

**SANTA ANA RIVER WATERMASTER
FOR
ORANGE COUNTY WATER DISTRICT
VS. CITY OF CHINO et al.
CASE NO. 117628 - COUNTY OF ORANGE**

**THIRTY-FOURTH
ANNUAL REPORT
OF THE
SANTA ANA RIVER WATERMASTER
FOR WATER YEAR
OCTOBER 1, 2003 - SEPTEMBER 30, 2004**

APRIL 30, 2005

SANTA ANA RIVER WATERMASTER

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

WATERMASTER

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April 30, 2005

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

Re: Watermaster Report for Water Year October 1, 2003 - September 30, 2004

Ladies and Gentlemen:

We have the honor of submitting herewith the Thirty-fourth Annual Report of the Santa Ana River Watermaster. The supporting basic data Appendices are bound separately.

The principal findings of the Watermaster for the water year 2003-04 are as follows:

At Prado

1	Measured Outflow at Prado	214,102 acre-feet
2	Base Flow at Prado	143,510 acre-feet
3	Annual Weighted TDS in Base and Storm Flows	508 mg/L
4	Annual Adjusted Base Flow	166,472 acre-feet
5	Cumulative Adjusted Base Flow	4,018,003 acre-feet
6	Other Credits (Debits)	247 acre-feet
7	Cumulative Entitlement of OCWD	1,428,000 acre-feet
8	Cumulative Credit	2,608,908 acre-feet
9	One-Third of Cumulative Debit	0 acre-feet
10	Minimum Required Base Flow in 2004-05	34,000 acre-feet

At Riverside Narrows

1	Base Flow at Riverside Narrows	54,788 acre-feet
2	Annual Weighted TDS in Base Flow	634 mg/L
3	Annual Adjusted Base Flow	54,788 acre-feet
4	Cumulative Adjusted Base Flow	1,471,521 acre-feet
5	Cumulative Entitlement of IEUA and WMWD	518,500 acre-feet
6	Cumulative Credit	953,021 acre-feet
7	One-Third of Cumulative Debit	0 acre-feet
8	Minimum Required Base Flow in 2004-05	12,420 acre-feet

Based on these findings, the Watermaster concludes that there was full compliance with the provisions of the Stipulated Judgment in 2003-04.

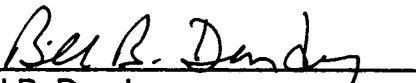
At the end of the 2003-04 water year, Inland Empire Utilities Agency (formerly Chino Basin Municipal Water District) and Western Municipal Water District have a cumulative credit of 2,608,908 acre-feet to their Base Flow obligation at Prado Dam. San Bernardino Valley Municipal Water District has a cumulative credit of 953,021 acre-feet to its Base Flow obligation at Riverside Narrows.

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

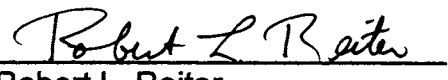
Sincerely yours,

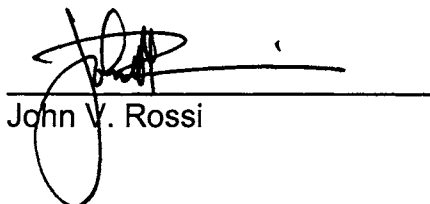
Santa Ana River Watermaster

By: 
Richard W. Atwater


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APPENDICES

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

- 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
- B Daily Precipitation Data Estimated for San Bernardino
- C Santa Ana River Watermaster Financial Statements with Report on Examination by Orange County Water District Controller
- D Water Quality and Flow of High Groundwater Mitigation Project Water Discharged to the Santa Ana River above Riverside Narrows
- E Water Quality and Discharge of Water Released by MWDSC to San Antonio Creek Near Upland (Connection OC-59)
- F Water Quality and Discharge from the Arlington Desalter to the Arlington Valley Drain
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CHAPTER I

WATERMASTER ACTIVITIES AND WATER CONDITIONS

Introduction

This Thirty-fourth Annual Report of the Santa Ana River Watermaster covers Water Year 2003-04. 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 2003-04 Water Year the Watermaster Committee consisted of Robert L. Reiter, Bill B. Dendy, Richard W. Atwater, Virginia L. Grebbien, and John V. Rossi. Mr. Reiter served as Chairman/Treasurer and Mr. Dendy served as Secretary. The history of the Watermaster Committee membership is presented in Chapter IV.

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 2003-04 the United States Geological Survey (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 ($\mu\text{s}/\text{cm}$) 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 2003-04 daily mean discharge record at Prado is considered by the USGS to be "good" for flows below 500 cfs and "fair" above. 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, 4,430 cfs on February 26, 2004, and 118 cfs on August 11, 2004. The maximum and minimum daily mean EC values reported by the USGS at Prado were 1090 $\mu\text{s}/\text{cm}$ on May 7, 2004, and 266 $\mu\text{s}/\text{cm}$ on February 27, 2004. The respective corresponding calculated TDS concentrations were 671 and 164 mg/L.

The 2003-04 daily mean discharge record at Riverside Narrows was rated by the USGS to be "poor" due to a continuing trend of channel scour, lateral stream movement away from the gage's sensor and deposition of sediments near the sensor. The maximum and minimum daily mean discharge values during the year were 3,570 cfs on February 26, 2004, and 56 cfs on July 19, 22, and 25, 2004. The maximum and minimum daily mean EC values reported by the USGS were 979 $\mu\text{s}/\text{cm}$ on May 4, 2004 and 920 $\mu\text{s}/\text{cm}$ on November 18, 2003. The corresponding measured TDS concentrations were 618 and 566 mg/L, respectively.

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.

In 2000-01 Station 2146 was destroyed when the hospital buildings were demolished. For many days of that 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 that entire year might be unreliable and decided to replace it with estimated data. Beginning with Water Year 2001-02 OCWD hydrogeologists Roy Herndon and Gwen Sharp have obtained the records for three nearby stations (2357 at San Bernardino, California Department of Forestry, 2015 at Del Rosa Ranger Station, and 2001B2 or 2001B3 at San Bernardino County Flood Control District) and, using the method recommended by the U.S. Weather Service, have annually estimated the precipitation at the location of the former Station 2146. For Water Year 2003-04 their estimate was 10.80 inches. The Watermaster accepted their estimate.

The estimated 2003-04 rainfall total was 60% 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 2003-04.

A new Station 2146A has been established near the site of the former Station 2146 and it is the intent of the Watermaster to determine, over time, whether or not the quality of the record at the new station is adequate to justify its use in lieu of an estimated record.

Watermaster Determinations

Each year the Watermaster uses its long-established procedures to analyze the basic hydrologic and water quality data to determine, at Riverside Narrows and at Prado, Base Flow, Base Flow TDS, Adjusted Base Flow, Cumulative Credits or Debits to Upper Area parties, and the Minimum Required Base Flow for the following water year. The procedures include determining, for both locations, the amounts of Nontributary Flow or other non-storm flow to be excluded from Base Flow, the relative amounts of Base Flow and Storm Flow and the relationships between EC and TDS concentrations.

During 2003-04 there were three sources of non-storm flow in the river at Prado that the Watermaster has included in neither Base Flow nor in the calculation of Cumulative Credits: imported water, Arlington Desalter product water, and WMWD-EVMWD Transfer Program water. A fourth source, treated municipal wastewater discharged to Temescal Creek from the San Jacinto Watershed, was also excluded from Base Flow but was partially added to the Cumulative Credit at Prado.

- A total of 7,766 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 225 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 2,832 acre-feet of water having an average TDS concentration of 290 mg/L.
- Under agreements with Elsinore Valley Municipal Water District (EVMWD) and OCWD, WMWD obtained and delivered to the Santa Ana River above Prado Dam 1,537 acre-feet of water for OCWD. The estimated flow-weighted average TDS of the water was 428 mg/L.
- Eastern Municipal Water District (EMWD) reported that it discharged to Temescal Creek 4,345 acre-feet of municipal wastewater, with a flow-weighted average TDS of 648 mg/L, which originated in the San Jacinto River Watershed. Discharges from the San Jacinto Watershed were not taken into account in the settlement discussions and calculations that led to the flow obligations in the Judgment. In the past the Watermaster decided that fifty percent of any portion of such discharges that reach Prado Reservoir and that are subsequently captured by OCWD should be added to the Cumulative Credit at Prado (after the usual water quality adjustment). OCWD Hydrogeologist Gwen Sharp estimated that 1,140 acre-feet of the EMWD wastewater, with a TDS concentration of 682 mg/L, reached Prado Reservoir and that 495 acre-feet of it was captured by OCWD, and recommended that the Cumulative Credit at Prado be increased accordingly, using the previously established fifty percent rule. The Watermaster accepted the estimate and the recommendation.

The Watermaster's determinations for the 2003-04 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 2003-04 is presented in Table 1. 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.

TABLE 1
SUMMARY OF FINDINGS AT PRADO

Water Year	Rainfall (in) ⁽¹⁾	Total Flow (ac-ft) ⁽²⁾	Base Flow (ac-ft) ⁽³⁾	Weighted TDS (mg/L) ⁽⁴⁾	Adjusted Base Flow (ac-ft)	Cumulative Credit (ac-ft) ⁽⁵⁾
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	728	74,875	205,652
1981-82	18.34	143,367	81,548	584	89,431	253,083
1982-83	32.36	425,938	111,692	411	138,591	353,036
1983-84	10.81	178,395	109,231	627	115,876	431,514
1984-85	12.86	162,912	125,023	617	133,670	523,184
1985-86	17.86	196,565	127,215	567	141,315	622,499
1986-87	8.08	140,538	119,848	622	127,638	708,137
1987-88	13.78	170,279	124,104	582	136,308	802,445
1988-89	12.64	152,743	119,572	583	131,230	891,675
1989-90	8.53	144,483	119,149	611	127,986	977,611
1990-91	15.48	191,321	111,151	514	128,379	1,064,040
1991-92	16.54	193,225	106,948	499	124,869	1,146,909
1992-93	30.92	568,677	128,068	368	163,499	1,268,408
1993-94	11.62	158,241	111,186	611	119,432	1,345,840
1994-95	25.14	424,017	123,468	415	152,792	1,458,394
1995-96	11.92	194,797	131,861	514	152,299	1,568,693
1996-97	18.64	204,610	136,676	514	157,861	1,684,554
1997-98	33.41	462,633	155,711	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	209,168	153,914	525	176,360	2,232,604
2001-02	5.08	156,596	145,981	587	159,728	2,350,332
2002-03	16.22	245,942	146,113	463	174,970	2,484,189
2003-04	10.80	201,967	143,510	508	166,472	2,608,908

TABLE 1 (Continued)

SUMMARY OF FINDINGS AT RIVERSIDE NARROWS

Water Year	Rainfall (in) ⁽¹⁾	Total Flow (ac-ft) ⁽²⁾	Base Flow (ac-ft) ⁽³⁾	Weighted TDS (mg/L) ⁽⁴⁾	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	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	633	69,772	198,072
1985-86	17.86	99,258	68,220	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	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	677	31,278	508,075
1994-95	25.14	243,411	45,562	646	45,562	538,387
1995-96	11.92	81,786	54,548	625	54,548	577,685
1996-97	18.64	104,518	62,618	624	62,618	625,053
1997-98	33.41	214,375	65,013	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	75,331	61,872	603	61,872	827,531
2001-02	5.08	59,434	58,705	606	58,705	870,986
2002-03	16.22	92,166	57,747	617	57,747	913,483
2003-04	10.80	77,336	54,788	634	54,788	953,021

TABLE 1 (Continued)

- (1) Measured at San Bernardino County Hospital prior to 2000-01 and, since then, estimated for that location.
- (2) As determined by the Watermaster, Total Flow at either Prado or Riverside Narrows in any year may be exclusive of any Nontributary Flow, Exchange Water or other "water management" flows and, at Prado, may include discharges from Lake Elsinore or the San Jacinto Watershed that reach the Santa Ana River.
- (3) As determined by the Watermaster: (a) Base Flow at Prado in any year is exclusive of Storm Flow and may be exclusive of any Nontributary Flow, Exchange Water or other "water management" flows as well as any discharges from Lake Elsinore or the San Jacinto Watershed that reach the Santa Ana River; (b) Base Flow at Riverside Narrows in any year is exclusive of Storm Flow and may be exclusive of any Nontributary Flow, Exchange Water or other "water management" flows and, beginning in 1979-80, includes wastewater from Rubidoux CSD that is treated at the Riverside Regional WWTP.
- (4) For Base and Storm Flow at Prado and Base Flow only at Riverside Narrows.
- (5) As determined by the Watermaster, Cumulative Credit at Prado in any year may include credit for a portion of any water discharged from Lake Elsinore or the San Jacinto Watershed that reach the Santa Ana River.

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 2.

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 and, therefore, helps the Upper Area parties comply with the Judgment. The available historical data on salt export are summarized in Table 3. The SARI first went into service in 1985-86. The NRWS has been in service since 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 2
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)	
	Redlands	Beaumont	Yucaipa	Subtotal (A)	San Bernardino	Colton	Rialto	RIX ¹	Subtotal (B)	Riverside	Corona	IEUA #1 ²	IEUA #2	IEUA #5	IEUA CCWRF ³			WRCR ⁴
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	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	109,299	163,410	175,284
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	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	110,852	168,605	180,706
2001-02	7,395	1,434	3,285	12,114	--	--	7,952	44,513	52,465	35,586	12,378	40,377	4,056	--	10,677	105,454	157,919	170,033
2002-03	7,499	1,593	3,480	12,572	--	--	8,042	45,570	53,612	36,298	12,027	45,838	4,343	--	10,837	111,752	165,364	177,936
2003-04	6,625	1,793	3,898	12,316	--	--	8,158	44,526	52,684	36,664	11,394	39,734	2,307	4,821	9,113	106,851	159,535	171,851

1. RIX = Rapid Infiltration and Extraction Facility for San Bernardino 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 3
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		Total Flow (acre-feet)
	North System (acre-feet)	SARI Flow ² (acre-feet)	Average TDS (mg/L)	
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	1,649	12,633
1990-91	2,847	7,340	1,906	10,187
1991-92	3,421	6,457	2,346	9,878
1992-93	3,774	5,277	2,516	9,051
1993-94	3,764	7,860	2,302	11,624
1994-95	4,131	8,656	1,903	12,787
1995-96	3,863	9,597	2,175	13,460
1996-97	4,191	10,225	2,292	14,417
1997-98	4,575	8,210	2,456	12,785
1998-99	3,666	4,305	2,611	7,971
1999-00	4,272	7,711	2,154	11,983
2000-01	5,075	8,205	2,504	13,280
2001-02	4,297	8,385	3,289	12,682
2002-03	3,926	9,331	3,482	13,257
2003-04	3,950	10,505	3,798	14,455

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

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 USGS through a cooperative monitoring program. The costs of the cooperative monitoring program for the 2003-04 Water Year, and each party's share of the costs, are set forth in Table 4. Each agency received a one-time credit to individual agency contribution due to distribution of Federal Matching Funds

**TABLE 4
COSTS TO THE PARTIES AND USGS FOR MEASUREMENTS
WHICH PROVIDE DATA USED BY THE
SANTA ANA RIVER WATERMASTER**

October 1, 2003 to September 30, 2004

	<u>Total Cost</u>	<u>USGS Share</u>	<u>Parties' Share</u>
USGS GAGING STATION			
Santa Ana River at MWD Crossing (Riverside Narrows)			
Surface Water Gage	\$24,000	\$10,000	\$12,000
Water Quality Monitoring/TDS Sampling	9,900	4,950	4,950
Chino Creek at Schaefer	17,100	8,550	8,550
Cucamonga Creek at Mira Loma	17,100	8,550	8,550
Santa Ana River below Prado Dam			
Surface Water Gage	17,100	8,550	8,550
Water Quality Monitoring/TDS Sampling	18,950	9,475	9,475
Water Quality Conductance Program	<u>1,900</u>	<u>0</u>	<u>1,900</u>
TOTAL COST AND SHARES	\$106,050	\$52,075	\$53,975
 COST DISTRIBUTION AMONG PARTIES			
Inland Empire Utilities Agency	20%		\$10,795
Orange County Water District	40%		\$21,590
San Bernardino Valley Municipal Water District	20%		\$10,795
Western Municipal Water District	20%		\$10,795

The Watermaster annually adopts a budget for the costs of services other than those provided by the USGS. Table 5 shows the budget and actual expenses incurred for such services during the 2003-04 fiscal year as well as the budget adopted for the 2004-05 fiscal year. Bank statements were reviewed by Watermaster Grebbien whose findings are reported in Appendix C.

TABLE 5
WATERMASTER SERVICE BUDGET AND EXPENSES

Budget Item	July 1, 2003 to June 30, 2004 Budget	July 1, 2003 to June 30, 2004 Expenses ⁽¹⁾	July 1, 2004 to June 30, 2005 Budget
Support Services	\$9,500.00	\$10,018.22	\$9,500.00
Reproduction of Annual Report	<u>2,500.00</u>	<u>525.21</u>	<u>2,500.00</u>
TOTAL	\$12,000.00	\$10,543.43	\$12,000.00

(1) Expenses for 2002-03 were paid in 2003-04.

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, water discharged from San Jacinto Watershed, Storm Flow, and Base Flow and 2) the Adjusted Base Flow at Prado credited to IEUA and WMWD.

Flow at Prado

During the 2003-04 Water Year, the flow of the Santa Ana River as measured at the USGS gaging station below Prado Dam amounted to 214,102 acre-feet. There was no water in storage behind the dam at the beginning or at the end of the water year. Inflow to the reservoir included 143,510 acre-feet of Base Flow and 57,317 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 WMWD Transfer Program water. Water discharged from San Jacinto Watershed was also excluded from Base Flow but was partially credited to Cumulative Credit at Prado. Of the nontributary flow due to State Water Project water released to San Antonio Creek at turnout OC-59, 7,766 acre-feet was calculated to have reached Prado Reservoir during 2003-04. Arlington Desalter flows totaled 2,832 acre-feet. The WMWD Transfer Program contributed 1,537 acre-feet. Flows from the San Jacinto Watershed calculated to have reached Prado Reservoir were 1,140 acre-feet. The monthly components of flow of the Santa Ana River at Prado Dam for 2003-04 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 2003-04 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

TABLE 6
 COMPONENTS OF FLOW AT PRADO DAM
 WATER YEAR 2003-04
 (acre-feet)

	USGS Measured Outflow	Storage Change (1)	Computed Inflow	San Jacinto Watershed Flow at Prado (2)	WMWD Transfer Water (3)	San Antonio Creek (4)	Arlington Desalter	Storm Flow	Base Flow
<u>2003</u>									
October	14,255	0	14,255	0	462	2,117	601	0	11,075
November	16,042	566	16,608	0	422	743	418	3,065	11,960
December	15,330	7,008	22,338	0	140	0	405	8,504	13,289
<u>2004</u>									
January	23,282	(5,910)	17,372	0	0	0	357	1,748	15,267
February	40,667	10,133	50,800	447	513	0	240	36,085	13,515
March	23,768	(4,781)	18,987	395	0	0	59	5,230	13,303
April	20,069	(4,278)	15,791	279	0	0	288	2,685	12,539
May	16,578	(2,737)	13,841	19	0	1,626	160	0	12,036
June	11,796	(1)	11,795	0	0	749	118	0	10,928
July	11,288	0	11,288	0	0	984	95	0	10,209
August	9,795	0	9,795	0	0	297	53	0	9,445
September	11,232	0	11,232	0	0	1,250	38	0	9,944
Total	214,102	0	214,102	1,140	1,537	7,766	2,832	57,317	143,510

- (1) The monthly change in storage is included in the monthly components of flow.
- (2) Discharge due to overflow of Lake Elsinore and/or discharge of wastewater by EMWD from the San Jacinto Watershed.
- (3) WMWD Transfer Program water pumped from the Bunker Hill, Riverside, and Colton basins and discharged to the Santa Ana River above the Riverside Narrows.
- (4) State Water Project water released into San Antonio Creek from turnout OC-59 and calculated to have reached Prado Dam in the 2003-04 Water Year.

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.

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 2003-04 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 WMWD Transfer Program water. Flows from the San Jacinto Watershed were also determined to have reached Prado Reservoir. 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.

High Groundwater Mitigation Project

No HGMP water was discharged to the Santa Ana River during the 2003-04 water year.

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 2003-04 Water Year, 8,035 acre-feet of State Water Project water was released into San Antonio Creek from the Foothill Feeder at turnout OC-59 near Upland, and 26 acre-feet had been in transit at the end of the 2002-03 water year due to the 12-hour delay from the time of release until the water reaches Prado Dam. Total monthly deliveries and daily flow rates were provided by the MWDC. 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 and in transit, a total of 7,766 acre-feet reached Prado Dam and 294 acre-feet (3.65%) 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. Beginning in 2004, the City of Norco began purchasing a portion of the Arlington Desalter product water for direct potable use. The Watermaster determined that the flow and TDS of the water delivered to OCWD via the Santa Ana River from this facility would be excluded from the computation of Base Flow and Adjusted Base at Prado. During the 2003-04 Water Year, 2,832 acre-feet of water discharged from the Arlington Desalter were determined to have reached Prado Dam. SAWPA provided daily discharge rates and electrical conductance of water discharged. A summary of Arlington Desalter discharges is contained in Appendix F.

WMWD Transfer Program

In 2001, OCWD and WMWD entered into an agreement that provides for delivery of groundwater pumped primarily from the Bunker Hill Basin to OCWD via the Riverside Canal and Santa Ana River. During the 2003-04 Water Year, WMWD delivered 1,537 acre-feet to the Santa Ana River upstream of Riverside Narrows and Prado Dam. A summary of the WMWD Transfer Program discharges is contained in Appendix K.

San Jacinto Watershed Discharge

Prior to the 1997-98 water year, discharges from the San Jacinto Watershed reaching Prado Reservoir were due to discharges from Lake Elsinore, and had been accounted for as "Lake Elsinore Discharge." In 1998 Eastern Municipal Water District (EMWD) completed its Reach 4 discharge pipeline to Wasson Canyon, which is tributary to Temescal Wash. The pipeline discharges tertiary-treated wastewater to Temescal Wash above Lee Lake when flows exceed EMWD's storage facility capacity. The collective discharges from Lake Elsinore and EMWD to Temescal Wash are referred to herein as San Jacinto Watershed discharges.

During the 2003-04 water year, EMWD discharged 4,345 acre-feet of wastewater to Temescal Wash, and 1,140 acre-feet of that discharge were estimated to have reached Prado Reservoir. The Watermaster previously determined that to the extent such discharges occur and are captured by OCWD, fifty percent of such captured water will be added as Cumulative Credit at Prado. OCWD captured 495 acre-feet of the San Jacinto Watershed discharge.

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 2003-04 Water Year, the maximum volume of water stored in Prado Reservoir reached 15,254 acre-feet on March 3, 2004. The maximum daily mean flow released from Prado Dam to the Santa Ana River was 4,430 cfs on February 26, 2004.

Base Flow

The Base Flow is that portion of the total flow remaining after subtracting Storm Flow, Nontributary Flow, Exchange Water, and certain other flows determined by the Watermaster. Flows affecting the determination of Base Flow in 2003-04 included releases to San Antonio Creek, Arlington Desalter discharges, WMWD Transfer water, and discharges from the San Jacinto Watershed. The general procedure used by the Watermaster to separate the 2003-04 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. Table 6 shows the monthly and annual quantities of Base Flow.

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, WMWD Transfer Program water, and San Jacinto Watershed discharge, was found to be 495 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:

$$\text{TDS} = \text{EC} \times 0.615691$$

(where the units of TDS and EC are mg/L and $\mu\text{s}/\text{cm}$, 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 495 mg/L represents the quality of the total flow including releases to San Antonio Creek, discharge from the Arlington Desalter, WMWD Transfer Program water, and discharges from the San Jacinto Watershed. 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 High Groundwater Mitigation Project Discharge

During the 2003-04 Water Year SBVMWD discharged no HGMP water. Therefore, no water quality adjustment was necessary.

Adjustment for Flow to San Antonio Creek

During the 2003-04 Water Year, 7,766 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 225 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 2003-04 Water Year totaled 2,832 acre-feet. Daily EC data is no longer available, so the TDS of grab samples collected from the Arlington channel by WMWD and analyzed for EC and TDS by an independent laboratory, was used to calculate the flow-weighted average TDS. In October 2003 when no sample was collected for analysis and July 2004 when the analysis yielded unrealistic results, an estimate based on the previous month was used. Using monthly TDS and daily flow rates, a flow-weighted average TDS of 290 mg/L was calculated. A summary of these calculations is contained in Appendix F.

