APPENDIX J

WATER QUALITY AND DISCHARGE OF THE SANTA ANA RIVER AT RIVERSIDE NARROWS

WATER YEAR 2000-01

PREPARED BY

DONALD L. HARRIGER

Table J-1

SANTA ANA RIVER AT RIVERSIDE NARROWS

FOR WATER YEAR 2000-01

Date Sampled	E.C. (microsiemens/cm)	TDS (mg/L)	Source of Data	*Ratio*	*Average*
2000					
10/02/00	930	561	USGS	0.60	
10/02/00	1014	632	C of R	0.62	
10/06/00	1005	620	C of R	0.62	
10/11/00	961	524	C of R	0.55	
10/18/00	872	545	USGS	0.63	
10/20/00	973	604	C of R	0.62	581
11/01/00	870	534	USGS	0.61	
11/03/00	959	584	C of R	0.61	
11/06/00	969	628	C of R	0.65	
11/08/00	957	608	C of R	0.64	
11/22/00	902	559	USGS	0.62	
11/22/00	982	556	C of R	0.57	578
12/01/00	991	604	C of R	0.61	
12/07/00	904	561	USGS	0.62	
12/08/00	996	584	C of R	0.59	
12/20/00	877	548	USGS	0.62	
12/20/00	979	516	C of R	0.53	
12/29/00	978	616	C of R	0.63	572
2001					
01/01/01	870	571	USGS	0.66	
01/03/01	997	612	C of R	0.61	
01/08/01	1013	608	C of R	0.60	
01/23/01	877	557	USGS	0.64	
01/26/01	991	660 *	C of R	0.67	
01/31/01	961	548 *	C of R	0.57	592

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

C of R City of Riverside

USGS U.S. Geological Survey

DWR Dept. of Water Resources

Table J-1

SANTA ANA RIVER AT RIVERSIDE NARROWS

FOR WATER YEAR 2000-01

Date Sampled	E.C. (microsiemens/cm)	TDS (mg/L)	Source of Data	*Ratio*	*Average*
2001					
02/02/01	858	574	USGS	0.67	
02/05/01	961	548	C of R	0.57	
02/07/01	1012	540	C of R	0.53	
02/14/01	721	421 *	USGS	0.58	
02/16/01	906	584 *	C of R	0.64	
02/21/01	942	564 *	C of R	0.60	554
03/01/01	606	388 *	USGS	0.64	
03/02/01	953	516 *	C of R	0.54	
03/05/01	997	576 *	C of R	0.58	
03/15/01	947	598	USGS	0.63	
03/16/01	1036	604	C of R	0.58	
03/21/01	1032	660	C of R	0.64	
03/30/01	1040	636	C of R	0.61	625
04/02/01	884	552	USGS	0.62	
04/04/01	1040	656	C of R	0.63	
04/13/01	1032	624 *	C of R	0.60	
04/18/01	1085	648 *	C of R	0.60	
04/24/01	930	596	USGS	0.64	
04/27/01	1047	656	C of R	0.63	615
05/01/01	900	564	USGS	0.63	
05/02/01	1070	608	C of R	0.57	
05/07/01	1047	700	C of R	0.67	
05/11/01	1073	652	C of R	0.61	
05/16/01	1031	584	C of R	0.57	
05/17/01	886	574	USGS	0.65	
05/25/01	1067	656	C of R	0.61	620

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

C of R City of Riverside

USGS U.S. Geological Survey

DWR Dept. of Water Resources

Table J-1

SANTA ANA RIVER AT RIVERSIDE NARROWS

FOR WATER YEAR 2000-01

Date Sampled	E.C. (microsiemens/cm)	TDS (mg/L)	Source of Data	*Ratio*	*Average*
2001					
06/04/01	902	562	USGS	0.62	
06/04/01	1050	644	C of R	0.61	
06/08/01	1055	632	C of R	0.60	
06/12/01	895	552	USGS	0.62	
06/13/01	1066	616	C of R	0.58	
06/22/01	1045	592	C of R	0.57	
06/27/01	1080	636	C of R	0.59	605
07/02/01	905	572	USGS	0.63	
07/06/01	1054	592	C of R	0.56	
07/10/01	922	574	USGS	0.62	
07/11/01	1106	728	C of R	0.66	
07/20/01	1052	596	C of R	0.57	
07/25/01	1081	636	C of R	0.59	616
08/03/01	1047	644	C of R	0.62	
08/06/01	909	588	USGS	0.65	
08/08/01	1037	656	C of R	0.63	
08/17/01	1042	620	C of R	0.60	
08/21/01	915	586	USGS	0.64	
08/22/01	1021	628	C of R	0.62	620
09/05/01	896	568	USGS	0.63	
09/05/01	1020	616	C of R	0.60	
09/14/01	1001	604	C of R	0.60	
09/17/01	926	550	USGS	0.59	
09/19/01	1002	644	C of R	0.64	596

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

C of R City of Riverside

USGS U.S. Geological Survey

DWR Dept. of Water Resources

TABLE J-2

FLOW WEIGHTED TDS OF BASE FLOW AT RIVERSIDE NARROWS

(Including Nontributary Flow

Discharged Above the Narrows)

FOR WATER YEAR 2000-01

Month	Flow[1] (acre-feet)	TDS[2] (mg/L)	Flow x TDS
2000			
October	5,696	581	3,309,376
November	5,931	578	3,428,118
December	6,188	572	3,539,536
2001			
January	5,571	592	3,298,032
February	5,079	554	2,813,766
March	5,806	625	3,628,750
April	5,479	615	3,369,585
May	4,701	620	2,914,620
June	4,542	605	2,747,910
July	4,423	616	2,724,568
August	4,485	620	2,780,700
September	4,465	596	2,661,140
Total	62,366		37,216,101

$$\text{Flow weighted TDS} = \frac{37,216,101}{62,366} = 597 \text{ mg/L}$$

(1) USGS measured flow minus storm flow from Table 7.

(2) TDS based on water quality data from Table J-1.