Adjustment for WMWD Transfer Program Discharge

During the 2003-04 Water Year, WMWD delivered 1,537 acre-feet via the Riverside Canal to the Santa Ana River upstream of Riverside Narrows and Prado. A TDS of 428 mg/L was calculated for samples collected from the Riverside Canal prior to its confluence with the Santa Ana River. A summary of the WMWD Transfer Program discharges is contained in Appendix K.

Adjustment for San Jacinto Watershed Discharge

Discharge from the San Jacinto Watershed during the 2003-04 Water Year reaching Prado Reservoir was determined to be 1,140 acre-feet. Using EMWD discharge data, the TDS data for the discharge, and monthly volume of the discharge determined to have reached Prado reservoir, a flow-weighted average TDS of 682 mg/L was calculated. A summary of these calculations is contained in Appendix G.

Flow Component	Annual Flow (acre-feet)	Average TDS (mg/L)	Annual Flow x Average TDS (acre-feet x mg/L)
1. Measured Outflow	214,102	495	105,980,490
2. Less High Groundwater Mitigation Project	0	---	---
3. Less Nontributary Flow San Antonio Creek	(7,766)	225	(1,747,350)
4. Less Arlington Desalter	(2,832)	290	(821,280)
5. Less WMWD Transfer Program	(1,537)	428	(657,836)
6. Less San Jacinto Watershed Discharge	(1,140)	682	(777,480)
7. Measured Outflow less lines 2 through 6	200,827		101,976,544
Average TDS in total Base and Storm Flow	$101,976,544 \div 200,827 = 508 \text{ mg/L}$		

After adjusting for Nontributary Flow of OC-59 water to San Antonio Creek, Arlington Desalter discharges, WMWD Transfer Program water, and San Jacinto Watershed discharge, the weighted average annual TDS of Storm Flow and Base Flow for 2003-04 is 508 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	$Q - \frac{35}{42,000} Q(\text{TDS}-800)$
700 mg/L to 800 mg/L	Q
Less than 700 mg/L	$Q + \frac{35}{42,000} Q(700-\text{TDS})$

Where: Q = Base Flow actually received.

The weighted average annual TDS of 508 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:

$$(143,510 \text{ acre-feet}) + \frac{35}{42,000} (143,510 \text{ acre-feet}) (700 - 508) = 166,472 \text{ acre-feet}$$

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 Watermasters agreed that San Jacinto Watershed outflows were not envisioned during the formulation of the Judgment and because of the occurrence of San Jacinto Watershed flows at Prado, the Watermaster decided, as in previous years, to credit one-half of the amount of any such outflows recharging the groundwater basin in Orange County to CBMWD (IEUA) and WMWD.

Of the 1,140 acre-feet of San Jacinto Watershed outflows reaching Prado Reservoir in 2003-04, 645 acre-feet flowed past OCWD's groundwater recharge facilities and was considered as lost to the ocean. Therefore, a net amount of 495 acre-feet of San Jacinto Watershed outflow recharged the Orange County groundwater basin in 2003-04. One-half of that amount has been considered a credit against the Upper Area Base Flow obligation at Prado Dam. Thus, an additional 247 acre-feet was added to the Cumulative Credit at Prado Dam.

While compiling the 2002-03 Watermaster Report, it came to the attention of the Watermaster that in previous reports one-half the San Jacinto Watershed discharge reaching Prado and recharging Orange County groundwater basin had been included in the Cumulative Adjusted Base Flow as well as in the Cumulative Credit. The Watermaster determined that the San Jacinto Watershed discharge should be included only in the Cumulative Credit and not in the Cumulative Adjusted Base Flow. Therefore, the Watermaster revised the Cumulative Adjusted Base Flow and has included a table of historical Watermaster findings concerning flow at Prado that reflect that revision in the report following the Watermaster's findings.

The Watermaster's findings concerning flow at Prado for 2003-04 required under the Stipulated Judgment are as follows:

1. Measured Outflow at Prado	214,102 acre-feet
2. Base Flow at Prado	143,510 acre-feet
3. Annual Weighted TDS of Base and Storm Flow	508 mg/L
4. Annual Adjusted Base Flow	166,472 acre-feet
5. Cumulative Adjusted Base Flow	4,018,003 acre-feet
6. Other Credits (Debits) ¹	247 acre-feet
7. Cumulative Entitlement of OCWD	1,428,000 acre-feet
8. Cumulative Credit ²	2,608,908 acre-feet
9. One-Third of Cumulative Debit	0 acre-feet
10. Minimum Required Base Flow in 2004-05	34,000 acre-feet

1. Other Credits (Debits) are comprised of San Jacinto Watershed outflow.
2. Cumulative Credit includes 18,905 acre-feet of San Jacinto Watershed outflow.

**Historical Watermaster Findings at Prado Dam
(acre-feet)**

Water Year	Base Flow	Annual Adjusted Base Flow	Cumulative Adjusted Base Flow	Other Credits (Debits) ¹	Cumulative Entitlement of OCWD	Cumulative Credit ²
1970-71	38,402	38,402	38,402	0	42,000	(3,598)
1971-72	40,416	40,416	78,818	0	84,000	(5,182)
1972-73	48,999	51,531	130,349	0	126,000	4,349
1973-74	43,106	45,513	175,862	0	168,000	7,862
1974-75	50,176	51,263	227,125	0	210,000	17,125
1975-76	45,627	48,098	275,223	0	252,000	23,223
1976-77	48,387	50,000	325,223	0	294,000	31,223
1977-78	58,501	73,955	399,178	0	336,000	63,178
1978-79	71,863	79,049	478,227	0	378,000	100,227
1979-80	82,509	106,505	584,732	0	420,000	164,732
1980-81	74,875	74,875	659,607	8,045	462,000	205,652
1981-82	81,548	89,431	749,038	0	504,000	253,083
1982-83	111,692	138,591	887,629	3,362	546,000	353,036
1983-84	109,231	115,876	1,003,505	4,602	588,000	431,514
1984-85	125,023	133,670	1,137,175	0	630,000	523,184
1985-86	127,215	141,315	1,278,490	0	672,000	622,499
1986-87	119,848	127,638	1,406,128	0	714,000	708,137
1987-88	124,104	136,308	1,542,436	0	756,000	802,445
1988-89	119,572	131,230	1,673,666	0	798,000	891,675
1989-90	119,149	127,986	1,801,652	0	840,000	977,661
1990-91	111,515	128,379	1,930,031	0	882,000	1,064,040
1991-92	106,948	124,869	2,054,900	0	924,000	1,146,909
1992-93	128,067	163,499	2,218,399	0	966,000	1,268,408
1993-94	111,186	119,432	2,337,831	0	1,008,000	1,345,840
1994-95	123,468	152,792	2,490,623	1,762	1,050,000	1,458,394
1995-96	131,861	152,299	2,642,922	0	1,092,000	1,568,693
1996-97	136,676	157,861	2,800,783	0	1,134,000	1,684,554
1997-98	155,711	195,677	2,996,460	0	1,176,000	1,838,231
1998-99	158,637	174,369	3,170,829	0	1,218,000	1,970,600
1999-00	148,269	169,644	3,340,473	0	1,260,000	2,098,244
2000-01	153,914	176,360	3,516,833	0	1,302,000	2,232,604
2001-02	145,981	159,728	3,676,561	0	1,344,000	2,350,332
2002-03	146,113	174,970	3,851,531	887	1,386,000	2,484,189
2003-04	143,510	166,472	4,018,003	247	1,428,000	2,608,908

1. Other Credits (Debits) are comprised of San Jacinto Watershed outflow.
2. Cumulative Credit includes 18,905 acre-feet of San Jacinto Watershed outflow.

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 77,336 acre-feet, measured at the USGS gaging station near the MWD Crossing. Separated into its components, Base Flow was 54,788 acre-feet and Storm Flow was 23,356 acre-feet. Excluded from the Base Flow was 1,537 acre-feet of WMWD Transfer Program water. Included in Base Flow are 2,345 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 2003-04 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 2003-04 are presented on Plate 8.

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 2003-04 Water Year it included WMWD Transfer Program Water. In the past it has included High Groundwater Mitigation Project Water.

High Groundwater Mitigation Project

No HGMP water was discharged to the Santa Ana River during the 2003-04 water year.

WMWD Transfer Program

In 2001, OCWD and WMWD entered into an agreement that provides for delivery of groundwater pumped primarily from the Bunker Hill Basin to OCWD via the Riverside Canal and Santa Ana River. During the 2003-04 Water Year, WMWD delivered 1,537 acre-feet to the Santa Ana River upstream of Riverside Narrows and Prado Dam. A summary of the WMWD Transfer Program discharges is contained in Appendix K.

TABLE 7
 COMPONENTS OF FLOW AT RIVERSIDE NARROWS
 WATER YEAR 2003-04
 (acre-feet)

Month	USGS Measured Flow	Storm Flow	SBVMWD HGMP Water ¹	WMWD Transfer Program ²	Rubidoux Waste-water	Base Flow ³
<u>2003</u> October	4,457	0	0	462	201	4,196
November	5,480	906	0	422	194	4,346
December	10,348	5,869	0	140	197	4,536
<u>2004</u> January	6,734	1,260	0	0	198	5,672
February	17,587	12,056	0	513	180	5,198
March	8,037	2,680	0	0	199	5,556
April	4,985	585	0	0	191	4,591
May	4,358	0	0	0	198	4,556
June	3,983	0	0	0	193	4,176
July	3,739	0	0	0	197	3,936
August	3,844	0	0	0	199	4,043
September	3,784	0	0	0	198	3,982
Total	77,336	23,356	0	1,537	2,345	54,788

- (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) WMWD Transfer Program water pumped from the Bunker Hill, Riverside, and Colton basins and discharged to the Santa Ana River above the Riverside Narrows.
- (3) Base Flow equals USGS measured flow, minus storm flow, minus HGMP, and minus WMWD water, plus Rubidoux Wastewater.

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 2003-04, in the amount of 2,345 acre-feet, has been added to the Base Flow as measured at the gaging station. A summary of Rubidoux discharges is contained in Appendix I.

Water Quality Adjustments

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. A summary of TDS and EC data of the Santa Ana River at Riverside Narrows is contained in Appendix J.

Adjustment for High Groundwater Mitigation Project Discharge

Since there was no discharge of High Groundwater Mitigation Project water during Water Year 2003-04, no water quality adjustment was required.

Adjustment for WMWD Transfer Program Discharge

During the 2003-04 Water Year, WMWD delivered 1,537 acre-feet to the Santa Ana River upstream of Riverside Narrows and Prado. A TDS of 428 mg/L was calculated for that water. A summary of the WMWD Transfer Program discharges is contained in Appendix K.

Adjustment for Wastewater Discharges from the Rubidoux Community Services District

The flow-weighted quality of wastewater from Rubidoux was 719 mg/L. A monthly summary of discharges and quality is contained in Appendix I.

The Base Flow quality resulting from exclusion of the Nontributary Flow and inclusion of the Rubidoux wastewater is shown in the following table as 634 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	53,980	624	33,683,520
2. Less Nontributary Flow HGMP Pumped Water	0	---	---
3. Less WMWD Transfer Flow	(1,537)	428	(657,836)
4. Plus Rubidoux Wastewater	2,345	719	1,686,055
5. Base Flow (line 1 less lines 2 and 3 plus line 4)	54,788		34,711,739
Average TDS of Base Flow		$34,711,739 \div 54,788 = 634 \text{ mg/L}$	

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	$Q - \frac{11}{15,250} Q(\text{TDS}-700)$
600 mg/L to 700 mg/L	Q
Less than 600 mg/L	$Q + \frac{11}{15,250} Q(600-\text{TDS})$

Where: Q = Base Flow actually received.

From the previous subsection, the weighted average annual TDS in the Base Flow at Riverside Narrows for Water Year 2003-04 was 634 mg/L. Therefore, no adjustment is necessary, and the Adjusted Base Flow for 2003-04 is 54,788 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 2003-04 required under the Stipulated Judgment are as follows:

1. Base Flow at Riverside Narrows	54,788 acre-feet
2. Annual Weighted TDS of Base Flow	634 mg/L
3. Annual Adjusted Base Flow	54,788 acre-feet
4. Cumulative Adjusted Base Flow	1,471,521 acre-feet
5. Cumulative Entitlement of CBMWD and WMWD	518,500 acre-feet
6. Cumulative Credit	953,021 acre-feet
7. One-Third of Cumulative Debit	0 acre-feet
8. Minimum Required Base Flow in 2004-05	12,420 acre-feet

CHAPTER IV

HISTORY AND SUMMARY OF THE JUDGMENT in the case of Orange County Water District v City of Chino, et al. (Case No. 117628-County of Orange)

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/Treasurer.

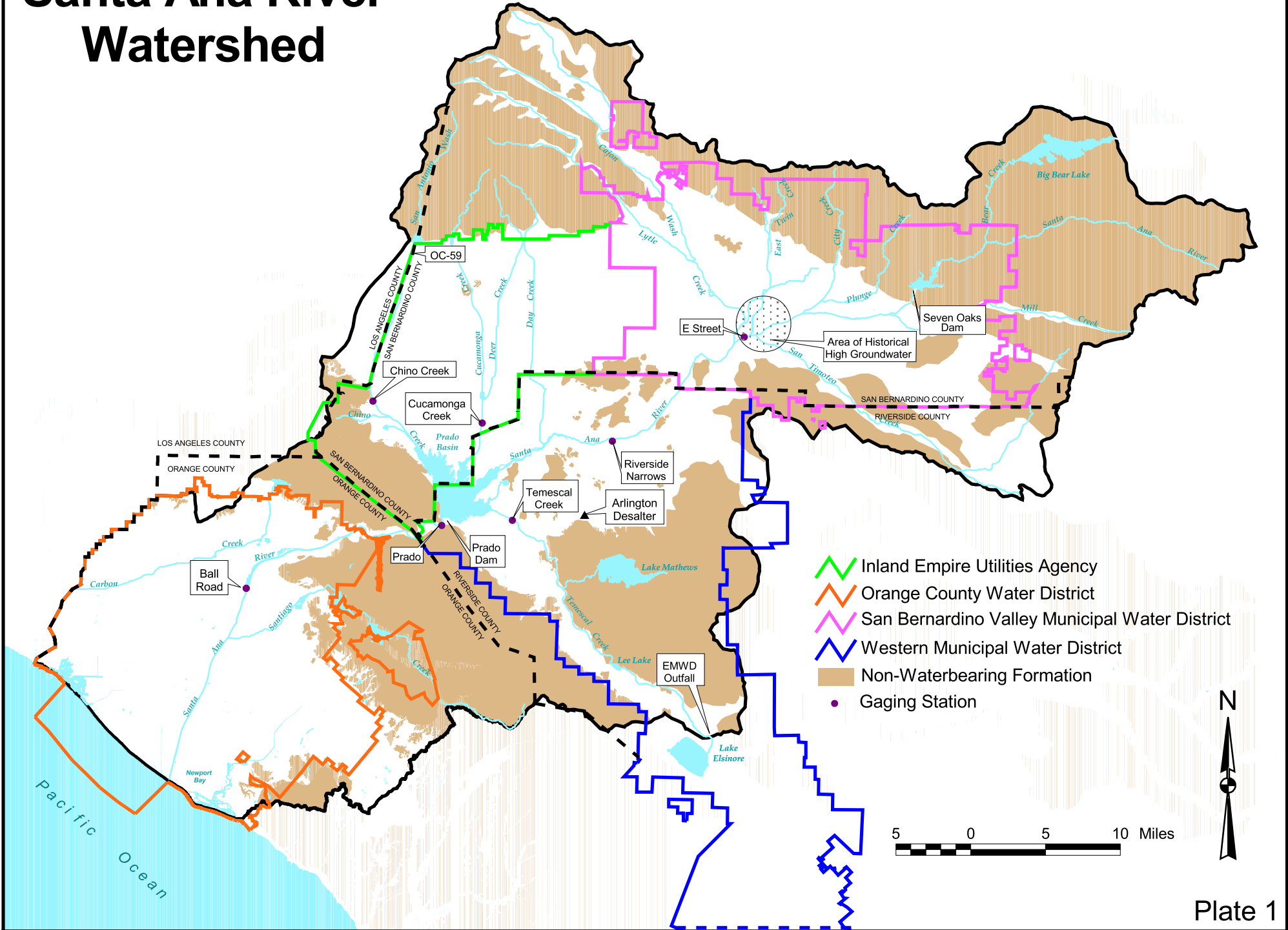
The original five members were appointed at the time of entry of the judgment. They prepared a *pro forma* annual report for the 1969-70 Water Year. The first annual report required by the judgment was prepared for the 1970-71 Water Year and reports have been prepared annually since then.




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.

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
2001-02 through 2002-03	Robert L. Reiter, Secretary/Treasurer	Richard W. Atwater	Donald L. Harriger, Chairman	Bill B. Dendy	Virginia L. Grebbien
2003-04	Robert L. Reiter, Chairman/Treasurer	Richard W. Atwater	John V. Rossi	Bill B. Dendy, Secretary	Virginia L. Grebbien

Santa Ana River Watershed

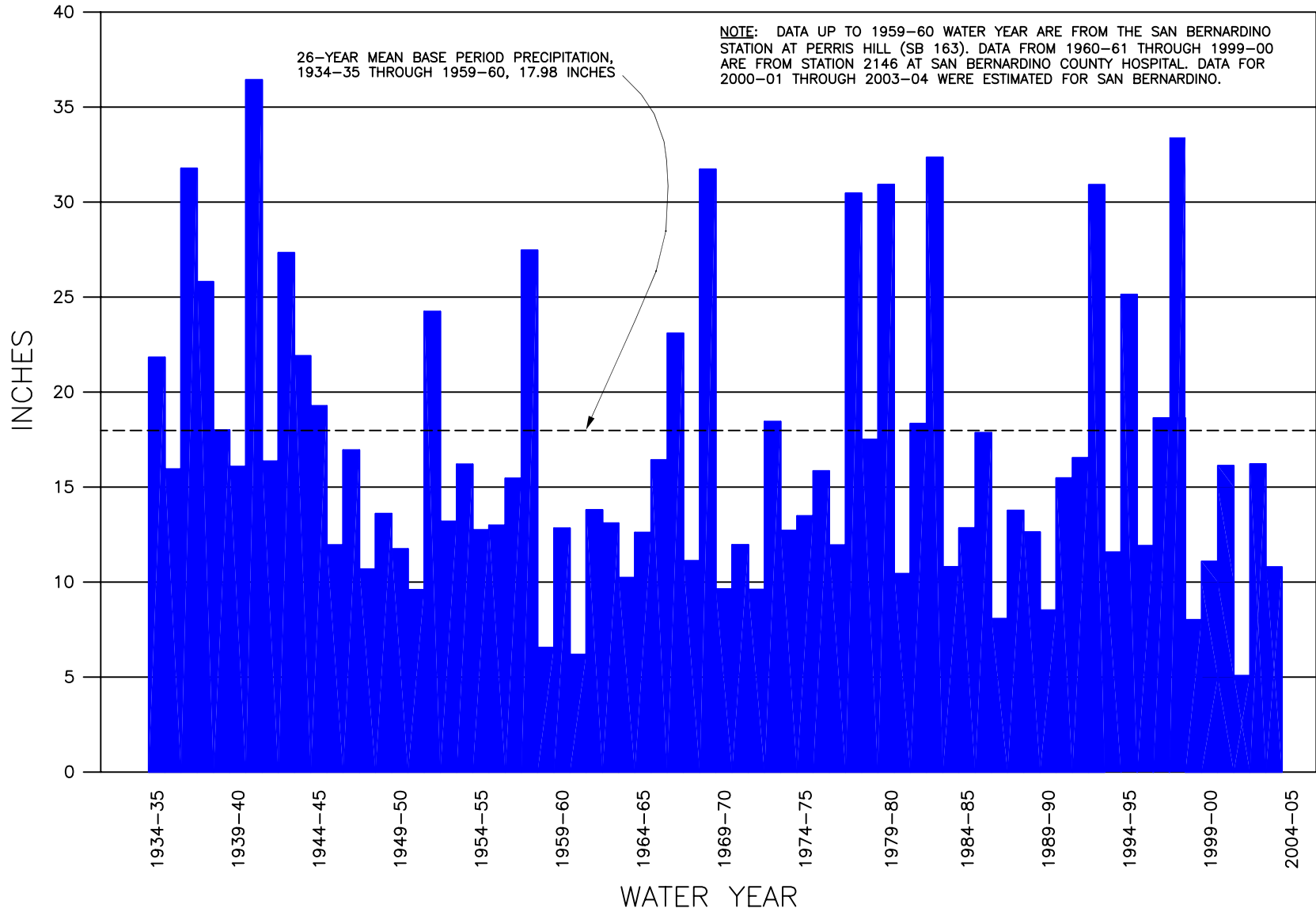


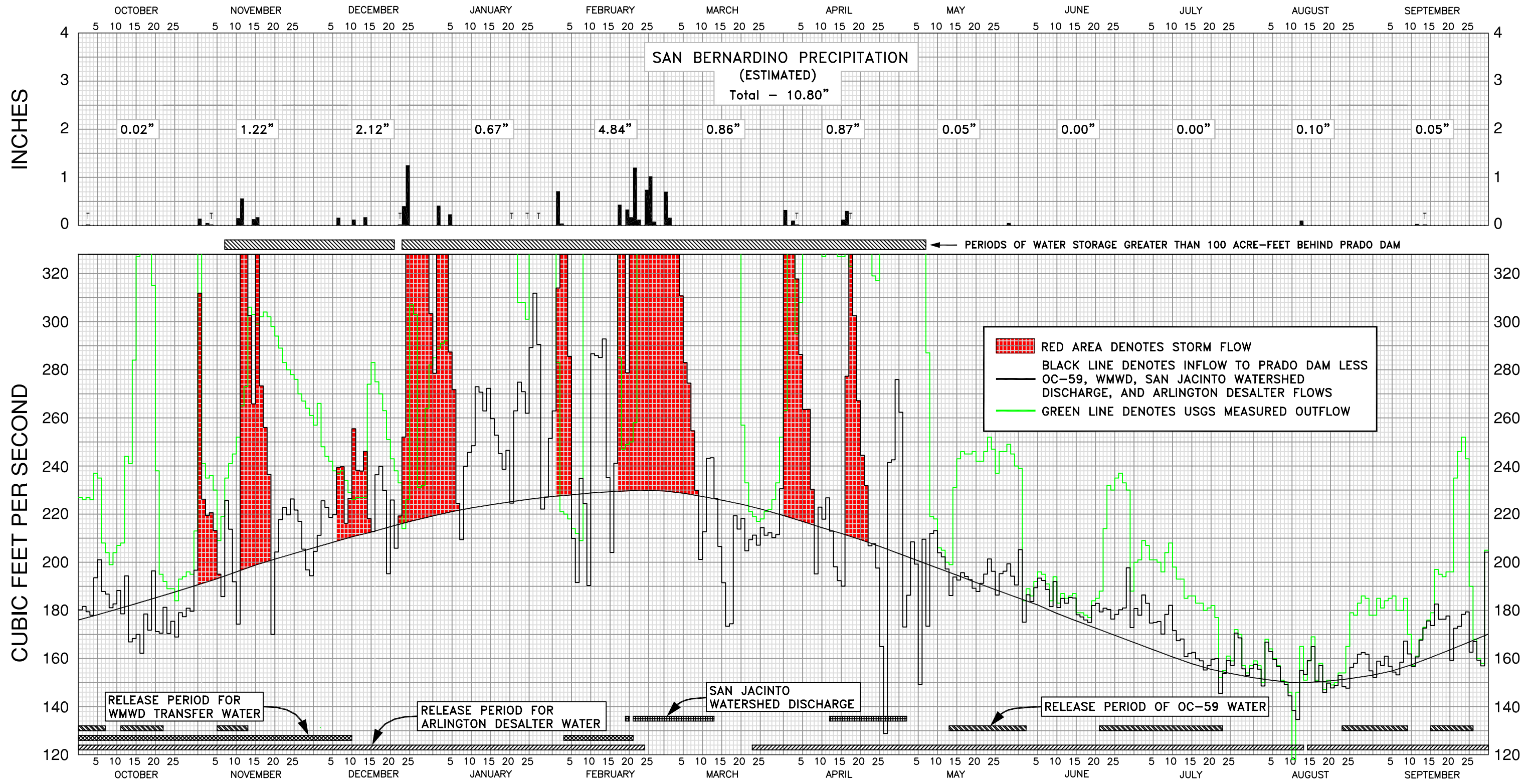
-  Inland Empire Utilities Agency
-  Orange County Water District
-  San Bernardino Valley Municipal Water District
-  Western Municipal Water District
-  Non-Waterbearing Formation
-  Gaging Station

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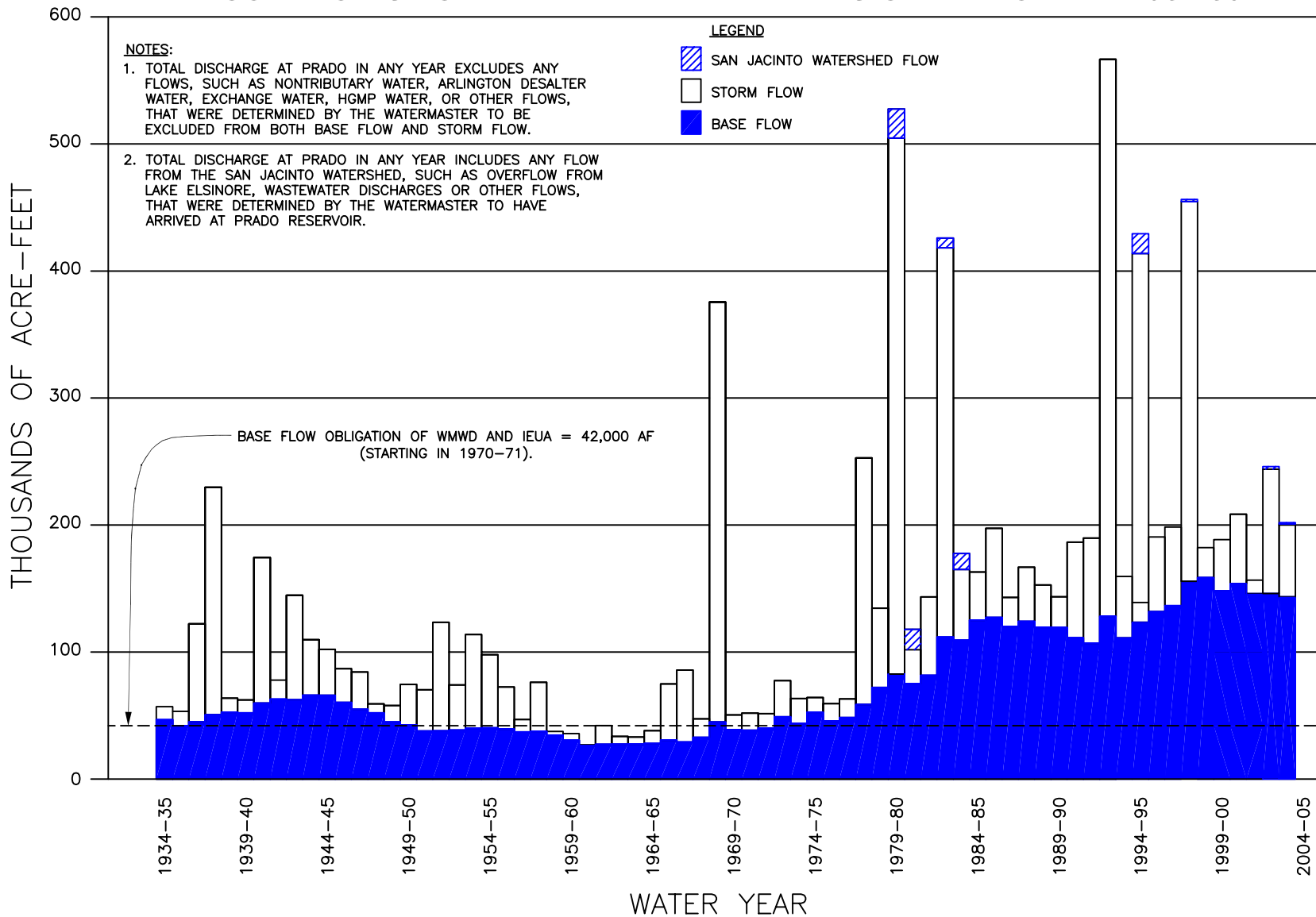
PRECIPITATION AT SAN BERNARDINO STARTING WITH 1934-35

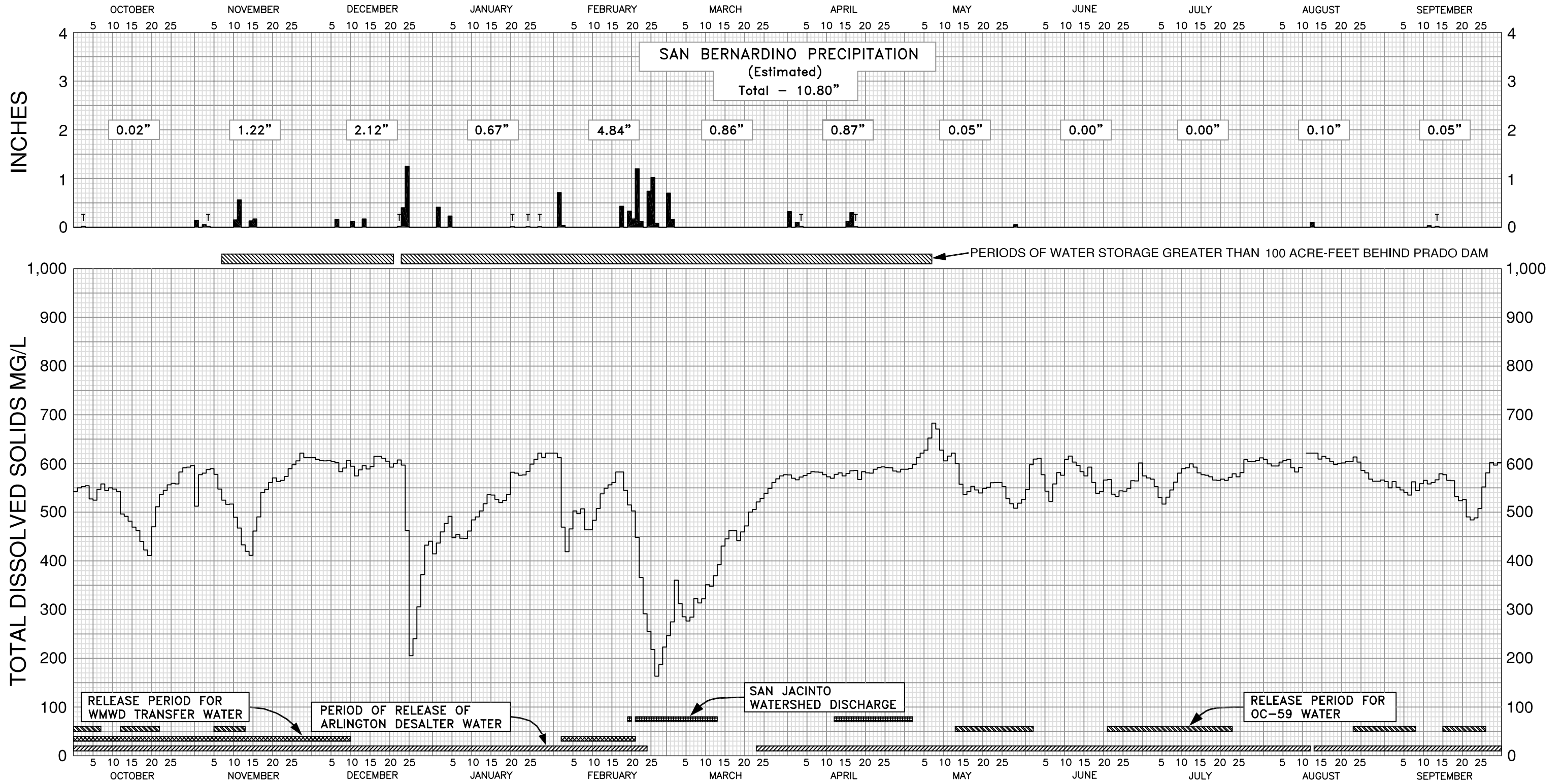




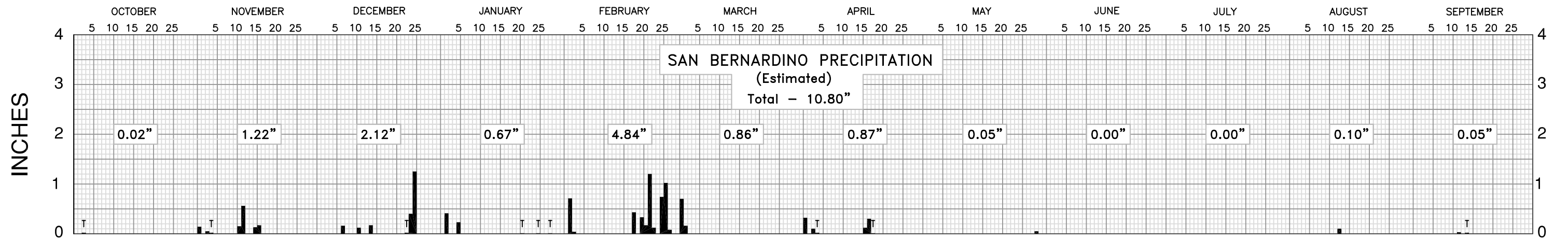
**DISCHARGE OF SANTA ANA RIVER AT PRADO DAM & SAN BERNARDINO PRECIPITATION
WATER YEAR 2003-04**

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



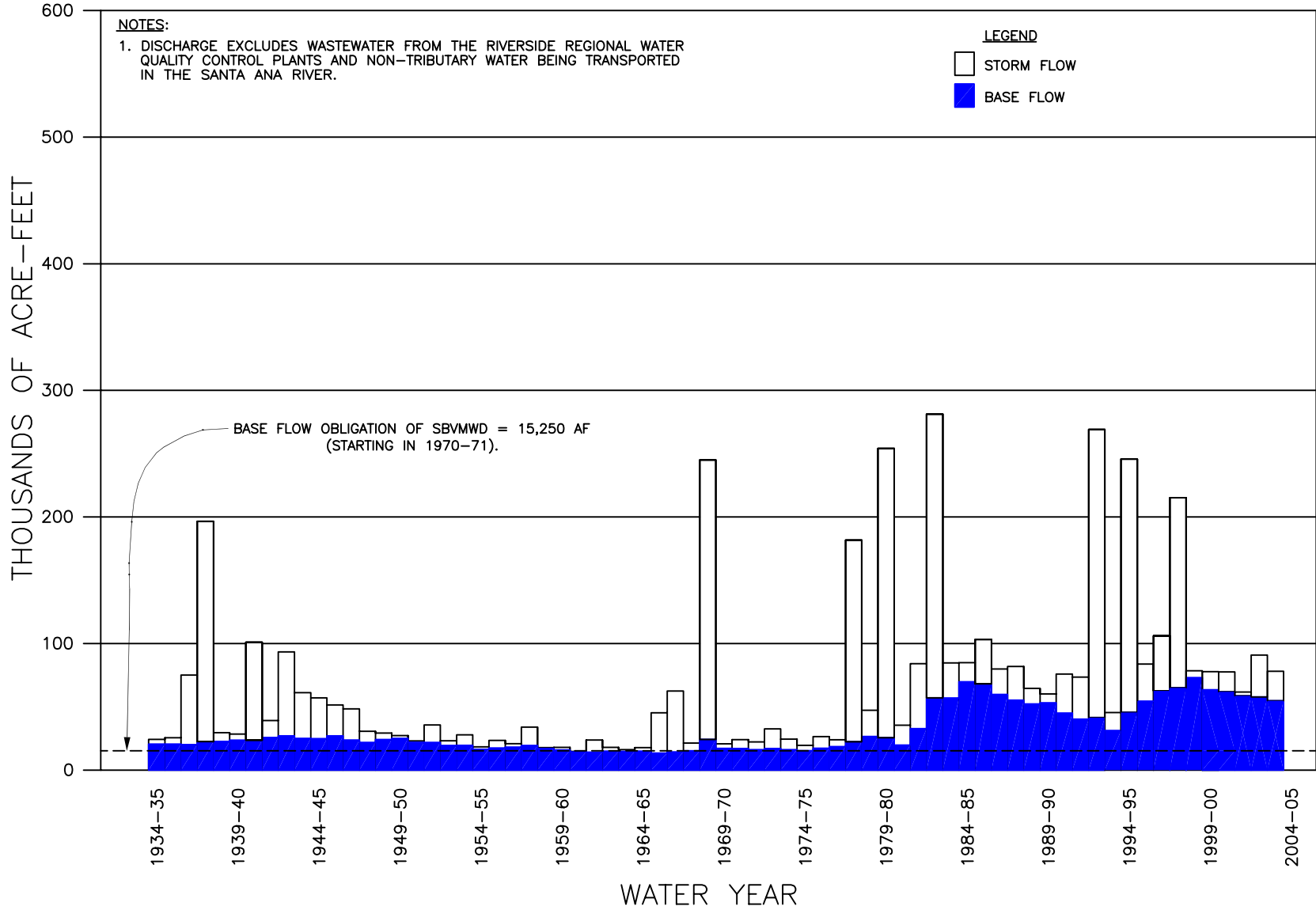


DISSOLVED SOLIDS IN SANTA ANA RIVER BELOW PRADO DAM
WATER YEAR 2003-04



DISCHARGE OF SANTA ANA RIVER AT RIVERSIDE NARROWS & SAN BERNARDINO PRECIPITATION
WATER YEAR 2003-04

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



**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-FOURTH ANNUAL REPORT
OF THE
SANTA ANA RIVER WATERMASTER**

**FOR WATER YEAR
OCTOBER 1, 2003 - SEPTEMBER 30, 2004**

APRIL 30, 2005

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 2003-04

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 mi², excludes 768 mi² 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 NGVD of 1929 (levels by U.S. Army Corps of Engineers). Prior to Mar. 18, 1940, at about same site at various datums.

REMARKS.—Records good below 500 ft³/s and fair above, except for estimated daily discharges, which are poor. 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 8,040 acre-ft to the basin. See schematic diagram of Santa Ana River Basin.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 7,440 ft³/s, Feb. 21, 1980, gage height, 6.88 ft; maximum gage height, 7.29 ft, Jan. 19, 1993; minimum daily, 2.4 ft³/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 ft³/s, on basis of slope-area measurement of peak flow at site 2.5 mi downstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	227	331	257	285	387	432	263	372	239	200	159	178
2	226	241	266	289	283	462	416	367	184	201	157	185
3	227	235	248	291	221	461	507	385	189	209	e150	181
4	226	236	244	292	220	462	295	395	186	207	e168	184
5	237	230	242	379	218	460	308	399	192	201	164	185
6	235	209	238	426	214	454	338	389	196	201	160	186
7	208	219	237	425	212	451	333	369	195	200	157	180
8	204	235	238	426	209	464	338	287	191	196	151	180
9	199	241	234	429	342	487	339	219	184	204	150	185
10	204	245	229	426	388	488	333	218	194	208	146	170
11	207	252	226	423	387	497	327	206	183	198	e118	157
12	208	265	227	423	392	496	333	205	187	193	e146	161
13	244	273	227	420	396	495	334	200	185	193	165	168
14	241	306	227	417	392	497	328	199	186	185	151	173
15	284	303	274	412	385	495	327	231	187	186	159	176
16	327	299	283	406	380	493	327	243	179	186	169	179
17	328	302	275	403	405	488	328	246	179	183	151	197
18	334	304	270	400	285	483	323	245	178	183	158	195
19	328	302	263	396	247	480	331	245	177	180	147	194
20	315	298	251	389	249	419	333	246	184	181	151	196
21	238	294	243	399	250	257	331	242	185	182	149	196
22	195	289	238	341	258	233	337	242	188	177	150	235
23	192	283	233	308	1360	221	339	246	214	152	154	246
24	189	280	214	308	1350	219	319	252	232	155	154	252
25	189	278	226	301	2700	217	317	247	230	161	165	243
26	184	276	307	377	4430	218	331	237	235	159	179	190
27	193	270	303	404	2490	221	334	246	237	172	178	168
28	194	267	231	398	881	222	330	246	233	170	183	160
29	196	264	232	393	572	226	341	249	230	157	186	158
30	195	261	264	386	---	233	378	245	188	154	185	205
31	213	---	282	366	---	252	---	240	---	157	178	---
TOTAL	7187	8088	7729	11738	20503	11983	10118	8358	5947	5691	4938	5663
MEAN	232	270	249	379	707	387	337	270	198	184	159	189
MAX	334	331	307	429	4430	497	507	399	239	209	186	252
MIN	184	209	214	285	209	217	263	199	177	152	118	157
AC-FT	14260	16040	15330	23280	40670	23770	20070	16580	11800	11290	9790	11230

e Estimated.

SANTA ANA RIVER BASIN

11074000 SANTA ANA RIVER BELOW PRADO DAM, CA—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1941 - 2004, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	114	143	208	320	418	394	252	183	150	124	102	97.9
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 2003 CALENDAR YEAR		FOR 2004 WATER YEAR		WATER YEARS 1941 - 2004	
ANNUAL TOTAL	125541		107943			
ANNUAL MEAN	344		295		208	
HIGHEST ANNUAL MEAN					789	
LOWEST ANNUAL MEAN					36.4	
HIGHEST DAILY MEAN	3850	Feb 13	4430	Feb 26	6440	Feb 23 1980
LOWEST DAILY MEAN	90	May 18	118	Aug 11	2.4	Jul 29 1978
ANNUAL SEVEN-DAY MINIMUM	181	Aug 23	147	Aug 8	3.0	Sep 24 1973
MAXIMUM PEAK FLOW			6230	Feb 25	7440	Feb 21 1980
MAXIMUM PEAK STAGE			7.26	Feb 25	7.29	Jan 19 1993
ANNUAL RUNOFF (AC-FT)	249000		214100		150600	
10 PERCENT EXCEEDS	503		418		361	
50 PERCENT EXCEEDS	270		238		129	
90 PERCENT EXCEEDS	199		168		40	

SANTA ANA RIVER BASIN

11066460 SANTA ANA RIVER AT METROPOLITAN WATER DISTRICT 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, near left side of Metropolitan Water District 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 mi².

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 NGVD of 1929, 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 Metropolitan Water District 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. From June 17, 1993, to Sept. 30, 2003, water-stage recorder and crest-stage gage on left bank at same site and datum.

REMARKS.—Records poor. 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 ft³/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 ft³/s, Sept. 7, 8, 1980.

EXTREMES OUTSIDE PERIOD OF RECORD.—Maximum discharge since at least 1927, 100,000 ft³/s, Mar. 2, 1938, on basis of slope-area measurement, at site 1.1 mi downstream. Flood of Jan. 22, 1862, 320,000 ft³/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 ft³/s, or maximum:

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Dec. 25	2200	19,700	13.22	Feb. 23	0300	1,700	7.95
Jan. 2	1930	1,550	7.52	Feb. 26	0945	15,000	11.98
Feb. 3	0245	1,710	7.93	Mar. 2	0245	1,980	8.02

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e80	78	68	105	93	134	106	e71	e70	e69	e61	e63
2	e79	77	67	340	97	873	154	e74	e70	e67	e61	e60
3	e77	80	e69	295	452	246	108	e74	e66	e65	e62	e61
4	e78	e82	69	155	115	175	88	e70	e69	e66	e63	e60
5	e77	81	e69	111	112	162	77	e67	e68	e63	e64	e60
6	e75	80	e70	107	e101	149	76	e69	e66	e65	e63	e61
7	e76	78	70	90	e100	137	e76	e67	e69	e62	e62	e60
8	e76	83	e70	84	e100	124	e77	e73	e67	e67	e64	e59
9	e75	78	e71	92	e97	120	e75	e72	e67	e61	e61	e58
10	e73	76	e72	84	e96	113	e74	e72	e68	e63	e61	e58
11	e72	84	73	93	e95	103	e73	e71	e66	e68	e61	e60
12	e71	234	83	82	e97	95	e72	e72	e66	e64	e62	e58
13	e69	131	81	91	e98	e90	e73	e72	e66	e61	e63	e58
14	e70	106	78	89	e96	e89	e73	e74	e67	e60	e62	e60
15	e70	103	76	94	e96	e87	e72	e72	e67	e59	e63	e61
16	e69	148	79	96	e95	e87	e72	e71	e68	e59	e63	e62
17	e68	101	76	91	e97	e89	115	e73	e64	e58	e65	e67
18	e69	97	71	90	e156	e88	158	e72	e65	e57	e68	e63
19	e68	96	76	92	e217	e89	82	e71	e68	e56	e66	e64
20	e70	94	78	93	282	e87	84	e70	e65	e57	e64	e65
21	e71	88	75	90	320	e86	e79	e68	e65	e58	e62	e67
22	68	89	75	92	616	e85	e73	e72	e66	e56	e61	e67
23	70	72	74	90	710	e84	e71	e71	e67	e57	e61	e65
24	69	84	75	96	131	e83	e74	e70	e69	e57	e63	e67
25	72	74	2390	91	105	e82	e72	e69	e69	e56	e62	e68
26	78	70	491	91	3570	e83	e71	e71	e65	e58	e62	e69
27	74	81	e125	89	406	e83	e71	e69	e64	e59	e60	e70
28	72	72	e120	98	195	e82	e70	e68	e66	e58	e62	e73
29	74	e74	e110	90	122	e80	e73	e70	e67	e59	e62	e72
30	68	e72	e105	98	---	e83	e74	e72	e68	e60	e61	e72
31	69	---	111	96	---	84	---	e70	---	e60	e63	---
TOTAL	2247	2763	5217	3395	8867	4052	2513	2197	2008	1885	1938	1908
MEAN	72.5	92.1	168	110	306	131	83.8	70.9	66.9	60.8	62.5	63.6
MAX	80	234	2390	340	3570	873	158	74	70	69	68	73
MIN	68	70	67	82	93	80	70	67	64	56	60	58
AC-FT	4460	5480	10350	6730	17590	8040	4980	4360	3980	3740	3840	3780

e Estimated.

SANTA ANA RIVER BASIN

11066460 SANTA ANA RIVER AT METROPOLITAN WATER DISTRICT CROSSING, NEAR ARLINGTON, CA—Continued

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 2004, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	62.6	82.7	106	220	283	301	143	116	79.4	56.0	55.4	56.6
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 2003 CALENDAR YEAR		FOR 2004 WATER YEAR		WATER YEARS 1970 - 2004	
ANNUAL TOTAL	45630		38990			
ANNUAL MEAN	125		107		130	
HIGHEST ANNUAL MEAN					416	
LOWEST ANNUAL MEAN					29.0	
HIGHEST DAILY MEAN	2460	Mar 16	3570	Feb 26	11500	Mar 2 1983
LOWEST DAILY MEAN	67	May 19	56	Jul 19	15	Sep 7 1980
ANNUAL SEVEN-DAY MINIMUM	69	Dec 1	57	Jul 19	16	Jul 1 1981
MAXIMUM PEAK FLOW			19700	Dec 25	31300	Feb 24 1998
MAXIMUM PEAK STAGE			13.22	Dec 25	20.23	Mar 4 1978
ANNUAL RUNOFF (AC-FT)	90510		77340		94380	
10 PERCENT EXCEEDS	102		112		180	
50 PERCENT EXCEEDS	82		72		71	
90 PERCENT EXCEEDS	72		61		24	

SANTA ANA RIVER BASIN

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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 mi².

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 NGVD of 1929, from topographic map. Prior to Nov. 10, 1950, water-stage recorder on right bank 0.4 mi upstream at datum 24.50 ft higher. Nov. 11, 1950, to September 1954, water-stage recorder on both banks 0.4 mi upstream at datum 24.50 ft higher. October 1966 to September 1976, water-stage recorder on right bank 0.4 mi upstream at datum 14.50 ft higher. 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 10 ft higher, from topographic map.

REMARKS.—Records poor. 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 ft³/s, Feb. 25, 1969, gage height, 11.9 ft, site and datum then in use; no flow for many days many years prior to 1967 and since Mar. 21, 1996.

EXTREMES FOR CURRENT YEAR.—Peak discharges greater than base discharge of 1,000 ft³/s, from rating curve extended above 5,930 ft³/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)
Dec. 25	1830	12,100	6.70	Feb. 26	0800	5,590	5.81
Feb. 3	0015	2,460	5.15	Mar. 2	0415	1,640	4.86
Feb. 20	1915	1,020	4.50	Apr. 1	2000	1,870	4.95
Feb. 22	2330	1,570	4.82				

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.00	e2.0	0.00	1.1	e0.83	22	81	2.2	0.00	e1.0	e0.00	e0.00
2	0.00	e0.75	0.00	73	43	409	43	0.00	0.49	e0.65	e0.00	e0.00
3	0.00	e0.40	0.00	18	191	60	30	0.00	e0.55	e0.49	e0.00	e0.00
4	0.00	e0.15	0.00	e9.0	e3.0	34	3.7	0.00	1.6	e0.52	e2.2	e0.00
5	0.00	e0.00	0.00	e6.0	e0.33	13	13	0.00	0.47	e0.91	e0.40	e0.00
6	0.00	0.00	0.00	e5.4	0.23	7.7	1.9	0.00	0.21	e1.6	e0.00	e0.00
7	0.00	0.00	0.00	e3.2	1.3	5.8	1.3	0.00	0.29	e1.1	e0.00	e0.00
8	0.00	0.00	0.00	e2.2	1.00	8.8	2.1	0.11	1.4	e0.70	e0.00	e0.00
9	0.00	0.00	0.00	e2.1	1.3	10	1.8	0.00	0.49	e0.45	e0.00	e0.75
10	0.00	0.00	0.25	e2.0	1.5	5.2	1.4	0.00	0.28	e0.40	e0.00	e0.00
11	0.00	0.00	2.8	e1.9	1.3	7.4	1.1	0.00	0.21	e0.35	e0.00	e0.00
12	0.00	99	0.24	e1.9	3.1	8.5	2.9	0.01	0.70	e0.37	e0.00	e0.00
13	0.00	2.9	0.00	e1.8	2.2	5.5	1.3	0.12	0.32	e2.1	e3.0	e0.00
14	0.00	0.00	4.0	e1.3	1.1	3.1	0.36	0.04	0.48	e3.0	e1.0	e0.00
15	0.00	0.00	2.4	e1.0	1.1	3.0	0.47	0.17	1.0	e1.9	e0.00	e0.00
16	0.00	41	1.6	e0.90	1.2	2.4	0.93	0.00	0.43	e0.70	e0.00	e0.00
17	0.00	0.04	2.1	e0.85	1.5	5.6	121	0.00	0.23	e0.40	e0.00	e0.00
18	0.00	0.00	1.4	e0.70	67	1.3	40	0.01	0.00	e0.37	e0.00	e0.00
19	0.00	1.4	2.1	e0.51	38	0.54	11	0.08	0.00	e0.35	e0.00	e0.00
20	0.00	0.00	2.0	e0.47	129	0.92	13	0.14	0.00	e0.90	e0.00	e0.00
21	0.00	0.43	2.0	e0.55	120	2.1	7.6	0.48	0.00	e1.4	e0.00	e0.00
22	0.00	0.00	2.0	e0.61	286	1.4	6.1	0.00	0.00	e0.85	e0.00	e0.00
23	0.00	0.00	2.9	e0.51	332	0.58	4.1	0.32	0.27	e0.60	e0.00	e0.00
24	0.00	0.00	4.9	e1.3	49	0.26	1.9	0.26	0.37	e0.45	e0.00	e0.00
25	0.00	0.00	1030	e1.2	22	1.6	2.0	0.13	1.3	e0.34	e0.00	e0.00
26	0.00	0.00	146	e1.3	1410	1.6	2.7	0.12	2.0	e0.31	e0.00	e0.00
27	0.00	0.00	8.9	e0.47	60	2.2	1.8	0.04	2.1	e0.10	e0.00	e0.00
28	0.00	0.00	4.9	e0.21	5.2	2.3	2.0	0.00	1.3	e0.00	e0.00	e0.00
29	0.00	0.00	7.9	e0.80	2.6	1.5	0.99	0.00	e1.4	e0.00	e0.00	e0.00
30	0.00	0.00	3.9	e0.90	---	1.7	2.4	0.00	e1.4	e0.00	e0.00	e0.00
31	0.00	---	1.4	e2.2	---	2.1	---	0.00	---	e0.00	e0.00	---
TOTAL	0.00	148.07	1233.69	143.38	2775.79	631.10	402.85	4.23	19.29	22.31	6.60	0.75
MEAN	0.00	4.94	39.8	4.63	95.7	20.4	13.4	0.14	0.64	0.72	0.21	0.03
MAX	0.00	99	1030	73	1410	409	121	2.2	2.1	3.0	3.0	0.75
MIN	0.00	0.00	0.00	0.21	0.23	0.26	0.36	0.00	0.00	0.00	0.00	0.00
AC-FT	0.00	294	2450	284	5510	1250	799	8.4	38	44	13	1.5

e Estimated.

SANTA ANA RIVER BASIN

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 - 2004, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	8.87	21.0	23.2	50.6	154	38.7	35.6	49.4	14.1	4.27	8.35	10.1
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	0.00	0.67	1.16	0.00	0.82	0.10	0.00	0.00	0.00	0.00	0.00	0.00
(WY)	2003	2001	2001	2003	2002	1997	1997	1996	1996	1996	1996	1996

SUMMARY STATISTICS FOR 2003 CALENDAR YEAR FOR 2004 WATER YEAR WATER YEARS 1996 - 2004

ANNUAL TOTAL	8629.06	5388.06	
ANNUAL MEAN	23.6	14.7	34.1
HIGHEST ANNUAL MEAN			152 1998
LOWEST ANNUAL MEAN			1.70 2002
HIGHEST DAILY MEAN	1030 Dec 25	1410 Feb 26	5050 Feb 24 1998
LOWEST DAILY MEAN	0.00 Jan 1	0.00 Oct 1	0.00 Mar 22 1996
ANNUAL SEVEN-DAY MINIMUM	0.00 Jan 1	0.00 Oct 1	0.00 Mar 22 1996
MAXIMUM PEAK FLOW		12100 Dec 25	21100 Feb 23 1998
MAXIMUM PEAK STAGE		6.70 Dec 25	7.70 Feb 23 1998
ANNUAL RUNOFF (AC-FT)	17120	10690	24720
10 PERCENT EXCEEDS	17	8.1	47
50 PERCENT EXCEEDS	0.00	0.40	0.53
90 PERCENT EXCEEDS	0.00	0.00	0.00

SANTA ANA RIVER BASIN

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 mi², excludes 768 mi² 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 NGVD of 1929, from topographic map. October 1980 to July 1983 at site 500 ft downstream at different datum.

REMARKS.—Records fair. Flow regulated by several small storage reservoirs. Many diversions upstream from station for irrigation. Water discharged to channel from Arlington Desalter at times since September 1990; records for water years 1981 to 1990 and 1991 to current year are not equivalent. See schematic diagram of Santa Ana River Basin.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 4,720 ft³/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 ft³/s, Sept. 25, 1981.

EXTREMES OUTSIDE PERIOD OF RECORD.—Maximum discharge, 8,850 ft³/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 2003 TO SEPTEMBER 2004
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	44	8.1	20	12	54	48	14	4.9	6.1	4.1	4.4
2	15	15	8.5	55	72	78	23	9.0	5.2	6.6	4.0	4.7
3	12	13	9.0	18	46	31	19	5.2	6.5	7.0	5.6	3.7
4	15	13	10	14	12	23	14	6.6	7.1	8.7	5.4	3.1
5	14	13	10	13	9.0	20	9.9	6.7	5.6	9.5	4.3	2.7
6	13	10	11	13	8.1	19	8.9	5.9	5.4	9.4	3.7	3.3
7	15	9.7	14	15	9.3	17	8.4	7.9	6.4	12	3.7	3.1
8	14	8.3	11	13	8.4	13	6.9	6.8	5.5	11	3.3	2.7
9	14	8.5	10	12	7.8	9.8	7.3	7.6	5.9	6.0	4.3	2.9
10	14	8.8	10	11	8.3	8.8	7.9	8.7	5.7	5.5	5.3	2.1
11	14	7.7	13	11	9.3	7.8	7.1	7.3	4.5	4.7	4.1	1.6
12	11	74	12	9.1	9.7	8.1	9.3	7.7	4.3	5.3	2.4	1.9
13	10	16	11	8.1	10	6.8	14	7.2	4.1	4.4	2.0	2.7
14	13	12	12	7.8	11	6.0	18	7.7	3.8	4.5	2.0	2.2
15	13	14	10	8.4	11	4.5	18	7.5	3.5	3.6	2.5	2.4
16	11	28	11	8.9	10	4.6	18	6.8	3.4	4.0	2.8	3.0
17	10	9.0	11	7.9	10	5.2	65	7.2	4.8	4.5	2.9	2.2
18	12	11	12	8.2	94	4.6	23	6.1	5.9	5.7	3.4	2.6
19	12	9.0	13	9.7	16	3.2	13	6.0	4.5	4.6	4.1	2.4
20	11	12	14	9.1	47	3.5	13	6.0	4.9	5.7	4.6	3.2
21	11	12	14	9.9	29	4.9	15	5.4	5.2	4.9	5.2	3.4
22	14	10	15	9.0	103	6.0	15	4.5	3.6	5.3	5.1	3.3
23	14	9.2	16	8.7	82	5.6	14	5.2	3.9	4.3	4.9	3.1
24	11	9.3	23	7.7	10	7.1	12	5.7	3.8	5.5	4.2	3.5
25	11	10	165	8.1	21	12	13	4.8	4.1	5.3	5.9	2.9
26	12	8.2	33	8.2	401	12	14	4.8	4.3	5.3	5.3	3.6
27	9.2	9.6	25	8.9	42	13	12	4.6	4.3	5.3	5.1	3.7
28	8.5	8.2	23	9.3	18	12	13	5.0	4.5	4.8	5.5	2.9
29	8.5	8.3	23	10	12	12	15	4.9	4.9	4.1	5.1	3.7
30	9.9	9.1	21	8.9	---	13	16	4.9	5.9	3.6	5.3	4.1
31	9.6	---	20	11	---	13	---	4.7	---	3.6	4.2	---
TOTAL	371.7	429.9	598.6	371.9	1138.9	438.5	490.7	202.4	146.4	180.8	130.3	91.1
MEAN	12.0	14.3	19.3	12.0	39.3	14.1	16.4	6.53	4.88	5.83	4.20	3.04
MAX	15	74	165	55	401	78	65	14	7.1	12	5.9	4.7
MIN	8.5	7.7	8.1	7.7	7.8	3.2	6.9	4.5	3.4	3.6	2.0	1.6
AC-FT	737	853	1190	738	2260	870	973	401	290	359	258	181

SANTA ANA RIVER BASIN

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 - 2004, BY WATER YEAR (WY)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
MEAN	12.2	14.6	17.1	37.7	80.8	58.8	35.4	21.2	13.9	12.4	11.8	12.0		
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	10.7	10.5	5.19	2.89	3.24	3.25	3.56	4.20	3.04		
(WY)	1996	1996	1999	2003	2002	2001	1991	1992	2003	1994	2004	2004		

SUMMARY STATISTICS

FOR 2003 CALENDAR YEAR

FOR 2004 WATER YEAR

WATER YEARS 1991 - 2004

ANNUAL TOTAL	7957.7	4591.2	
ANNUAL MEAN	21.8	12.5	27.0
HIGHEST ANNUAL MEAN			81.8 1995
LOWEST ANNUAL MEAN			12.5 2004
HIGHEST DAILY MEAN	626 Mar 16	401 Feb 26	2090 Feb 24 1998
LOWEST DAILY MEAN	1.8 Jan 25	1.6 Sep 11	0.34 Jul 3 1992
ANNUAL SEVEN-DAY MINIMUM	2.6 Jun 10	2.3 Sep 9	0.89 Jan 13 1992
MAXIMUM PEAK FLOW		1110 Feb 26	3660 Feb 24 1998
MAXIMUM PEAK STAGE		4.78 Feb 26	6.54 Feb 24 1998
ANNUAL RUNOFF (AC-FT)	15780	9110	19570
10 PERCENT EXCEEDS	33	18	37
50 PERCENT EXCEEDS	12	8.5	13
90 PERCENT EXCEEDS	3.3	3.6	4.2

SANTA ANA RIVER BASIN

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 mi².

PERIOD OF RECORD.—January 1968 to July 1977, December 1978 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, crest-stage gage, and concrete-lined flood-control channel. Elevation of gage is 660 ft above NGVD of 1929, from topographic map. Prior to July 1977 at site 100 ft downstream at different datum.

REMARKS.—Records fair above 200 ft³/s and poor below. 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 ft³/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 ft³/s, June 6, 1987.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	50	132	57	55	61	130	291	46	57	e52	59	45
2	53	59	57	97	355	282	90	47	57	e52	52	52
3	55	55	59	56	132	66	118	42	59	e53	25	52
4	56	53	54	61	50	52	74	47	56	e52	55	50
5	60	49	48	65	46	52	56	49	58	e50	e57	49
6	65	52	52	61	44	52	48	49	59	e52	e57	47
7	63	54	69	65	48	48	47	50	57	e51	e56	50
8	61	52	51	65	53	48	47	47	55	53	59	49
9	55	49	52	64	47	51	48	51	55	55	48	51
10	53	52	65	66	49	52	50	51	57	51	45	51
11	52	56	90	70	45	52	53	51	56	51	45	49
12	52	341	60	83	61	52	51	52	e56	47	26	51
13	53	93	55	61	55	52	50	51	e55	52	40	51
14	55	62	59	61	45	51	47	48	e55	51	50	48
15	59	59	59	67	46	48	47	50	e54	51	55	49
16	58	97	53	56	50	47	47	50	e56	49	51	50
17	60	55	56	61	54	47	198	54	e57	48	52	52
18	60	50	61	65	274	47	92	55	e55	53	52	50
19	60	52	58	65	48	49	58	56	e55	e55	51	51
20	58	53	60	66	55	47	53	52	e54	e56	53	51
21	58	53	68	63	73	49	52	51	e55	e57	51	52
22	59	56	61	57	1130	49	52	53	e54	e57	52	49
23	56	58	57	56	247	47	48	56	e54	e58	58	46
24	56	56	64	59	73	47	48	61	e52	e60	54	48
25	52	57	1630	62	159	45	49	56	e53	e59	46	50
26	50	55	85	62	1860	42	47	51	e53	e57	56	49
27	56	59	59	61	84	45	47	50	e51	e56	54	44
28	60	54	54	63	61	48	44	49	e53	e55	54	48
29	60	56	65	63	55	45	47	52	e53	52	51	48
30	56	57	62	61	---	43	48	53	e52	51	52	49
31	55	---	62	63	---	42	---	54	---	59	51	---
TOTAL	1756	2086	3442	1980	5360	1827	2047	1584	1653	1655	1567	1481
MEAN	56.6	69.5	111	63.9	185	58.9	68.2	51.1	55.1	53.4	50.5	49.4
MAX	65	341	1630	97	1860	282	291	61	59	60	59	52
MIN	50	49	48	55	44	42	44	42	51	47	25	44
AC-FT	3480	4140	6830	3930	10630	3620	4060	3140	3280	3280	3110	2940

e Estimated.

SANTA ANA RIVER BASIN

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)

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 - 2004, BY WATER YEAR (WY)

MEAN	37.6	44.0	49.8	75.1	101	66.4	45.2	36.2	35.5	34.0	33.8	37.5
MAX	56.6	102	111	265	304	198	96.7	69.4	57.1	53.4	51.8	52.0
(WY)	2004	2003	2004	1993	1998	1995	2003	2003	1992	2004	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 2003 CALENDAR YEAR FOR 2004 WATER YEAR WATER YEARS 1986 - 2004

ANNUAL TOTAL	28457	26438	
ANNUAL MEAN	78.0	72.2	49.4
HIGHEST ANNUAL MEAN			78.1 2003
LOWEST ANNUAL MEAN			26.6 1987
HIGHEST DAILY MEAN	1690 Mar 15	1860 Feb 26	2490 Feb 20 1996
LOWEST DAILY MEAN	36 Feb 7	25 Aug 3	2.5 Jun 6 1987
ANNUAL SEVEN-DAY MINIMUM	42 Feb 4	44 Aug 9	12 Aug 25 1988
MAXIMUM PEAK FLOW		14100 Dec 25	14100 Dec 25 2003
MAXIMUM PEAK STAGE		6.06 Dec 25	6.06 Dec 25 2003
ANNUAL RUNOFF (AC-FT)	56440	52440	35800
10 PERCENT EXCEEDS	69	65	59
50 PERCENT EXCEEDS	54	53	35
90 PERCENT EXCEEDS	44	47	20

SANTA ANA RIVER BASIN

1

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 old Schaefer Avenue Bridge, 0.8 mi downstream from San Antonio Creek, and 1.5 mi southwest of Chino.

DRAINAGE AREA.—48.9 mi².

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 NGVD of 1929, from topographic map.

REMARKS.—Records fair above 10 ft³/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, 8,040 acre-ft was released. See schematic diagram of Santa Ana River Basin.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 12,700 ft³/s, Feb. 27, 1983, gage height, 10.32 ft, from rating curve extended above 560 ft³/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 ft³/s, on basis of contracted-opening measurement at site 6.1 mi downstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	29	1.8	1.4	1.8	119	52	2.2	26	21	1.4	36
2	24	2.5	1.8	38	117	107	2.1	2.0	1.8	20	1.5	34
3	24	2.7	1.6	2.2	16	4.6	3.0	2.0	2.1	20	1.5	30
4	27	2.2	2.4	2.8	2.3	3.2	2.9	1.9	1.8	23	1.8	32
5	28	2.3	1.7	2.7	2.0	2.8	2.3	1.8	1.8	27	1.7	47
6	11	16	1.8	1.7	2.0	2.2	1.9	1.6	1.4	25	1.3	42
7	1.6	56	9.6	4.0	1.9	2.1	2.1	1.6	1.6	24	1.2	32
8	1.6	58	3.0	3.2	2.2	2.1	1.4	1.5	1.4	26	1.2	25
9	2.1	55	1.8	4.5	2.3	2.1	2.1	1.7	1.5	26	1.3	21
10	2.8	88	1.9	2.1	3.4	2.4	2.1	1.6	1.3	28	1.4	1.6
11	2.3	122	2.3	4.6	2.9	2.2	1.7	1.7	1.2	28	1.4	1.5
12	21	170	1.8	1.9	2.6	2.3	1.6	1.5	1.3	26	1.4	1.3
13	63	3.6	1.7	1.6	3.4	2.6	1.6	1.5	1.3	26	1.4	1.5
14	79	2.8	6.1	2.1	2.1	2.3	1.5	17	1.3	25	1.4	1.5
15	134	5.8	2.2	2.6	1.9	2.2	1.5	52	1.3	26	1.5	1.5
16	155	7.5	1.9	2.9	2.0	2.4	1.5	51	1.3	24	1.6	13
17	151	2.2	2.0	2.0	2.5	1.9	15	53	1.5	24	1.5	24
18	152	2.3	2.1	2.0	69	2.1	1.9	53	1.6	27	1.4	23
19	138	1.7	1.8	2.1	3.3	1.9	1.8	56	1.5	28	1.5	21
20	98	1.6	1.9	2.0	5.7	1.9	1.6	58	1.5	27	1.7	25
21	27	1.8	1.8	2.3	15	1.9	1.6	59	1.6	24	1.7	70
22	3.1	2.3	1.9	2.7	395	1.8	1.6	62	9.9	17	1.6	110
23	1.8	1.8	2.0	1.9	109	1.9	2.2	64	50	1.2	1.7	112
24	2.0	1.8	3.9	2.5	3.9	1.6	1.5	63	51	1.2	8.2	115
25	2.1	1.8	285	2.5	133	1.7	1.5	62	58	1.1	28	88
26	2.5	1.8	4.0	2.1	617	1.8	1.5	64	59	1.1	25	1.1
27	2.6	1.6	2.3	1.7	4.1	1.5	1.6	61	59	1.4	21	1.1
28	2.6	1.6	2.0	1.9	3.0	1.6	1.8	63	55	1.3	28	1.2
29	2.6	1.7	2.1	1.9	2.6	1.6	2.1	63	24	1.3	28	1.1
30	1.5	1.7	3.1	1.8	---	1.6	2.0	61	12	1.3	28	1.0
31	1.6	---	1.8	1.8	---	1.7	---	64	---	1.5	27	---
TOTAL	1190.8	649.1	361.1	109.5	1528.9	288.0	119.0	1048.6	434.0	553.4	227.3	914.4
MEAN	38.4	21.6	11.6	3.53	52.7	9.29	3.97	33.8	14.5	17.9	7.33	30.5
MAX	155	170	285	38	617	119	52	64	59	28	28	115
MIN	1.5	1.6	1.6	1.4	1.8	1.5	1.4	1.5	1.2	1.1	1.2	1.0
AC-FT	2360	1290	716	217	3030	571	236	2080	861	1100	451	1810

SANTA ANA RIVER BASIN

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

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 2004, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	16.7	17.0	25.8	32.1	38.4	28.2	9.76	13.5	18.2	18.9	16.5	14.5
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	0.06	0.23	0.53	0.55	0.33	0.30	0.14	0.22	0.06	0.07	0.14	0.13
(WY)	1978	1978	1970	1972	1972	1972	1977	1973	1977	1977	1976	1977

SUMMARY STATISTICS	FOR 2003 CALENDAR YEAR		FOR 2004 WATER YEAR		WATER YEARS 1970 - 2004	
ANNUAL TOTAL	5971.52		7424.1			
ANNUAL MEAN	16.4		20.3		20.7	
HIGHEST ANNUAL MEAN					92.4	
LOWEST ANNUAL MEAN					3.24	
HIGHEST DAILY MEAN	780	Mar 15	617	Feb 26	2060	Mar 1 1978
LOWEST DAILY MEAN	0.87	Aug 3	1.0	Sep 30	0.00	May 21 1977
ANNUAL SEVEN-DAY MINIMUM	1.3	Aug 22	1.2	Jul 23	0.02	Oct 28 1977
MAXIMUM PEAK FLOW			2780	Feb 26	12700	Feb 27 1983
MAXIMUM PEAK STAGE			6.72	Feb 26	10.32	Feb 27 1983
ANNUAL RUNOFF (AC-FT)	11840		14730		15020	
10 PERCENT EXCEEDS	27		59		74	
50 PERCENT EXCEEDS	2.1		2.2		1.3	
90 PERCENT EXCEEDS	1.5		1.5		0.38	

11074000 -- SANTA ANA R BL PRADO DAM CA

WATER-QUALITY DATA, WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004

Date	Time	Instantaneous discharge, cfs (00061)	Specific conductance, wat unf uS/cm 25 degC (00095)	Temperature, water, deg C (00010)	Residue on evap. at 180degC wat flt mg/L (70300)
OCT					
03...	0945	226	891	21.0	557
17...	0945	333	755	19.5	465
31...	0930	197	961	16.5	605
NOV					
21...	1110	293	905	16.0	566
DEC					
02...	0755	366	956	14.0	601
15...	0955	324	965	12.5	600
JAN					
02...	1130	289	697	11.5	454
14...	1215	416	849	12.5	517
FEB					
04...	1045	218	689	13.5	433
19...	1240	246	868	15.0	545
MAR					
01...	1105	538	408	13.5	257
19...	1515	481	705	19.0	448
APR					
02...	0905	263	895	19.0	586
15...	1055	329	960	20.0	584
MAY					
07...	1145	376	1080	23.5	652
21...	1100	237	940	20.5	561
JUN					
04...	1110	178	1020	23.5	618
17...	1220	166	1020	23.5	640
JUL					
02...	0740	201	930	21.0	555
14...	1000	218	965	24.5	577
AUG					
05...	1000	163	995	22.5	590
12...	1100	80	1010	26.0	611
SEP					
03...	1220	174	927	24.5	553
17...	0930	200	914	23.0	564

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCES

STATION NUMBER 11074000 SANTA ANA R BL PRADO DAM CA SOURCE AGENCY USGS STATE 06 COUNTY 065
 LATITUDE 335300 LONGITUDE 1173840 NAD27 DRAINAGE AREA 1490 CONTRIBUTING DRAINAGE AREA DATUM 449 NGVD29
 Date Processed: 2005-01-27 13:24 By jmcombs

APPROVED

DD #4

Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius
 WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	897	861	1000	667	1010	984	700	653	1030	999	421	383
2	911	876	962	896	1000	972	747	688	1020	942	552	388
3	917	863	951	936	1000	969	808	694	975	485	656	513
4	931	851	971	940	998	968	790	734	771	569	532	449
5	879	824	978	931	999	940	837	756	807	701	486	433
6	868	839	956	919	999	956	759	711	867	775	470	422
7	909	862	931	852	993	958	775	715	885	762	496	436
8	926	888	869	833	964	929	777	709	878	782	568	474
9	907	853	869	828	979	934	758	705	815	695	527	490
10	927	862	855	822	1000	963	770	732	779	720	569	491
11	910	857	823	780	989	952	823	759	839	743	630	516
12	898	849	824	671	960	873	812	762	868	795	596	540
13	866	772	754	642	970	898	832	797	900	850	617	572
14	831	787	739	638	982	957	863	821	911	878	678	610
15	802	766	729	634	974	937	901	859	912	891	750	661
16	783	741	805	705	987	942	887	860	930	890	753	709
17	774	729	810	786	1010	986	885	838	959	927	781	730
18	739	683	917	797	1010	993	868	833	967	926	775	703
19	701	670	942	860	1000	987	891	807	958	792	739	704
20	751	637	949	888	995	960	938	780	867	819	779	728
21	803	729	942	917	975	954	998	884	859	776	791	753
22	847	803	932	901	988	958	977	906	776	700	844	791
23	911	835	931	898	999	965	951	917	742	431	835	816
24	907	867	955	917	976	955	946	928	526	444	866	834
25	920	889	980	948	955	314	963	931	447	385	880	847
26	935	887	984	956	347	323	991	943	451	261	891	864
27	925	889	1000	967	471	347	1000	942	287	233	917	881
28	970	911	1030	999	531	471	1020	996	341	284	925	885
29	975	941	1010	987	693	531	1010	982	415	311	930	913
30	970	955	1010	985	736	668	1030	999	---	---	949	925
31	985	948	---	---	748	685	1020	996	---	---	946	931
MONTH	985	637	1030	634	1010	314	1030	653	1030	233	949	383

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DD #4

Specific conductance, water, unfiltered, microsiemens per centimeter at 25 degrees Celsius
 WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004

DAY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	947	927	968	943	933	847	959	904	1010	970	929	897
2	937	920	985	945	998	933	944	903	992	940	923	868
3	931	915	998	953	999	970	945	889	983	950	939	877
4	936	920	1020	977	1020	947	932	844	1020	948	921	863
5	941	928	1030	995	975	898	896	818	1000	955	926	829
6	948	936	1040	1020	925	845	858	822	1010	976	904	852
7	953	944	1080	1020	890	822	886	843	1020	948	926	846
8	951	942	1140	1080	936	884	908	871	985	921	948	890
9	957	931	1110	1040	966	918	938	889	965	925	929	847
10	953	924	1050	973	962	907	966	921	977	940	923	886
11	944	916	997	970	1010	950	977	930	1010	---	938	889
12	942	914	1030	970	1020	949	974	945	1050	992	924	885
13	962	882	1050	973	1000	930	990	958	1060	986	936	892
14	954	930	998	939	989	941	992	926	1040	980	950	894
15	957	913	972	847	977	911	962	916	1020	957	953	927
16	961	927	887	850	955	901	955	907	1020	965	959	919
17	981	925	901	859	1010	904	953	888	1010	973	941	895
18	975	885	917	882	959	866	957	901	1000	950	944	889
19	949	880	928	837	896	848	938	900	998	943	901	826
20	963	934	910	852	918	849	941	903	1000	935	866	836
21	955	935	935	865	953	895	948	897	1010	946	881	813
22	953	934	928	874	939	894	949	877	1010	953	820	772
23	973	943	935	871	918	831	948	888	996	964	800	773
24	981	949	935	892	896	835	972	909	1010	979	812	774
25	983	952	938	892	897	860	943	913	1010	928	842	809
26	979	949	935	862	909	845	961	931	973	926	935	817
27	977	946	882	826	923	861	1000	961	966	908	1000	918
28	964	925	858	822	937	894	1000	956	965	879	1010	943
29	979	921	843	805	940	902	997	963	937	890	993	957
30	979	933	859	816	1020	940	1010	964	931	896	992	960
31	---	---	874	839	---	---	1020	965	942	890	---	---
MONTH	983	880	1140	805	1020	822	1020	818	1060	---	1010	772

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 Date Processed: 2005-01-27 12:18 By jmcombs

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DD #1

Temperature, water, degrees Celsius
 WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004

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

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 Date Processed: 2005-01-27 12:18 By jmcombs

APPROVED

DD #1

Temperature, water, degrees Celsius
 WATER YEAR OCTOBER 2003 TO SEPTEMBER 2004

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	19.5	19.0	22.0	21.0	27.0	21.5	26.0	21.0	27.5	23.0	27.5	23.0
2	19.0	18.5	22.5	21.5	28.0	21.5	26.5	21.0	27.0	23.0	27.0	23.0
3	19.0	18.5	23.0	22.0	28.5	22.0	25.5	22.0	26.5	22.0	26.0	23.5
4	19.0	18.5	23.5	22.5	29.0	22.0	27.0	22.0	27.5	22.5	26.5	21.5
5	19.0	18.5	24.0	23.5	29.0	22.0	27.5	22.5	27.5	22.5	26.5	22.0
6	19.0	18.5	24.0	23.5	28.0	22.0	27.5	23.0	28.0	22.0	25.5	22.0
7	19.0	18.5	25.0	23.0	24.5	22.0	26.5	23.0	27.5	22.0	26.5	22.0
8	19.0	19.0	26.0	21.0	26.0	21.0	26.0	22.5	28.0	23.0	26.5	23.0
9	19.5	19.0	26.0	20.0	25.0	20.0	27.0	22.0	29.0	23.5	27.5	24.5
10	19.5	19.0	25.5	20.0	26.5	20.0	28.5	22.5	29.0	23.5	29.0	24.5
11	20.5	19.0	25.5	20.0	27.0	20.5	28.5	22.5	26.5	---	28.5	24.5
12	20.0	19.5	25.5	20.0	27.5	21.0	29.0	23.5	27.0	25.5	28.0	24.0
13	20.0	19.5	26.0	19.5	28.0	21.5	29.5	24.0	28.0	24.5	27.0	23.5
14	20.0	19.5	27.0	20.5	28.0	21.5	28.5	23.5	28.5	24.0	25.5	23.0
15	20.0	19.5	25.5	21.0	27.5	22.0	27.5	24.0	28.0	24.0	25.5	23.0
16	20.5	19.5	25.5	20.5	26.5	22.0	28.5	23.5	27.5	23.5	26.5	23.5
17	20.0	19.5	24.0	21.0	27.5	22.0	28.5	23.0	27.5	23.0	26.0	23.0
18	19.5	18.0	25.0	21.0	27.0	21.5	29.0	23.0	27.5	23.0	25.5	22.5
19	19.0	18.0	25.0	20.5	25.0	21.5	29.5	23.5	27.0	22.5	24.5	22.5
20	19.5	18.5	24.5	20.5	26.5	21.0	29.5	23.5	26.5	22.5	24.0	20.5
21	19.5	18.5	24.0	20.5	26.0	21.5	29.5	24.0	26.0	23.0	22.5	20.0
22	19.5	18.5	24.0	19.5	27.0	21.5	29.0	23.5	26.0	22.0	23.5	19.5
23	20.5	19.0	23.0	20.0	26.5	22.5	29.0	23.5	26.0	22.0	23.5	19.5
24	20.0	19.0	24.0	20.0	27.0	22.5	29.5	23.5	26.0	21.5	24.0	20.0
25	20.5	19.5	22.5	20.0	27.0	22.0	30.0	23.5	25.5	22.0	24.5	20.5
26	21.0	19.5	24.0	19.5	27.5	22.5	29.5	23.5	26.5	22.5	25.5	21.5
27	21.0	20.0	24.5	19.5	26.5	22.0	29.0	23.0	26.5	23.0	25.5	21.5
28	21.5	20.5	23.0	20.5	26.0	22.5	28.5	23.0	27.0	23.0	24.5	21.5
29	21.5	21.0	25.0	20.0	25.5	21.5	28.0	22.5	26.5	23.0	24.0	21.5
30	22.0	21.0	26.5	20.5	26.0	21.5	27.5	22.5	26.5	22.5	22.0	21.0
31	---	---	27.0	21.5	---	---	28.0	22.5	27.0	22.5	---	---
MONTH	22.0	18.0	27.0	19.5	29.0	20.0	30.0	21.0	29.0	---	29.0	19.5

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 2003 TO SEPTEMBER 2004

Date	Time	Instan- taneous dis- charge, cfs (00061)	Specif. conduc- tance, wat unf uS/cm 25 degC (00095)	Temper- ature, water, deg C (00010)	Residue on evap. at 180degC wat flt mg/L (70300)
OCT					
07...	1245	76	957	24.0	582
21...	1345	71	948	25.0	592
NOV					
04...	1300	87	936	20.0	586
18...	1220	100	920	19.0	566
DEC					
08...	1400	71	922	20.0	568
17...	1410	77	947	18.5	592
JAN					
07...	1315	89	927	18.0	586
20...	1315	89	921	17.0	583
FEB					
03...	1230	241	553	14.5	560
18...	1400	154	767	18.0	--
MAR					
01...	1330	97	954	14.5	589
12...	1220	94	949	21.5	614
26...	1240	83	947	19.0	601
APR					
05...	1300	76	945	18.0	600
20...	1205	84	941	22.0	600
MAY					
04...	1030	71	979	30.0	618
18...	1315	70	968	27.0	617
JUN					
07...	1310	69	924	23.0	604
22...	1115	65	963	23.5	632
JUL					
01...	1400	68	934	28.0	619
20...	1145	58	925	28.0	608
AUG					
03...	1245	62	930	26.0	616
23...	1215	61	946	24.0	609
SEP					
08...	1115	59	966	23.0	620
21...	1335	66	950	23.5	610

APPENDIX B

DAILY PRECIPITATION DATA
ESTIMATED FOR SAN BERNARDINO

WATER YEAR 2003-04

TABLE B-1

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

Day	2003			2004								
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0	0.14	0	0	0	0.70	0.32	0	0	0	0	0
2	0	0	0	0.41	0.71	0.16	0	0	0	0	0	0
3	0.02	0.05	0	0	0.04	0	0.10	0	0	0	0	0
4	0	0.02	0	0	0	0	0.02	0	0	0	0	0
5	0	0	0	0.23	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0.16	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0.15	0.12	0	0	0	0	0	0	0	0	0
12	0	0.56	0	0	0	0	0	0	0	0	0	0.03
13	0	0	0	0	0	0	0	0	0	0	0.10	0
14	0	0	0.17	0	0	0	0	0	0	0	0	0.02
15	0	0.13	0	0	0	0	0	0	0	0	0	0
16	0	0.17	0	0	0	0	0.12	0	0	0	0	0
17	0	0	0	0	0	0	0.30	0	0	0	0	0
18	0	0	0	0	0.43	0	0.01	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0.33	0	0	0	0	0	0	0
21	0	0	0	0.01	0.17	0	0	0	0	0	0	0
22	0	0	0	0	1.20	0	0	0	0	0	0	0
23	0	0	0.02	0	0.12	0	0	0	0	0	0	0
24	0	0	0.40	0	0	0	0	0	0	0	0	0
25	0	0	1.25	0.01	0.74	0	0	0	0	0	0	0
26	0	0	0	0	1.02	0	0	0	0	0	0	0
27	0	0	0	0	0.08	0	0	0	0	0	0	0
28	0	0	0	0.01	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0.05	0	0	0	0
30	0	0	0	0		0	0	0	0	0	0	0
31	0		0	0		0		0		0	0	
Total	0.02	1.22	2.12	0.67	4.84	0.86	0.87	0.05	0.00	0.00	0.10	0.05

Total Rainfall = 10.80 Inches

Data Source:

Calculated from San Bernardino Flood Control District Precipitation Stations 2001B2, 2015, and 2357.

Table B-2
 2003-04 DATA ESTIMATED FOR SAN BERNARDINO COUNTY HOSPITAL SITE FROM
 ADJACENT STATIONS 2001B2, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations ¹			For Stn. 2146-A =			Average	Monthly Total
		2001B2	2015	2357	(2001B2 X 1.1156)	(2015 X 0.8960)	(2357 X 0.9526)		
	<i>Ratio Adjacent Stn. to 2146-A =</i>	1.1156	0.8960	0.9526					
10/1/03	[]M	0	0	0	0	0	0	0	
10/2/03	[]M	0	0	0	0	0	0	0	
10/3/03	[]M	0	0.04	0.01	0	0.04	0.01	0.02	
10/4/03	[]M	0	0	0	0	0	0	0	
10/5/03	[]M	0	0	0	0	0	0	0	
10/6/03	[]M	0	0	0	0	0	0	0	
10/7/03	[]M	0	0	0	0	0	0	0	
10/8/03	[]M	0	0	0	0	0	0	0	
10/9/03	[]M	0	0	0	0	0	0	0	
10/10/03	[]M	0	0	0.01	0	0	0.01	0	
10/11/03	[]M	0	0	0	0	0	0	0	
10/12/03	[]M	0	0	0	0	0	0	0	
10/13/03	[]M	0	0	0	0	0	0	0	
10/14/03	[]M	0	0	0	0	0	0	0	
10/15/03	0	0	0	0	0	0	0	0	
10/16/03	0	0	0	0	0	0	0	0	
10/17/03	0	0	0	0	0	0	0	0	
10/18/03	0	0	0	0	0	0	0	0	
10/19/03	0	0	0	0	0	0	0	0	
10/20/03	0	0	0	0	0	0	0	0	
10/21/03	0	0	0	0	0	0	0	0	
10/22/03	0	0	0	0	0	0	0	0	
10/23/03	0	0	0	0	0	0	0	0	
10/24/03	0	0	0	0	0	0	0	0	
10/25/03	0	0	0	0	0	0	0	0	
10/26/03	0	0	0	0	0	0	0	0	
10/27/03	0	0	0	0	0	0	0	0	
10/28/03	0	0	0	0	0	0	0	0	
10/29/03	0	0	0	0	0	0	0	0	
10/30/03	0	0	0	0	0	0	0	0	
10/31/03	0.01	0	0	0	0	0	0	0	0.02
11/1/03	0.16	0	0.21	0.24	0.00	0.19	0.23	0.14	
11/2/03	0	0	0	0	0	0	0	0	
11/3/03	0.05	0.05	0.06	0.04	0.06	0.05	0.04	0.05	
11/4/03	0	0	0	0.05	0	0	0	0.02	
11/5/03	0	0	0	0.01	0	0	0	0	
11/6/03	0	0	0	0	0	0	0	0	
11/7/03	0	0	0	0	0	0	0	0	
11/8/03	0	0	0	0	0	0	0	0	
11/9/03	0	0	0	0	0	0	0	0	
11/10/03	0	0	0	0.01	0	0	0.01	0	
11/11/03	0	0.4	0	0	0.45	0	0	0.15	
11/12/03	0.75	0.3	0.8	0.65	0	0.72	0.62	0.56	
11/13/03	0	0	0	0	0	0	0	0	
11/14/03	0	0	0	0	0	0	0	0	
11/15/03	0.14	0	0.25	0.18	0	0.22	0.17	0.13	
11/16/03	0.1	0.23	0.13	0.15	0.26	0.12	0.14	0.17	
11/17/03	0	0	0	0	0	0	0	0	
11/18/03	0	0	0	0	0	0	0	0	
11/19/03	0	0	0	0	0	0	0	0	
11/20/03	0	0	0	0	0	0	0	0	
11/21/03	0	0	0	0	0	0	0	0	
11/22/03	0	0	0	0	0	0	0	0	

Table B-2
 2003-04 DATA ESTIMATED FOR SAN BERNARDINO COUNTY HOSPITAL SITE FROM
 ADJACENT STATIONS 2001B2, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations ¹			(2001B2 X	(2015 X	(2357 X	Average	Monthly Total
		2001B2	2015	2357	1.1156)	0.8960)	0.9526)		
	<i>Ratio Adjacent Stn. to 2146-A =</i>	1.1156	0.8960	0.9526					
11/23/03	0	0	0	0	0	0	0	0	
11/24/03	0	0	0	0	0	0	0	0	
11/25/03	0	0	0	0	0	0	0	0	
11/26/03	0	0	0	0	0	0	0	0	
11/27/03	0	0	0	0	0	0	0	0	
11/28/03	0	0	0	0	0	0	0	0	
11/29/03	0	0	0	0	0	0	0	0	
11/30/03	0	0	0	0	0	0	0	0	1.22
12/1/03	0	0	0	0	0	0	0	0	
12/2/03	0	0	0	0	0	0	0	0	
12/3/03	0	0	0	0	0	0	0	0	
12/4/03	0	0	0	0	0	0	0	0	
12/5/03	0	0	0	0	0	0	0	0	
12/6/03	0	0	0	0	0	0	0	0	
12/7/03	0.15	0.14	0.21	0.15	0.16	0.19	0.14	0.16	
12/8/03	0.01	0	0	0	0	0	0	0	
12/9/03	0	0	0	0	0	0	0	0	
12/10/03	0	0	0	0	0	0	0	0	
12/11/03	0.18	0.29	0.02	0.01	0.32	0.02	0.01	0.12	
12/12/03	0	0	0	0.01	0	0	0	0	
12/13/03	0	0	0	0	0	0	0	0	
12/14/03	0.16	0.13	0.19	0.19	0.15	0.17	0.18	0.17	
12/15/03	0	0	0	0	0	0	0	0	
12/16/03	0	0	0	0	0	0	0	0	
12/17/03	0	0	0	0	0	0	0	0	
12/18/03	0	0	0	0	0	0	0	0	
12/19/03	0	0	0	0	0	0	0	0	
12/20/03	0	0	0	0	0	0	0	0	
12/21/03	0	0	0	0	0	0	0	0	
12/22/03	0	0	0	0	0	0	0	0	
12/23/03	0.04	0	0.04	0.02	0	0.04	0.02	0.02	
12/24/03	0.05	0.98	0.05	0.06	1.09	0.04	0.06	0.40	
12/25/03	1.23	0	2.23	1.84	0	2.00	1.75	1.25	
12/26/03	0	0	0	0	0	0	0	0	
12/27/03	0	0	0	0	0	0	0	0	
12/28/03	0	0	0	0	0	0	0	0	
12/29/03	0	0	0	0	0	0	0	0	
12/30/03	0	0	0	0	0	0	0	0	
12/31/03	0	0	0	0	0	0	0	0	2.12
1/1/04	0	0	0	0	0	0	0	0	
1/2/04	0.76	0	0.59	0.74	0	0.53	0.70	0.41	
1/3/04	0	0	0	0.01	0	0	0	0	
1/4/04	0	0	0	0	0	0	0	0	
1/5/04	0	0.63	0	0	0.70	0	0	0.23	
1/6/04	0	0	0	0	0	0	0	0	
1/7/04	0	0	0	0	0	0	0	0	
1/8/04	0	0	0	0	0	0	0	0	
1/9/04	0	0	0	0	0	0	0	0	
1/10/04	0	0	0	0	0	0	0	0	
1/11/04	0	0	0	0	0	0	0	0	
1/12/04	0	0	0	0	0	0	0	0	
1/13/04	0	0	0	0	0	0	0	0	
1/14/04	0	0	0	0	0	0	0	0	

Table B-2
 2003-04 DATA ESTIMATED FOR SAN BERNARDINO COUNTY HOSPITAL SITE FROM
 ADJACENT STATIONS 2001B2, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations ¹			(2001B2 X	(2015 X	(2357 X	Average	Monthly Total
		2001B2	2015	2357	1.1156)	0.8960)	0.9526)		
	<i>Ratio Adjacent Stn. to 2146-A =</i>	1.1156	0.8960	0.9526					
1/15/04	0	0	0	0	0	0	0	0	
1/16/04	0	0	0	0	0	0	0	0	
1/17/04	0	0	0	0	0	0	0	0	
1/18/04	0	0	0	0	0	0	0	0	
1/19/04	0	0	0	0	0	0	0	0	
1/20/04	0	0	0	0	0	0	0	0	
1/21/04	0	0	0.02	0.01	0	0.02	0.01	0.01	
1/22/04	0	0	0	0	0	0	0	0	
1/23/04	0	0	0	0	0	0	0	0	
1/24/04	0	0	0	0	0	0	0	0	
1/25/04	0	0	0.02	0	0	0.02	0	0.01	
1/26/04	0	0	0	0	0	0	0	0	
1/27/04	0	0	0	0	0	0	0	0	
1/28/04	0	0	0.02	0.01	0	0.02	0.01	0.01	
1/29/04	0	0	0	0	0	0	0	0	
1/30/04	0	0	0	0	0	0	0	0	
1/31/04	0	0	0	0	0	0	0	0	0.67
2/1/04	0	0	0	0	0	0	0	0	
2/2/04	0.67	0.62	0.77	0.79	0.69	0.69	0.75	0.71	
2/3/04	0.04	0	0.06	0.07	0	0.05	0.07	0.04	
2/4/04	0	0	0	0	0	0	0	0	
2/5/04	0	0	0	0	0	0	0	0	
2/6/04	0	0	0	0	0	0	0	0	
2/7/04	0	0	0	0	0	0	0	0	
2/8/04	0	0	0	0	0	0	0	0	
2/9/04	0	0	0	0	0	0	0	0	
2/10/04	0	0	0	0	0	0	0	0	
2/11/04	0	0	0	0	0	0	0	0	
2/12/04	0	0	0	0	0	0	0	0	
2/13/04	0	0	0	0	0	0	0	0	
2/14/04	0	0	0	0	0	0	0	0	
2/15/04	0	0	0	0	0	0	0	0	
2/16/04	0	0	0	0	0	0	0	0	
2/17/04	0	0	0	0	0	0	0	0	
2/18/04	0.41	0.36	0.51	0.46	0.40	0.46	0.44	0.43	
2/19/04	0.01	0	0	0	0	0	0	0	
2/20/04	0.43	0	0.75	0.33	0	0.67	0.31	0.33	
2/21/04	0.32	0	0.37	0.19	0	0.33	0.18	0.17	
2/22/04	0.77	1.54	1.02	1.02	1.72	0.91	0.97	1.20	
2/23/04	0.18	0.03	0.17	0.18	0.03	0.15	0.17	0.12	
2/24/04	0.02	0	0.01	0	0	0.01	0	0	
2/25/04	0.26	1.48	0.3	0.3	1.65	0.27	0.29	0.74	
2/26/04	1.53	0.01	1.66	1.63	0.01	1.49	1.55	1.02	
2/27/04	0.22	0	0.06	0.2	0	0.05	0.19	0.08	
2/28/04	0	0	0	0	0	0	0	0	
2/29/04	0	0	0	0	0	0	0	0	4.84
3/1/04	0.63	0.84	0.64	0.61	0.94	0.57	0.58	0.70	
3/2/04	0.17	0.02	0.25	0.23	0.02	0.22	0.22	0.16	
3/3/04	0	0	0	0	0	0	0	0	
3/4/04	0	0	0	0	0	0	0	0	
3/5/04	0	0	0	0	0	0	0	0	
3/6/04	0	0	0	0	0	0	0	0	
3/7/04	0	0	0	0	0	0	0	0	

Table B-2
 2003-04 DATA ESTIMATED FOR SAN BERNARDINO COUNTY HOSPITAL SITE FROM
 ADJACENT STATIONS 2001B2, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations ¹			(2001B2 X	(2015 X	(2357 X	Average	Monthly Total
		2001B2	2015	2357	1.1156)	0.8960)	0.9526)		
	<i>Ratio Adjacent Stn. to 2146-A =</i>	1.1156	0.8960	0.9526					
3/8/04	0	0	0	0	0	0	0	0	
3/9/04	0	0	0	0	0	0	0	0	
3/10/04	0	0	0	0	0	0	0	0	
3/11/04	0	0	0	0	0	0	0	0	
3/12/04	0	0	0	0	0	0	0	0	
3/13/04	0	0	0	0	0	0	0	0	
3/14/04	0	0	0	0	0	0	0	0	
3/15/04	0	0	0	0	0	0	0	0	
3/16/04	0	0	0	0	0	0	0	0	
3/17/04	0	0	0	0	0	0	0	0	
3/18/04	0	0	0	0	0	0	0	0	
3/19/04	0	0	0	0	0	0	0	0	
3/20/04	0	0	0	0	0	0	0	0	
3/21/04	0	0	0	0	0	0	0	0	
3/22/04	0	0	0	0	0	0	0	0	
3/23/04	0	0	0	0	0	0	0	0	
3/24/04	0	0	0	0	0	0	0	0	
3/25/04	0	0	0	0	0	0	0	0	
3/26/04	0	0	0	0	0	0	0	0	
3/27/04	0	0	0	0	0	0	0	0	
3/28/04	0	0	0	0	0	0	0	0	
3/29/04	0	0	0	0	0	0	0	0	
3/30/04	0	0	0	0	0	0	0	0	
3/31/04	0	0	0	0	0	0	0	0	0.86
4/1/04	0.58	0.3	0.39	0.28	0.33	0.35	0.27	0.32	
4/2/04	0	0	0.01	0	0	0.01	0	0	
4/3/04	0.06	0	0.07	0.25	0	0.06	0.24	0.10	
4/4/04	0.01	0.05	0.01	0	0.06	0.01	0	0.02	
4/5/04	0	0	0	0	0	0	0	0	
4/6/04	0	0	0	0	0	0	0	0	
4/7/04	0	0	0	0	0	0	0	0	
4/8/04	0	0	0	0	0	0	0	0	
4/9/04	0	0	0	0	0	0	0	0	
4/10/04	0	0	0	0	0	0	0	0	
4/11/04	0	0	0	0	0	0	0	0	
4/12/04	0	0	0	0	0	0	0	0	
4/13/04	0	0	0	0	0	0	0	0	
4/14/04	0	0	0	0	0	0	0	0	
4/15/04	0	0	0	0	0	0	0	0	
4/16/04	0	0.33	0	0	0.37	0	0	0.12	
4/17/04	0.38	0	0.56	0.43	0	0.50	0.41	0.30	
4/18/04	0	0	0.01	0.02	0	0.01	0.02	0.01	
4/19/04	0	0	0	0	0	0	0	0	
4/20/04	0	0	0	0	0	0	0	0	
4/21/04	0	0	0	0	0	0	0	0	
4/22/04	0	0	0	0	0	0	0	0	
4/23/04	0	0	0	0	0	0	0	0	
4/24/04	0	0	0	0	0	0	0	0	
4/25/04	0	0	0	0	0	0	0	0	
4/26/04	0	0	0	0	0	0	0	0	
4/27/04	0	0	0	0	0	0	0	0	
4/28/04	0	0	0	0	0	0	0	0	
4/29/04	0	0	0	0	0	0	0	0	

Table B-2
 2003-04 DATA ESTIMATED FOR SAN BERNARDINO COUNTY HOSPITAL SITE FROM
 ADJACENT STATIONS 2001B2, 2015, AND 2357 (Inches)

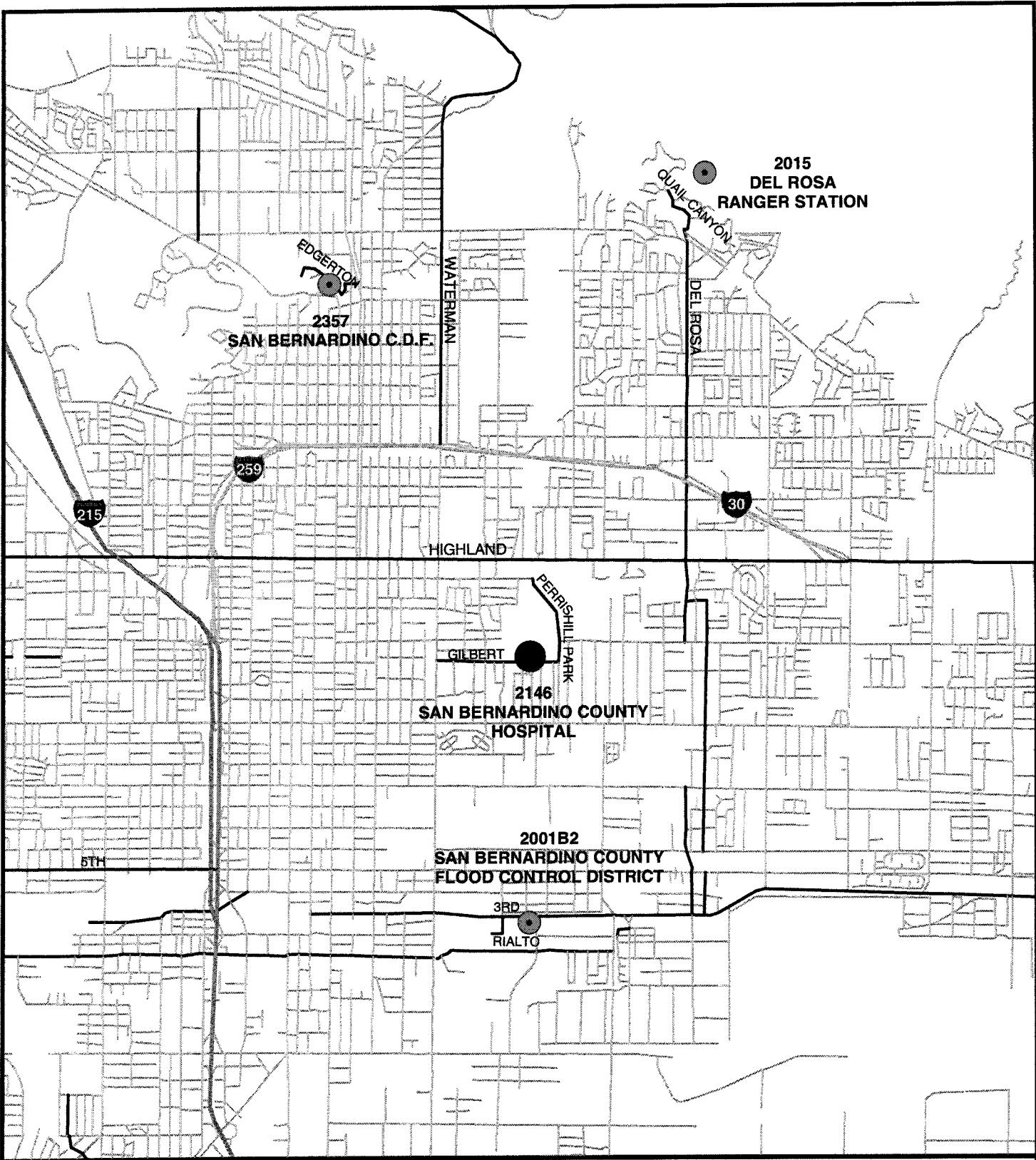
	Recorded Daily Precipitation				Calculated Precipitation			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations ¹			For Stn. 2146-A =			Average	Monthly Total
		2001B2	2015	2357	(2001B2 X 1.1156)	(2015 X 0.8960)	(2357 X 0.9526)		
<i>Ratio Adjacent Stn. to 2146-A =</i>		1.1156	0.8960	0.9526					
4/30/04	0	0	0	0	0	0	0	0	0.87
5/1/04	0	0	0	0	0	0	0	0	
5/2/04	0	0	0	0	0	0	0	0	
5/3/04	0	0	0	0	0	0	0	0	
5/4/04	0	0	0	0	0	0	0	0	
5/5/04	0	0	0	0	0	0	0	0	
5/6/04	0	0	0	0	0	0	0	0	
5/7/04	0	0	0	0	0	0	0	0	
5/8/04	0	0	0	0	0	0	0	0	
5/9/04	0	0	0	0	0	0	0	0	
5/10/04	0	0	0	0	0	0	0	0	
5/11/04	0	0	0	0	0	0	0	0	
5/12/04	0	0	0	0	0	0	0	0	
5/13/04	0	0	0	0	0	0	0	0	
5/14/04	0	0	0	0	0	0	0	0	
5/15/04	0	0	0	0	0	0	0	0	
5/16/04	0	0	0	0	0	0	0	0	
5/17/04	0	0	0.01	0	0	0.01	0	0	
5/18/04	0	0	0	0	0	0	0	0	
5/19/04	0	0	0	0	0	0	0	0	
5/20/04	0	0	0	0	0	0	0	0	
5/21/04	0	0	0	0	0	0	0	0	
5/22/04	0	0	0	0	0	0	0	0	
5/23/04	0	0	0	0	0	0	0	0	
5/24/04	0	0	0	0	0	0	0	0	
5/25/04	0	0	0	0	0	0	0	0	
5/26/04	0	0	0	0	0	0	0	0	
5/27/04	0	0	0	0	0	0	0	0	
5/28/04	0	0	0	0	0	0	0	0	
5/29/04	0.01	0	0.17	0.01	0	0.15	0.01	0.05	
5/30/04	0	0	0	0	0	0	0	0	
5/31/04	0	0	0	0	0	0	0	0	0.05
6/1/04	0	0	0	0	0	0	0	0	
6/2/04	0	0	0	0	0	0	0	0	
6/3/04	0	0	0	0	0	0	0	0	
6/4/04	0	0	0	0	0	0	0	0	
6/5/04	0	0	0	0	0	0	0	0	
6/6/04	0	0	0	0	0	0	0	0	
6/7/04	0	0	0	0	0	0	0	0	
6/8/04	0	0	0	0	0	0	0	0	
6/9/04	0	0	0	0	0	0	0	0	
6/10/04	0	0	0	0	0	0	0	0	
6/11/04	0	0	0	0	0	0	0	0	
6/12/04	0	0	0	0	0	0	0	0	
6/13/04	0	0	0	0	0	0	0	0	
6/14/04	0	0	0	0	0	0	0	0	
6/15/04	0	0	0	0	0	0	0	0	
6/16/04	0	0	0	0	0	0	0	0	
6/17/04	0	0	0	0	0	0	0	0	
6/18/04	0	0	0	0	0	0	0	0	
6/19/04	0	0	0	0	0	0	0	0	
6/20/04	0	0	0	0	0	0	0	0	
6/21/04	0	0	0	0	0	0	0	0	

Table B-2
 2003-04 DATA ESTIMATED FOR SAN BERNARDINO COUNTY HOSPITAL SITE FROM
 ADJACENT STATIONS 2001B2, 2015, AND 2357 (Inches)






	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations ¹			(2001B2 X	(2015 X	(2357 X	Average	Monthly Total
		2001B2	2015	2357	1.1156)	0.8960)	0.9526)		
	<i>Ratio Adjacent Stn. to 2146-A =</i>	1.1156	0.8960	0.9526					
6/22/04	0	0	0	0	0	0	0	0	
6/23/04	0	0	0	0	0	0	0	0	
6/24/04	0	0	0	0	0	0	0	0	
6/25/04	0	0	0	0	0	0	0	0	
6/26/04	0	0	0	0	0	0	0	0	
6/27/04	0	0	0	0	0	0	0	0	
6/28/04	0	0	0	0	0	0	0	0	
6/29/04	0	0	0	0	0	0	0	0	
6/30/04	0	0	0	0	0	0	0	0	0.00
7/1/04	0	0	0	0	0	0	0	0	
7/2/04	0	0	0	0	0	0	0	0	
7/3/04	0	0	0	0	0	0	0	0	
7/4/04	0	0	0	0	0	0	0	0	
7/5/04	0	0	0	0	0	0	0	0	
7/6/04	0	0	0	0	0	0	0	0	
7/7/04	0	0	0	0	0	0	0	0	
7/8/04	0	0	0	0	0	0	0	0	
7/9/04	0	0	0	0	0	0	0	0	
7/10/04	0	0	0	0	0	0	0	0	
7/11/04	0	0	0	0	0	0	0	0	
7/12/04	0	0	0	0	0	0	0	0	
7/13/04	0	0	0	0	0	0	0	0	
7/14/04	0	0	0	0	0	0	0	0	
7/15/04	0	0	0	0	0	0	0	0	
7/16/04	0	0	0	0	0	0	0	0	
7/17/04	0	0	0	0	0	0	0	0	
7/18/04	0	0	0	0	0	0	0	0	
7/19/04	0	0	0	0	0	0	0	0	
7/20/04	0	0	0	0	0	0	0	0	
7/21/04	0	0	0	0	0	0	0	0	
7/22/04	0	0	0	0	0	0	0	0	
7/23/04	0	0	0	0	0	0	0	0	
7/24/04	0	0	0	0	0	0	0	0	
7/25/04	0	0	0	0	0	0	0	0	
7/26/04	0	0	0	0	0	0	0	0	
7/27/04	0	0	0	0	0	0	0	0	
7/28/04	0	0	0	0	0	0	0	0	
7/29/04	0	0	0	0	0	0	0	0	
7/30/04	0	0	0	0	0	0	0	0	
7/31/04	0	0	0	0	0	0	0	0	0.00
8/1/04	0	0	0	0	0	0	0	0	
8/2/04	0	0	0	0	0	0	0	0	
8/3/04	0	0	0	0	0	0	0	0	
8/4/04	0	0	0	0	0	0	0	0	
8/5/04	0	0	0	0	0	0	0	0	
8/6/04	0	0	0	0	0	0	0	0	
8/7/04	0	0	0	0	0	0	0	0	
8/8/04	0	0	0	0	0	0	0	0	
8/9/04	0	0	0	0	0	0	0	0	
8/10/04	0	0	0	0	0	0	0	0	
8/11/04	0	0	0	0	0	0	0	0	
8/12/04	0	0	0	0	0	0	0	0	
8/13/04	0	0	0.19	0.13	0	0.17	0.12	0.10	

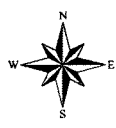
Table B-2
 2003-04 DATA ESTIMATED FOR SAN BERNARDINO COUNTY HOSPITAL SITE FROM
 ADJACENT STATIONS 2001B2, 2015, AND 2357 (Inches)

	Recorded Daily Precipitation				Calculated Precipitation For Stn. 2146-A =			Calculated Data	
	Interpolation Stn. 2146-A	Adjacent Stations ¹			(2001B2 X	(2015 X	(2357 X	Average	Monthly Total
		2001B2	2015	2357	1.1156)	0.8960)	0.9526)		
	<i>Ratio Adjacent Stn. to 2146-A =</i>	1.1156	0.8960	0.9526					
8/14/04	0	0	0	0	0	0	0	0	
8/15/04	0	0	0	0	0	0	0	0	
8/16/04	0	0	0	0	0	0	0	0	
8/17/04	0	0	0	0	0	0	0	0	
8/18/04	0	0	0	0	0	0	0	0	
8/19/04	0	0	0	0	0	0	0	0	
8/20/04	0	0	0	0	0	0	0	0	
8/21/04	0	0	0	0	0	0	0	0	
8/22/04	0	0	0	0	0	0	0	0	
8/23/04	0	0	0	0	0	0	0	0	
8/24/04	0	0	0	0	0	0	0	0	
8/25/04	0	0	0	0	0	0	0	0	
8/26/04	0	0	0	0	0	0	0	0	
8/27/04	0	0	0	0	0	0	0	0	
8/28/04	0	0	0	0	0	0	0	0	
8/29/04	0	0	0	0	0	0	0	0	
8/30/04	0	0	0	0	0	0	0	0	
8/31/04	0	0	0	0	0	0	0	0	0.10
9/1/04	0	0	0	0	0	0	0	0	
9/2/04	0	0	0	0	0	0	0	0	
9/3/04	0	0	0	0	0	0	0	0	
9/4/04	0	0	0	0	0	0	0	0	
9/5/04	0	0	0	0	0	0	0	0	
9/6/04	0	0	0	0	0	0	0	0	
9/7/04	0	0	0	0	0	0	0	0	
9/8/04	0	0	0	0	0	0	0	0	
9/9/04	0	0	0	0	0	0	0	0	
9/10/04	0	0	0	0	0	0	0	0	
9/11/04	0	0	0	0	0	0	0	0	
9/12/04	0	0	0.11	0	0	0.10	0	0.03	
9/13/04	0	0	0	0	0	0	0	0	
9/14/04	0	0	0.04	0.01	0	0.04	0.01	0.02	
9/15/04	0	0	0	0	0	0	0	0	
9/16/04	0	0	0	0	0	0	0	0	
9/17/04	0	0	0	0	0	0	0	0	
9/18/04	0	0	0	0	0	0	0	0	
9/19/04	0	0	0	0	0	0	0	0	
9/20/04	0	0	0	0	0	0	0	0	
9/21/04	0	0	0	0	0	0	0	0	
9/22/04	0	0	0	0	0	0	0	0	
9/23/04	0	0	0	0	0	0	0	0	
9/24/04	0	0	0	0	0	0	0	0	
9/25/04	0	0	0	0	0	0	0	0	
9/26/04	0	0	0	0	0	0	0	0	
9/27/04	0	0	0	0	0	0	0	0	
9/28/04	0	0	0	0	0	0	0	0	
9/29/04	0	0	0	0	0	0	0	0	
9/30/04	0	0	0	0	0	0	0	0	0.05
ANNUAL	10.49	8.73	13.02	11.54	9.74	11.67	10.99	10.80	10.80



Precipitation Station 2146, San Bernardino County Hospital and Adjacent Rain Stations 2001B2, 2015, and 2357

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



w:\drive\maps\projects\awpa\precip_stations_012502.mxd 04/03/2003

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APPENDIX C

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

WATER YEAR 2003-04

Directors

PHILIP L. ANTHONY
WES BANNISTER
KATHRYN L. BARR
DENIS R. BILODEAU
RICHARD CHAVEZ
PAUL COOK
JAN DEBAY
SHAWN NELSON
JOSE SOLORIO
ROGER C. YOH



ORANGE COUNTY WATER DISTRICT

Orange County's Groundwater Authority

Officers

PHILIP L. ANTHONY
President

JAN DEBAY
First Vice President

KATHRYN L. BARR
Second Vice President

—

VIRGINIA GREBBIEN
General Manager

April 11, 2005

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

Subject: Review of Fiscal Year 2003-2004 Financial Transactions

Gentlemen:

I have reviewed the transactions and prepared the attached Statement of Assets and Liabilities comprised of cash transactions for the Santa Ana River Watermaster, and the related Statement of Revenue, Expenses and Changes in Fund Balance for the year ended June 30, 2004. This review includes examining supporting documentation that supports the amounts and disclosures in the financial statements. We have reviewed minutes of meetings, annual budgets 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

Dianna L. Honeywell
Principal Project Accountant

Cc: Sharon Koike, Chief Financial Officer, OCWD

SANTA ANA RIVER WATERMASTER

FINANCIAL STATEMENTS

JUNE 30, 2004

SANTA ANA RIVER WATERMASTER

STATEMENT OF ASSETS AND LIABILITIES ARISING FROM
CASH TRANSACTIONS

JUNE 30, 2004

ASSETS

Cash in checking account (Note 3)	\$ 8,000
Cash in savings account (Note 3)	<u>\$ 2,465</u>
	<u>\$ 10,465</u>

FUND BALANCE

Fund Balance	<u>\$ 10,465</u>
--------------	------------------

SANTA ANA RIVER WATERMASTER

STATEMENT OF ASSETS AND LIABILITIES ARISING FROM CASH TRANSACTIONS

FOR THE PERIOD JULY 1, 2003 - JUNE 30, 2004

	<u>Actual</u>	<u>Budget</u>	<u>Variance - Favorable (Unfavorable)</u>
REVENUE COLLECTED:			
Water District Contributions (Note 2):			
Orange County Water District	\$ 4,800	\$ 4,800	\$ -
Inland Empire Utilities Agency	2,400	2,400	-
Western Municipal Water District	2,400	2,400	-
San Bernardino Valley Municipal Water District	2,400	2,400	-
Interest From Savings Account	6	-	6
TOTAL REVENUE COLLECTED	<u>\$ 12,006</u>	<u>\$ 12,000</u>	<u>\$ 6</u>
EXPENSES PAID:			
Professional Engineering Services	\$ 10,018	\$ 9,000	\$ (1,018)
Administrative Expenses:			
Auditing Services	-	-	-
Reproduction of Annual Report	525	3,000	2,475
	<u>\$ 10,543</u>	<u>\$ 12,000</u>	<u>\$ 1,457</u>
EXCESS OF REVENUE COLLECTED OVER (UNDER) EXPENSES PAID	1,463		
FUND BALANCE AT JUNE 30, 2003	9,002		
FUND BALANCE AT JUNE 30, 2004	<u><u>10,465</u></u>		

See notes to the financial statements

SANTA ANA RIVER WATERMASTER
NOTES TO FINANCIAL STATEMENTS

JUNE 30, 2004

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 a committee of five representatives from four water districts. Two representatives serve from Orange County Water District and one representative each serves from the Inland Empire Utilities Agency, 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 districts contributions are made in the following ratios:

Orange County Water District	40%
Inland Empire Utilities Agency	20%
Western Municipal Water District	20%
San Bernardino Valley Municipal Water District	<u>20%</u>
Total	<u>100%</u>

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

SANTA ANA RIVER WATERMASTER

NOTES TO FINANCIAL STATEMENTS
(CONTINUED)

JUNE 30, 2004

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, 2004 consisted of the following:

Bank of America:

Checking account	\$ 7,999.63
Savings account	<u>2,465.01</u>

\$10,464.64

All cash is fully insured by the FDIC.

0595 P
E 0-2

**Your Bank of America
Business Checking
Statement**

Statement Period:
May 21 through June 22, 2004

Account Number: 05957-11534

At Your Service
Call: 909.686.2590
Online: www.bankofamerica.com

Written Inquiries
Bank of America
Magnolia Center Branch
PO Box 37176
San Francisco, CA 94137-0001



SANTA ANA RIVER WATERMASTER
C-O SBVMWD
P O BOX 5906
SN BERNARDINO CA 92412-5906

Customer since 1969
Bank of America appreciates your
business and we enjoy serving you.

Our free Online Banking service allows you to check account balances,
transfer funds, pay bills and more. Enroll at www.bankofamerica.com.

Summary of Your Business Checking Account

Beginning Balance on 05/21/04	\$7,999.63	Number of 24 Hour Customer Service Calls	
Ending Balance	\$7,999.63	Self-Service	0
		Assisted	0

Important Information About Your Account

Based on the minimum balance you've maintained in this account, your monthly service charge has been waived.

You may have noticed that your Bank of America statement looks different. Your account details will now print on the front and back of your statement pages. This is just one of the many ways Bank of America is committed to conserving resources. We hope you like the new statement format and if you have any questions, please call Customer Service.

Bank of America News

Want a safe and secure way to store your important valuables away from home? Visit any Bank of America banking center to inquire about various box sizes available to meet all your needs. We ensure privacy and dual control to protect your valuables.

Taking a summer vacation? Don't forget your American Express Traveler's Cheques. They are backed by American Express 24/7/365 Customer Service & Support, including refunds usually within 24 hours, plus credit card and passport replacement assistance. Visit www.bankofamerica.com or stop by any Bank of America banking center to purchase some today!

Earn airline miles, travel and vacation rewards, merchandise, hotel and restaurant discounts and much more. Plus benefits, services and protections designed for your business. Select the Bank of America Business Credit Card that's right for your business. Visit www.bankofamerica.com/intrate or visit your nearest banking center to apply.

APPENDIX D

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

WATER YEAR 2003-04

There was no discharge of HGMP water to Santa Ana River in the Bunker Hill area during the 2003-04 water year.

APPENDIX E

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

WATER YEAR 2003-04

TABLE E-1
NONTRIBUTARY WATER FROM OC-59
MONTHLY TOTALS
WATER YEAR 2003-04
(acre-feet)

Month	Released at OC-59	12-Hour Delay ¹	Evaporation Losses ²	Calculated Flow at Prado
<u>2003</u>				
October	2,122	2,148	31	2,117
November	751	751	8	743
December	0	0	0	0
<u>2004</u>				
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	1,740	1,690	64	1,626
June	747	784	35	749
July	1,046	1,059	74	984
August	351	327	30	297
September	1,278	1,302	52	1,250
Total	8,035	8,061	294	7,766

- (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 2003
(cfs)

Day	Released at OC-59	12-Hour Delay	Calculated Flow At Prado Dam ¹
1	24	25	25
2	23	24	23
3	22	22	22
4	25	24	23
5	27	26	26
6	6	16	16
7	0	3	3
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	21	11	10
13	49	35	35
14	68	59	58
15	130	99	98
16	150	140	138
17	149	149	147
18	147	148	146
19	135	141	139
20	79	107	106
21	14	46	46
22	0	7	7
23	0	0	0
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
31	0	0	0
Total (cfs-days)	1,070	1,083	1,067
(AF)	2,122	2,148	2,117

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
NOVEMBER 2003
(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	17	8	8
7	50	33	33
8	51	50	50
9	49	50	50
10	80	64	64
11	105	92	91
12	28	66	66
13	0	14	14
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
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)	379	379	375
(AF)	751	751	743

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
DECEMBER 2003
(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	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
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
31	0	0	0
Total (cfs-days) (AF)	0	0	0

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
JANUARY 2004
(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	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
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
31	0	0	0
Total (cfs-days) (AF)	0	0	0

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
FEBRUARY 2004
(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	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
Total (cfs-days) (AF)	0	0	0

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
MARCH 2004
(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	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
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
31	0	0	0
Total (cfs-days) (AF)	0	0	0

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
APRIL 2004
(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	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
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) (AF)	0	0	0

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
MAY 2004
(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	21	10	10
15	51	36	34
16	49	50	48
17	50	49	47
18	50	50	48
19	55	53	51
20	56	55	53
21	51	53	51
22	51	51	49
23	50	50	48
24	49	49	48
25	49	49	47
26	51	50	48
27	49	50	48
28	50	49	48
29	50	50	48
30	49	49	47
31	50	49	47
Total (cfs-days) (AF)	877 1,740	852 1,690	820 1,626

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
JUNE 2004
(cfs)

Day	Released at OC-59	12-Hour Delay	Calculated Flow At Prado Dam ¹
1	13	32	30
2	0	7	6
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	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	14	7	7
23	52	33	31
24	52	52	49
25	56	54	51
26	58	57	54
27	56	57	55
28	48	52	50
29	15	32	30
30	13	14	13
Total (cfs-days)	377	395	378
(AF)	747	784	749

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
JULY 2004
(cfs)

Day	Released at OC-59	12-Hour Delay	Calculated Flow At Prado Dam ¹
1	23	18	17
2	22	23	21
3	23	22	21
4	25	24	22
5	27	26	24
6	25	26	24
7	24	25	23
8	25	25	23
9	25	25	23
10	26	26	24
11	27	26	25
12	25	26	24
13	25	25	23
14	24	25	23
15	25	25	23
16	24	24	23
17	23	23	22
18	25	24	22
19	26	25	23
20	24	25	23
21	22	23	21
22	12	17	16
23	0	6	6
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
31	0	0	0
Total (cfs-days)	528	534	497
(AF)	1,046	1,059	985

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
AUGUST 2004
(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	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	10	5	5
25	26	18	16
26	22	24	22
27	20	21	19
28	25	22	20
29	25	25	23
30	25	25	22
31	25	25	22
Total (cfs-days)	177	165	150
(AF)	351	327	297

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

TABLE E-2
NONTRIBUTARY WATER FROM OC-59
SEPTEMBER 2004
(cfs)

Day	Released at OC-59	12-Hour Delay	Calculated Flow At Prado Dam ¹
1	27	26	25
2	26	27	25
3	23	25	24
4	24	24	23
5	34	29	28
6	31	33	31
7	24	28	26
8	20	22	21
9	16	18	17
10	0	8	8
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	10	5	5
17	19	15	14
18	19	19	18
19	17	18	17
20	20	19	18
21	55	37	36
22	74	64	61
23	76	75	72
24	76	76	73
25	55	65	63
26	0	27	26
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
Total (cfs-days) (AF)	644 1,278	657 1,302	630 1,250

(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 2003-04
 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
<u>2003</u>						
October	2,148	10	18	3	31	1.4%
November	751	2	6	0	8	1.1%
December	0	0	0	0	0	0%
<u>2004</u>						
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	1,690	19	34	11	64	3.8%
June	784	10	22	3	35	4.5%
July	1,059	25	43	6	74	7.0%
August	327	8	20	2	30	9.2%
September	1,302	17	30	5	52	4.0%
Total	8,061	91	173	30	294	

Percent of Annual Releases : 3.65%

TABLE E-3.1
 EVAPOTRANSPIRATION LOSSES OF STATE PROJECT WATER FROM OC-59
 WATER YEAR 2003-04
 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]
<u>2003</u>					
October	2,148	16	4.08	10	0.5%
November	751	7	2.23	2	0.3%
December	0	0	---	0	0%
January	0	0	---	0	0%
February	0	0	---	0	0%
March	0	0	---	0	0%
April	0	0	---	0	0%
May	1,690	18	7.10	19	1.1%
June	784	10	6.50	10	1.3%
July	1,059	22	7.55	25	2.4%
August	327	8	6.81	8	2.4%
September	1,302	19	5.83	17	1.3%

(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 2003-04
 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 (acre) ^(c)	Computed Evaporation Losses ^(d)	
					(AF)	(% of release)
[1]	[2]	[3]	[4]	[5]	[6]	[7]
<u>2003</u>						
October	2,148	23	4.08	72	18	0.8%
November	751	14	2.23	72	6	0.8%
December	0	0	---	0	0	0%
<u>2004</u>						
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	1,690	25	7.10	72	34	2.0%
June	784	17	6.50	72	22	2.8%
July	1,059	29	7.55	72	43	4.1%
August	327	15	6.81	72	20	6.1%
September	1,302	26	5.83	72	30	2.3%

(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 2003-04
 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 (acre) ^(d)	Computed Evaporation Losses ^(e)	
						(AF)	(% of release)
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
<u>2003</u>							
October	2,148	23	4.08	3.50	72	3	0.1%
November	751	14	2.23	2.80	72	0	0.0%
December	0	0	---	---	0	0	0%
<u>2004</u>							
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	1,690	25	7.10	4.90	72	11	0.7%
June	784	17	6.50	5.70	72	3	0.4%
July	1,059	29	7.55	6.40	72	6	0.6%
August	327	15	6.81	6.20	72	2	0.6%
September	1,302	26	5.83	4.80	72	5	0.4%

(a) Period of delivery plus 7 days after stoppage of delivery.

(b) 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 2003-04

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)
<u>2003</u>				
October	2,122	178	377,716	2,117
November	751	226	169,726	743
December	0	-	0	0
<u>2004</u>				
January	0	-	0	0
February	0	-	0	0
March	0	-	0	0
April	0	-	0	0
May	1,740	226	393,217	1,626
June	747	260	194,220	749
July	1,046	259	271,038	984
August	351	230	80,794	297
September	1,278	204	260,661	1,250
<hr/>				
Total	8,035		1,747,372	7,766
	At Discharge:		At Prado:	
	Flow-weighted TDS = $\frac{1,747,372}{8,035}$		Flow-weighted TDS = $\frac{1,747,372}{7,766}$	
	= 217 mg/L		= 225 mg/L	

(1) TDS values from monthly analyses of State Water Project water for Silverwood Lake at Devil Canyon.

APPENDIX F

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

WATER YEAR 2003-04

TABLE F-1

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

WATER YEAR 2003-04

Month	Discharge (acre-feet)	Weighted TDS (mg/L) ¹	Discharge X TDS
<u>2003</u>			
October	601	330 ²	198,330
November	418	280 ³	117,040
December	405	250	101,250
<u>2004</u>			
January	357	270	96,390
February	240	270	64,800
March	59	290	17,110
April	288	280	80,640
May	160	240 ⁴	38,400
June	118	370	43,660
July	95	395 ²	37,525
August	53	280	14,840
September	38	280	10,650
Total	2,832		820,635
Yearly Flow-weighted TDS =		290	

1. Daily average EC is no longer available. TDS is monthly lab data of the water discharged to the Arlington channel unless otherwise indicated.

2. TDS was estimated from the following and/or previous month's data.

3. Sample of distribution pump effluent analyzed for TDS.

4. Data from the Final Blend analyzed for TDS.

APPENDIX G

WATER QUALITY AND DISCHARGE
FROM THE SAN JACINTO WATERSHED

WATER YEAR 2003-04

TABLE G-1
SAN JACINTO WATERSHED DISCHARGE CALCULATIONS
WATER YEAR 2003-04
FEBRUARY 2004

	[1]	[2]	[3]=[1]-[2]	[4]	[5]	[6]	[7]=[3]-[4]-[6]
Day	Temescal Creek Flow (cfs)	Arlington Desalter Flow (cfs)	Temescal Creek Flow - Arlington Desalter (cfs)	Temescal Creek Base Flow (cfs)	EMWD Wastewater Discharge (cfs)	Scalped Storm Flow (cfs)	San Jacinto Water Reaching Prado (cfs)
1	12	5.6	6.4	6.4	0	0	0
2	72	5.3	66.7	4.4	0	62	0
3	46	5.4	40.6	4.4	0	36	0
4	12	5.6	6.4	4.4	0	2	0
5	9	5.4	3.6	3.6	0	0	0
6	8.1	3.9	4.2	4.2	0	0	0
7	9.3	5.2	4.1	4.1	0	0	0
8	8.4	5.2	3.2	3.2	0	0	0
9	7.8	5.2	2.6	2.6	0	0	0
10	8.3	5.2	3.1	3.1	0	0	0
11	9.3	5.2	4.1	4.1	0	0	0
12	9.7	5.2	4.5	4.5	0	0	0
13	10	5.1	4.9	4.9	0	0	0
14	11	4.4	6.6	6.6	0	0	0
15	11	5.2	5.8	5.8	0	0	0
16	10	5.4	4.6	4.6	0	0	0
17	10	5.2	4.8	4.8	0	0	0
18	94	4.8	89.2	4.3	6	85	0
19	16	4.9	11.1	4.3	39	7	0
20	47	5.2	41.8	4.3	39	0	37
21	29	5.2	23.8	4.3	39	0	19
22	103	5.2	97.8	4.3	39	73	20
23	82	5.2	76.8	4.3	39	52	21
24	10	2.6	7.4	4.3	39	0	3
25	21	0.0	21.0	4.3	54	0	17
26	401	0.0	401.0	4.3	63	334	63
27	42	0.0	42.0	4.3	73	10	28
28	18	0.0	18.0	4.3	83	4	10
29	12	0.0	12.0	4.3	59	0	8
Total (cfs)	1,139	121	1,018	127	572	665	226
(acre-feet)	2,259	240	2,019	252	1,135	1,319	448

1. USGS measured flow of Temescal Creek above Main St. at Corona.
2. Discharge of the Arlington Desalter to the Arlington Valley Channel.
3. Temescal Creek flow minus the Arlington Desalter contribution.
4. When other flow was present, Temescal base flow was assumed to be 4 cfs based on flowrates during non-storm periods.
5. Eastern Municipal Water District wastewater discharge to Temescal Creek at Wasson Canyon.
6. Temescal Creek flow attributed to storm events.
7. Flow in Temescal Creek at Corona attributed to EMWD discharge of wastewater to Temescal Creek.

TABLE G-1
SAN JACINTO WATERSHED DISCHARGE CALCULATIONS
WATER YEAR 2003-04
MARCH 2004

	[1]	[2]	[3]=[1]-[2]	[4]	[5]	[6]	[7]=[3]-[4]-[6]
Day	Temescal Creek Flow (cfs)	Arlington Desalter Flow (cfs)	Temescal Creek Flow - Arlington Desalter (cfs)	Temescal Creek Base Flow (cfs)	EMWD Wastewater Discharge (cfs)	Scalped Storm Flow (cfs)	San Jacinto Water Reaching Prado (cfs)
1	54	0	54	4.3	69	5	45
2	78	0	78	4.3	64	30	44
3	31	0	31	4.3	64	6	21
4	23	0	23	4.3	0	2	17
5	20	0	20	4.3	0	0	16
6	19	0	19	4.3	0	0	15
7	17	0	17	4.3	0	0	13
8	13	0	13	4.3	0	0	9
9	10	0	10	4.3	0	0	6
10	8.8	0	8.8	4.3	0	0	5
11	7.8	0	7.8	4.3	0	0	4
12	8.1	0	8.1	4.3	0	0	4
13	6.8	0	6.8	4.3	0	0	3
14	6.0	0	6.0	4.3	0	0	2
15	4.5	0	4.5	4.5	0	0	0
16	4.6	0	4.6	4.6	0	0	0
17	5.2	0	5.2	5.2	0	0	0
18	4.6	0	4.6	4.6	0	0	0
19	3.2	0	3.2	3.2	0	0	0
20	3.5	0	3.5	3.5	0	0	0
21	4.9	0	4.9	4.9	0	0	0
22	6.0	0	6.0	6.0	0	0	0
23	5.6	0	5.6	5.6	0	0	0
24	7.1	1.9	5.2	5.2	0	0	0
25	12	4.1	7.9	7.9	0	0	0
26	12	3.6	8.4	8.4	0	0	0
27	13	4.0	9.0	9.0	0	0	0
28	12	3.9	8.1	8.1	0	0	0
29	12	4.1	7.9	7.9	0	0	0
30	13	4.1	8.9	8.9	0	0	0
31	13	4.1	8.9	8.9	0	0	0
Total (cfs)	439	30	409	167	197	43	199
(acre-feet)	870	59	811	330	392	85	395

1. USGS measured flow of Temescal Creek above Main St. at Corona.
2. Discharge of the Arlington Desalter to the Arlington Valley Channel.
3. Temescal Creek flow minus the Arlington Desalter contribution.
4. When other flow was present, Temescal base flow was assumed to be 4 cfs based on flowrates during non-storm periods.
5. Eastern Municipal Water District wastewater discharge to Temescal Creek at Wasson Canyon.
6. Temescal Creek flow attributed to storm events.
7. Flow in Temescal Creek at Corona attributed to EMWD discharge of wastewater to Temescal Creek.

TABLE G-1
 SAN JACINTO WATERSHED DISCHARGE CALCULATIONS
 WATER YEAR 2003-04
 APRIL 2004

	[1]	[2]	[3]=[1]-[2]	[4]	[5]	[6]	[7]=[3]-[4]-[6]
Day	Temescal Creek Flow (cfs)	Arlington Desalter Flow (cfs)	Temescal Creek Flow - Arlington Desalter (cfs)	Temescal Creek Base Flow (cfs)	EMWD Wastewater Discharge (cfs)	Scalped Storm Flow (cfs)	San Jacinto Water Reaching Prado (cfs)
1	48	4.1	43.9	6.3	0	38	0
2	23	5.0	18.0	6.3	0	12	0
3	19	4.7	14.3	6.3	0	8	0
4	14	5.5	8.5	6.3	0	2	0
5	10	5.0	4.9	4.9	0	0	0
6	8.9	5.0	3.9	3.9	103	0	0
7	8.4	5.7	2.7	2.7	81	0	0
8	6.9	3.3	3.6	3.6	77	0	0
9	7.3	4.7	2.6	2.6	76	0	0
10	7.9	5.7	2.2	2.2	82	0	0
11	7.1	5.7	1.4	1.4	99	0	0
12	9.3	5.6	3.7	3.7	65	0	0
13	14	5.7	8.3	3.1	79	0	5
14	18	5.7	12.3	3.1	71	0	9
15	18	5.0	13.0	3.1	71	0	10
16	18	5.1	12.9	3.1	74	0	10
17	65	5.6	59.4	3.1	75	39	17
18	23	3.4	19.6	3.1	53	0	17
19	13	4.3	8.7	3.1	55	0	6
20	13	4.9	8.1	3.1	56	0	5
21	15	5.7	9.3	3.1	52	0	6
22	15	5.7	9.3	3.1	62	0	6
23	14	5.7	8.3	3.1	54	0	5
24	12	5.7	6.3	3.1	43	0	3
25	13	5.7	7.3	3.1	59	0	4
26	14	4.3	9.7	3.1	17	0	7
27	12	2.9	9.1	3.1	17	0	6
28	13	3.7	9.3	3.1	0	0	6
29	15	2.4	12.6	3.1	0	0	9
30	16	3.8	12.2	3.1	0	0	9
Total (cfs)	491	145	345	106	1,421	99	141
(acre-feet)	973	288	685	210	2,818	196	279

1. USGS measured flow of Temescal Creek above Main St. at Corona.
2. Discharge of the Arlington Desalter to the Arlington Valley Channel.
3. Temescal Creek flow minus the Arlington Desalter contribution.
4. When other flow was present, Temescal base flow was assumed to be 4 cfs based on flowrates during non-storm periods.
5. Eastern Municipal Water District wastewater discharge to Temescal Creek at Wasson Canyon.
6. Temescal Creek flow attributed to storm events.
7. Flow in Temescal Creek at Corona attributed to EMWD discharge of wastewater to Temescal Creek.

TABLE G-1
SAN JACINTO WATERSHED DISCHARGE CALCULATIONS
WATER YEAR 2003-04
MAY 2004

	[1]	[2]	[3]=[1]-[2]	[4]	[5]	[6]	[7]=[3]-[4]-[6]
Day	Temescal Creek Flow (cfs)	Arlington Desalter Flow (cfs)	Temescal Creek Flow - Arlington Desalter (cfs)	Temescal Creek Base Flow (cfs)	EMWD Wastewater Discharge (cfs)	Scalped Storm Flow (cfs)	San Jacinto Water Reaching Prado (cfs)
1	14	4.6	9.4	3.1	0	0	6
2	9.0	2.8	6.2	3.1	0	0	3
3	5.2	2.3	2.9	2.9	0	0	0
4	6.6	2.0	4.6	4.6	0	0	0
5	6.7	1.6	5.1	5.1	0	0	0
6	5.9	2.0	3.9	3.9	0	0	0
7	7.9	2.1	5.8	5.8	0	0	0
8	6.8	2.1	4.7	4.7	0	0	0
9	7.6	1.8	5.8	5.8	0	0	0
10	8.7	1.8	6.9	6.9	0	0	0
11	7.3	2.0	5.3	5.3	0	0	0
12	7.7	2.8	4.9	4.9	0	0	0
13	7.2	2.8	4.4	4.4	0	0	0
14	7.7	2.8	4.9	4.9	0	0	0
15	7.5	2.8	4.7	4.7	0	0	0
16	6.8	2.8	4.0	4.0	0	0	0
17	7.2	2.8	4.4	4.4	0	0	0
18	6.1	2.8	3.3	3.3	0	0	0
19	6.0	2.7	3.3	3.3	0	0	0
20	6.0	2.7	3.3	3.3	0	0	0
21	5.4	2.9	2.5	2.5	0	0	0
22	4.5	2.8	1.7	1.7	0	0	0
23	5.2	2.8	2.4	2.4	0	0	0
24	5.7	3.0	2.7	2.7	0	0	0
25	4.8	2.7	2.1	2.1	0	0	0
26	4.8	2.8	2.0	2.0	0	0	0
27	4.6	2.8	1.8	1.8	0	0	0
28	5.0	2.7	2.3	2.3	0	0	0
29	4.9	2.4	2.5	2.5	0	0	0
30	4.9	2.6	2.3	2.3	0	0	0
31	4.7	2.8	1.9	1.9	0	0	0
Total (cfs)	202	81	122	113	0	0	9
(acre-feet)	401	160	242	223	0	0	19

1. USGS measured flow of Temescal Creek above Main St. at Corona.
2. Discharge of the Arlington Desalter to the Arlington Valley Channel.
3. Temescal Creek flow minus the Arlington Desalter contribution.
4. When other flow was present, Temescal base flow was assumed to be 4 cfs based on flowrates during non-storm periods.
5. Eastern Municipal Water District wastewater discharge to Temescal Creek at Wasson Canyon.
6. Temescal Creek flow attributed to storm events.
7. Flow in Temescal Creek at Corona attributed to EMWD discharge of wastewater to Temescal Creek.

TABLE G-2
SUMMARY OF SAN JACINTO WATERSHED DISCHARGE
WATER YEAR 2003-04
FEBRUARY 2004

Day	EMWD Discharge to Temescal Creek (cfs) ⁽¹⁾	San Jacinto Watershed Outflow Reaching Prado (cfs) ⁽²⁾	Santa Ana River Flow Lost to the Ocean (cfs) ⁽³⁾	San Jacinto Outflow Recharged by OCWD (cfs) ⁽⁴⁾
1	0	0	0	0
2	0	0	0	0
3	0	0	224	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	6	0	24	0
19	39	0	0	0
20	39	37	0	38
21	39	19	0	19
22	39	20	139	0
23	39	21	862	0
24	39	3	1,105	0
25	54	17	2,885	0
26	63	63	4,735	0
27	73	28	3,265	0
28	83	10	580	0
29	59	8	402	0
Total	572	226	14,221	57

(1) Eastern Municipal Water District (EMWD) effluent discharge to Temescal Creek at Wasson Canyon.

(2) The amount of EMWD discharge determined to have reached Prado reservoir by scalping the flow of Temescal Creek at the Main St. gauging station in Corona.

(3) Flow of the Santa Ana River at Ball Road has historically been lost to the ocean. OCWD Forebay Operations currently sink 20-25 cfs between Ball Road and Orangewood Avenue. Therefore, the Ball Road figure minus 25 cfs was used for "Santa Ana River Flow Lost to the Ocean".

(4) When the Santa Ana River flow lost to the ocean is greater than the San Jacinto watershed outflow reaching Prado Dam, it is assumed that no San Jacinto watershed outflow could be recharged by OCWD. When San Jacinto watershed outflow reaching Prado Dam was greater than the Santa Ana River flow lost to the ocean, San Jacinto watershed outflow recharged by OCWD was calculated as the difference between the two.

TABLE G-2
SUMMARY OF SAN JACINTO WATERSHED DISCHARGE
WATER YEAR 2003-04
MARCH 2004

Day	EMWD Discharge to Temescal Creek (cfs) ⁽¹⁾	San Jacinto Watershed Outflow Reaching Prado (cfs) ⁽²⁾	Santa Ana River Flow Lost to the Ocean (cfs) ⁽³⁾	San Jacinto Outflow Recharged by OCWD (cfs) ⁽⁴⁾
1	69	45	135	0
2	64	44	261	0
3	64	21	23	0
4	0	17	12	5
5	0	16	11	5
6	0	15	0	15
7	0	13	0	13
8	0	9	3	6
9	0	6	31	0
10	0	5	24	0
11	0	4	19	0
12	0	4	27	0
13	0	3	35	0
14	0	2	34	0
15	0	0	31	0
16	0	0	33	0
17	0	0	19	0
18	0	0	8	0
19	0	0	3	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
Total	197	199	709	43

(1) Eastern Municipal Water District (EMWD) effluent discharge to Temescal Creek at Wasson Canyon.

(2) The amount of EMWD discharge determined to have reached Prado reservoir by scalping the flow of Temescal Creek at the Main St. gauging station in Corona.

(3) Flow of the Santa Ana River at Ball Road has historically been lost to the ocean. OCWD Forebay Operations currently sink 20-25 cfs between Ball Road and Orangewood Avenue. Therefore, the Ball Road figure minus 25 cfs was used for "Santa Ana River Flow Lost to the Ocean".

(4) When the Santa Ana River flow lost to the ocean is greater than the San Jacinto watershed outflow reaching Prado Dam, it is assumed that no San Jacinto watershed outflow could be recharged by OCWD. When San Jacinto watershed outflow reaching Prado Dam was greater than the Santa Ana River flow lost to the ocean, San Jacinto watershed outflow recharged by OCWD was calculated as the difference between the two.

TABLE G-2
SUMMARY OF SAN JACINTO WATERSHED DISCHARGE
WATER YEAR 2003-04
APRIL 2004

Day	EMWD Discharge to Temescal Creek (cfs) ⁽¹⁾	San Jacinto Watershed Outflow Reaching Prado (cfs) ⁽²⁾	Santa Ana River Flow Lost to the Ocean (cfs) ⁽³⁾	San Jacinto Outflow Recharged by OCWD (cfs) ⁽⁴⁾
1	0	0	272	0
2	0	0	3	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	103	0	0	0
7	81	0	0	0
8	77	0	0	0
9	76	0	0	0
10	82	0	0	0
11	99	0	0	0
12	65	0	0	0
13	79	5	0	5
14	71	9	0	9
15	71	10	0	10
16	74	10	0	10
17	75	17	0	17
18	53	17	0	17
19	55	6	0	6
20	56	5	0	5
21	52	6	0	6
22	62	6	0	6
23	54	5	0	5
24	43	3	0	3
25	59	4	0	4
26	17	7	0	7
27	17	6	0	6
28	0	6	0	6
29	0	9	0	9
30	0	9	0	9
Total	1,421	141	275	141

(1) Eastern Municipal Water District (EMWD) effluent discharge to Temescal Creek at Wasson Canyon.

(2) The amount of EMWD discharge determined to have reached Prado reservoir by scalping the flow of Temescal Creek at the Main St. gauging station in Corona.

(3) Flow of the Santa Ana River at Ball Road has historically been lost to the ocean. OCWD Forebay Operations currently sink 20-25 cfs between Ball Road and Orangewood Avenue. Therefore, the Ball Road figure minus 25 cfs was used for "Santa Ana River Flow Lost to the Ocean".

(4) When the Santa Ana River flow lost to the ocean is greater than the San Jacinto watershed outflow reaching Prado Dam, it is assumed that no San Jacinto watershed outflow could be recharged by OCWD. When San Jacinto watershed outflow reaching Prado Dam was greater than the Santa Ana River flow lost to the ocean, San Jacinto watershed outflow recharged by OCWD was calculated as the difference between the two.

TABLE G-2
SUMMARY OF SAN JACINTO WATERSHED DISCHARGE
WATER YEAR 2003-04
MAY 2004

Day	EMWD Discharge to Temescal Creek (cfs) ⁽¹⁾	San Jacinto Watershed Outflow Reaching Prado (cfs) ⁽²⁾	Santa Ana River Flow Lost to the Ocean (cfs) ⁽³⁾	San Jacinto Outflow Recharged by OCWD (cfs) ⁽⁴⁾
1	0	6	0	6
2	0	3	0	3
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
Total	0	9	0	9

(1) Eastern Municipal Water District (EMWD) effluent discharge to Temescal Creek at Wasson Canyon.

(2) The amount of EMWD discharge determined to have reached Prado reservoir by scalping the flow of Temescal Creek at the Main St. gauging station in Corona.

(3) Flow of the Santa Ana River at Ball Road has historically been lost to the ocean. OCWD Forebay Operations currently sink 20-25 cfs between Ball Road and Orangewood Avenue. Therefore, the Ball Road figure minus 25 cfs was used for "Santa Ana River Flow Lost to the Ocean".

(4) When the Santa Ana River flow lost to the ocean is greater than the San Jacinto watershed outflow reaching Prado Dam, it is assumed that no San Jacinto watershed outflow could be recharged by OCWD. When San Jacinto watershed outflow reaching Prado Dam was greater than the Santa Ana River flow lost to the ocean, San Jacinto watershed outflow recharged by OCWD was calculated as the difference between the two.

TABLE G-3
SUMMARY OF SAN JACINTO WATERSHED DISCHARGE
WATER YEAR 2003-04

MONTHLY TOTALS

Month	EMWD Discharge to Temescal Creek (cfs) ⁽¹⁾	San Jacinto Watershed Outflow Reaching Prado (cfs) ⁽²⁾	Santa Ana River Flow Lost to the Ocean (cfs) ⁽³⁾	San Jacinto Outflow Recharged By OCWD (cfs) ⁽⁴⁾
<u>2003</u>				
October	0	0	0	0
November	0	0	129	0
December	0	0	251	0
<u>2004</u>				
January	0	0	0	0
February	572	226	14,221	57
March	197	199	709	43
April	1,421	141	275	141
May	0	9	0	9
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	5	0
<hr/>				
Total (cfs)	2,190	575	15,590	249
(acre-feet)	4,345	1,140	30,922	495

(1) Eastern Municipal Water District (EMWD) effluent discharge to Temescal Creek at Wasson Canyon.

(2) The amount of EMWD discharge determined to have reached Prado reservoir by scalping the flow of Temescal Creek at the Main St. gauging station in Corona.

(3) Flow of the Santa Ana River at Ball Road has historically been lost to the ocean. OCWD Forebay Operations currently sink 20-25 cfs between Ball Road and Orangewood Avenue. Therefore, the Ball Road figure minus 25 cfs was used for "Santa Ana River Flow Lost to the Ocean".

(4) When the Santa Ana River flow lost to the ocean is greater than the San Jacinto watershed outflow reaching Prado Dam, it is assumed that no San Jacinto watershed outflow could be recharged by OCWD. When San Jacinto watershed outflow reaching Prado Dam was greater than the Santa Ana River flow lost to the ocean, San Jacinto watershed outflow recharged by OCWD was calculated as the difference between the two.

TABLE G-4
SUMMARY OF FLOW-WEIGHTED AVERAGE TDS
OF SAN JACINTO WATERSHED DISCHARGE
CALCULATED TO REACH PRADO RESERVOIR
WATER YEAR 2003-04

Month	EMWD Discharge to Temescal Creek ⁽¹⁾ (acre-feet)	EMWD Discharge TDS ⁽²⁾ (mg/L)	95% of EMWD Discharge ⁽³⁾ (acre-feet)	Flow at Prado x TDS
<u>2003</u>				
October	0	---	0	0
November	0	---	0	0
December	0	---	0	0
<u>2004</u>				
January	0	---	0	0
February	1,135	655	1,078	743,365
March	392	655	372	256,493
April	2,818	644	2,677	1,814,929
May	0	---	0	0
June	0	---	0	0
July	0	---	0	0
August	0	---	0	0
September	0	---	0	0
Total	4,345		4,127	2,814,787
				Flow-weighted TDS at Discharge ⁽⁴⁾ = 648 mg/L
				Flow-weighted TDS of Discharge with 5% Evaporation ⁽⁵⁾ = 682 mg/L

(1) Actual EMWD discharge to Temescal Creek at Wasson Canyon.

(2) Water quality data for EMWD Surface Water Discharge at Wasson Canyon.

(3) EMWD discharge with 5% evaporation prior to arriving at Prado reservoir.

(4) Water quality for EMWD discharge at Wasson Canyon =
(Sum of Monthly Discharge Volume X Discharge TDS)/Total Discharge Volume.

(5) Water quality for EMWD discharge arriving at Prado reservoir =
(Sum of Monthly Discharge Volume X Discharge TDS)/95% of Total Discharge Volume.

TABLE G-5

SAN JACINTO WATERSHED DISCHARGE METHOD OF DETERMINING FLOW REACHING PRADO RESERVOIR

WATER YEAR 2003-04

Prior to water year 2002-03, outflow from the San Jacinto Watershed has occurred only in very wet years when Lake Elsinore overflows to Temescal Creek. Temescal Creek is dammed at Lee Lake, and thus Lake Elsinore overflow only reaches Prado Reservoir if Lee Lake also overflows. In past years, the operator of Lee Lake kept a record of the elevation of the water in the lake so that the volume of water overflowing the dam and flowing down Temescal Creek to Prado Reservoir could be calculated. The record was incomplete in water year 2002-03, and nonexistent in 2003-04. Therefore, when San Jacinto Watershed outflow occurred in 2002-03, the Watermaster needed to come up with a method for calculating the volume of outflow that reached Prado Reservoir.

In 2002-03 the San Jacinto Watershed outflow was due not to Lake Elsinore overflow, but to Eastern Municipal Water District (EMWD) discharge. EMWD had completed a pipeline to discharge tertiary treated wastewater to Wasson Canyon wash (which is tributary to Temescal Creek) when flows exceeded their capacity. The Watermaster committee obtained the daily discharge rate, but saw that the discharge rate did not correlate with the increased flow rate of Temescal Creek at the Main Street gage in Corona. It was observed that a lag-time occurred between the EMWD discharge and time the flow reached the gage due to the time it took EMWD flow to reach and fill Lee Lake. To complicate matters, storm flow occurred concurrently with EMWD discharge. Staff was given the task of determining the amount of the increased flow at the Main St. gage that was due to the EMWD discharge.

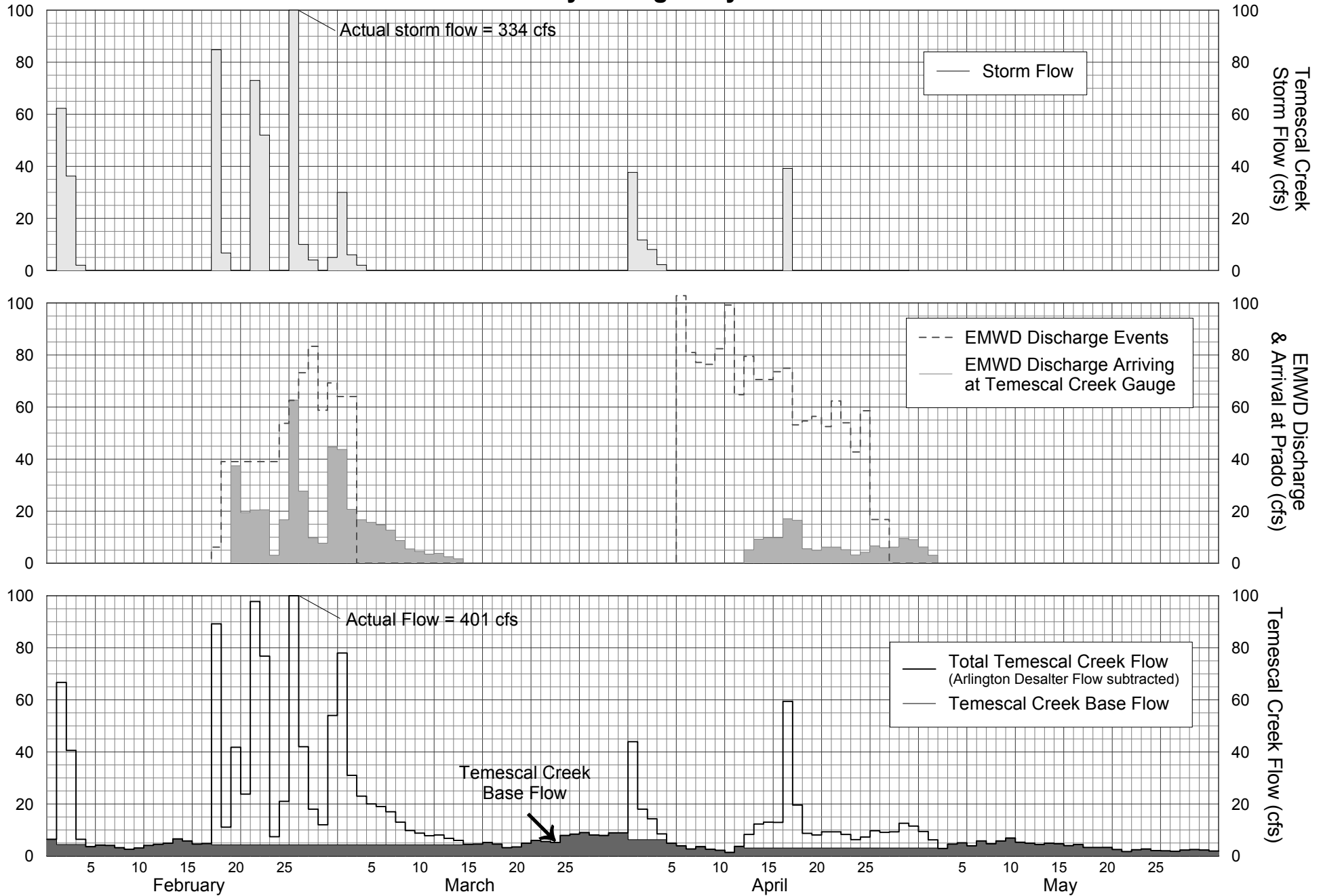
In the method developed, Arlington Desalter flow discharged to the Arlington Drain was first subtracted from the Temescal flow (Arlington Drain is tributary to Temescal Creek). It was noted that during October through January storm periods (prior to EMWD discharge), that the flow rate was very flashy, spiking and then dropping back to base flow conditions very quickly. So storm flow was calculated easily by scalping the Temescal Creek flow, using the average flow for the non-storm period prior to the rain event as Temescal Creek base flow. A rough correlation was made for the amount of rain versus the volume of storm flow in each event. Then the graph was scalped for the periods when storm flow and EMWD discharge occurred concurrently such that storm flow volume for each storm event was similar in rate to that observed prior to EMWD discharge. The remainder of the flow at the Temescal Creek gage was attributed to EMWD discharge.

The following hydrograph, Components of Temescal Creek Flow, illustrates the Temescal Creek flow components from February through May 2004.

Components of Temescal Creek Flow

February through May 2004

G-12



APPENDIX H

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

WATER YEAR 2003-04

TABLE H-1

WATER QUALITY SAMPLES BELOW PRADO DAM
WATER YEAR 2003-04

Date	EC (microsiemens/cm)	TDS (mg/L)	Source
10/03/03	891	557	USGS
10/13/03	877	512	OCWD
10/17/03	755	465	USGS
10/31/03	961	605	USGS
11/06/03	983	556	OCWD
11/21/03	905	566	USGS
12/02/03	956	601	USGS
12/08/03	958	526	OCWD
12/15/03	965	600	USGS
01/02/04	697	454	USGS
01/12/04	819	482	OCWD
01/14/04	849	517	USGS
02/04/04	689	433	USGS
02/19/04	868	545	USGS
02/24/04	482	326	OCWD
03/01/04	408	257	USGS
03/09/04	532	308	OCWD
03/19/04	705	448	USGS
04/02/04	895	586	USGS
04/05/04	947	576	OCWD
04/15/04	960	584	USGS
05/07/04	1080	652	USGS
05/21/04	940	561	USGS
06/04/04	1020	618	USGS
06/14/04	1030	604	OCWD
06/17/04	1020	640	USGS
07/02/04	930	555	USGS
07/12/04	984	572	OCWD
07/14/04	965	577	USGS
08/03/04	1050	636	OCWD
08/05/04	995	590	USGS
08/09/04	1020	604	OCWD
08/12/04	1010	611	USGS
08/17/04	1040	616	OCWD
08/24/04	1030	632	OCWD
08/31/04	969	570	OCWD
09/03/04	927	553	USGS
09/08/04	945	564	OCWD
09/17/04	914	564	USGS

TABLE H-2

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

OCTOBER 2003

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	227	882	543	123,270
2	226	894	550	124,397
3	227	898	553	125,506
4	226	901	555	125,371
5	237	857	528	125,052
6	235	853	525	123,418
7	208	889	547	113,849
8	204	907	558	113,920
9	199	885	545	108,432
10	204	894	550	112,287
11	207	890	548	113,429
12	208	882	543	112,952
13	244	807	497	121,235
14	241	799	492	118,557
15	284	783	482	136,912
16	327	763	470	153,616
17	328	752	463	151,864
18	334	715	440	147,033
19	328	687	423	138,737
20	315	668	411	129,554
21	238	764	470	111,952
22	195	831	512	99,770
23	192	872	537	103,081
24	189	886	546	103,100
25	189	904	557	105,195
26	184	909	560	102,978
27	193	907	558	107,777
28	194	947	583	113,114
29	196	961	592	115,969
30	195	963	593	115,618
31	213	968	596	126,946

Total	7,187			3,724,891
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Monthly Flow Weighted TDS = 518 mg/L

1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

NOVEMBER 2003

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	331	833	513	169,760
2	241	938	578	139,182
3	235	943	581	136,440
4	236	955	588	138,764
5	230	958	590	135,661
6	209	939	578	120,830
7	219	890	548	120,004
8	235	853	525	123,418
9	241	839	517	124,492
10	245	840	517	126,709
11	252	796	490	123,503
12	265	760	468	124,000
13	273	704	433	118,331
14	306	682	420	128,490
15	303	669	412	124,805
16	299	750	462	138,069
17	302	797	491	148,193
18	304	879	541	164,523
19	302	889	547	165,300
20	298	912	562	167,330
21	294	927	571	167,799
22	289	915	563	162,810
23	283	919	566	160,127
24	280	932	574	160,671
25	278	958	590	163,973
26	276	971	598	165,003
27	270	984	606	163,577
28	267	1010	622	166,033
29	264	995	613	161,730
30	261	995	613	159,892
Total	8,088			4,369,420
		Monthly Flow Weighted TDS =	540 mg/L	

1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

DECEMBER 2003

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	257	995	613	157,441
2	266	988	608	161,809
3	248	985	606	150,401
4	244	984	606	147,825
5	242	986	607	146,911
6	238	982	605	143,897
7	237	978	602	142,709
8	238	948	584	138,915
9	234	960	591	138,309
10	229	986	607	139,019
11	226	966	595	134,415
12	227	934	575	130,538
13	227	954	587	133,333
14	227	968	596	135,290
15	274	957	589	161,445
16	283	965	594	168,142
17	275	999	615	169,146
18	270	999	615	166,070
19	263	993	611	160,793
20	251	983	605	151,911
21	243	963	593	144,077
22	238	975	600	142,871
23	233	987	608	141,591
24	214	970	597	127,805
25	226	752	463	104,638
26	307	334	206	63,132
27	303	391	241	72,943
28	231	497	306	70,686
29	232	605	372	86,418
30	264	703	433	114,267
31	282	716	441	124,315

Total	7,729			4,171,063
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Monthly Flow Weighted TDS = 540 mg/L

1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

JANUARY 2004

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	285	674	415	118,268
2	289	710	437	126,334
3	291	747	460	133,837
4	292	775	477	139,331
5	379	799	492	186,444
6	426	728	448	190,943
7	425	738	454	193,112
8	426	726	447	190,418
9	429	725	446	191,495
10	426	750	462	196,713
11	423	787	485	204,964
12	423	797	491	207,569
13	420	817	503	211,268
14	417	841	518	215,921
15	412	871	536	220,942
16	406	870	536	217,474
17	403	856	527	212,394
18	400	845	520	208,104
19	396	852	525	207,729
20	389	872	537	208,847
21	399	946	582	232,395
22	341	943	581	197,983
23	308	936	576	177,496
24	308	937	577	177,686
25	301	949	584	175,872
26	377	973	599	225,848
27	404	989	609	246,003
28	398	1010	622	247,496
29	393	996	613	240,999
30	386	1010	622	240,033
31	366	1010	622	227,596

Total	11,738			6,171,516
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Monthly Flow Weighted TDS = 526 mg/L

1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

FEBRUARY 2004

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	387	1010	622	240,655
2	283	995	613	173,369
3	221	763	470	103,820
4	220	681	419	92,243
5	218	757	466	101,605
6	214	817	503	107,646
7	212	808	497	105,465
8	209	824	507	106,032
9	342	754	464	158,767
10	388	754	464	180,122
11	387	786	484	187,282
12	392	825	508	199,115
13	396	874	538	213,093
14	392	893	550	215,526
15	385	904	557	214,285
16	380	912	562	213,374
17	405	947	583	236,139
18	285	947	583	166,172
19	247	886	546	134,739
20	249	837	515	128,318
21	250	817	503	125,755
22	258	729	449	115,800
23	1,360	595	366	498,217
24	1,350	474	292	393,981
25	2,700	415	256	689,882
26	4,430	355	219	968,267
27	2,490	266	164	407,797
28	881	304	187	164,897
29	572	363	223	127,840
Total	20,503			6,770,203
		Monthly Flow Weighted TDS =	330 mg/L	

1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

MARCH 2004

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	432	401	247	106,657
2	462	447	275	127,149
3	461	586	361	166,326
4	462	508	313	144,500
5	460	464	286	131,413
6	454	450	277	125,786
7	451	463	285	128,564
8	464	525	323	149,982
9	487	510	314	152,919
10	488	524	323	157,440
11	497	571	352	174,725
12	496	566	348	172,847
13	495	601	370	183,165
14	497	638	393	195,227
15	495	700	431	213,337
16	493	724	446	219,760
17	488	752	463	225,944
18	483	751	462	223,331
19	480	718	442	212,192
20	419	747	460	192,707
21	257	767	472	121,364
22	233	813	501	116,630
23	221	822	506	111,848
24	219	847	521	114,206
25	217	859	529	114,767
26	218	875	539	117,443
27	221	892	549	121,372
28	222	912	562	124,655
29	226	924	569	128,571
30	233	934	575	133,988
31	252	938	578	145,535

Total 11,983 4,754,352

Monthly Flow Weighted TDS = 397 mg/L

1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

APRIL 2004

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	263	937	577	151,725
2	416	926	570	237,174
3	507	921	567	287,495
4	295	930	573	168,915
5	308	935	576	177,307
6	338	942	580	196,034
7	333	948	584	194,364
8	338	947	583	197,074
9	339	946	582	197,448
10	333	938	578	192,314
11	327	931	573	187,439
12	333	926	570	189,853
13	334	939	578	193,097
14	328	944	581	190,638
15	327	934	575	188,043
16	327	942	580	189,654
17	328	951	586	192,051
18	323	952	586	189,323
19	331	922	568	187,898
20	333	948	584	194,364
21	331	944	581	192,381
22	337	943	581	195,661
23	339	956	589	199,536
24	319	962	592	188,942
25	317	964	594	188,148
26	331	962	592	196,050
27	334	961	592	197,621
28	330	950	585	193,019
29	341	947	583	198,823
30	378	956	589	222,491
Total	10,118			5,874,881
		Monthly Flow Weighted TDS =	581 mg/L	

1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

MAY 2004

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	372	956	589	218,959
2	367	959	590	216,694
3	385	972	598	230,404
4	395	995	613	241,982
5	399	1010	622	248,117
6	389	1020	628	244,294
7	369	1060	653	240,821
8	287	1110	683	196,141
9	219	1090	671	146,972
10	218	1020	628	136,905
11	206	984	606	124,803
12	205	1000	616	126,217
13	200	1010	622	124,370
14	199	975	600	119,459
15	231	906	558	128,856
16	243	872	537	130,462
17	246	882	543	133,588
18	245	899	554	135,609
19	245	887	546	133,799
20	246	877	540	132,830
21	242	892	549	132,906
22	242	896	552	133,502
23	246	911	561	137,980
24	252	912	562	141,501
25	247	912	562	138,693
26	237	898	553	131,035
27	246	858	528	129,953
28	246	841	518	127,378
29	249	826	509	126,632
30	245	843	519	127,162
31	240	856	527	126,488

Total	8,358			4,864,510
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Monthly Flow Weighted TDS =	582	mg/L
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1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

JUNE 2004

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	239	888	547	130,669
2	184	971	598	110,002
3	189	990	610	115,202
4	186	993	611	113,717
5	192	938	578	110,884
6	196	883	544	106,556
7	195	849	523	101,931
8	191	907	558	106,660
9	184	945	582	107,056
10	194	936	576	111,800
11	183	989	609	111,432
12	187	1000	616	115,134
13	185	980	603	111,625
14	186	969	597	110,968
15	187	948	584	109,147
16	179	934	575	102,935
17	179	963	593	106,131
18	178	912	562	99,949
19	177	876	539	95,464
20	184	882	543	99,919
21	185	920	566	104,791
22	188	922	568	106,721
23	214	873	537	115,025
24	232	866	533	123,700
25	230	884	544	125,182
26	235	883	544	127,759
27	237	891	549	130,014
28	233	918	565	131,693
29	230	917	565	129,855
30	188	977	602	113,088
Total	5,947			3,385,010
	Monthly Flow Weighted TDS =		569	mg/L

1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

JULY 2004

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	200	934	575	115,011
2	201	927	571	114,720
3	209	923	568	118,771
4	207	898	553	114,448
5	201	862	531	106,676
6	201	840	517	103,953
7	200	863	531	106,268
8	196	887	546	107,039
9	204	913	562	114,674
10	208	943	581	120,764
11	198	958	590	116,787
12	193	961	592	114,194
13	193	974	600	115,739
14	185	963	593	109,688
15	186	944	581	108,106
16	186	938	578	107,418
17	183	936	576	105,461
18	183	931	573	104,897
19	180	920	566	101,958
20	181	919	566	102,413
21	182	923	568	103,427
22	177	919	566	100,150
23	152	929	572	86,941
24	155	941	579	89,802
25	161	931	573	92,287
26	159	945	582	92,511
27	172	988	608	104,628
28	170	982	605	102,783
29	157	981	604	94,827
30	154	985	606	93,394
31	157	994	612	96,084
Total	5,691			3,265,820
		Monthly Flow Weighted TDS =	574 mg/L	

1. TDS = EC x 0.615691

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

AUGUST 2004

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	159	989	609	96,818
2	157	974	600	94,150
3	150	967	595	89,306
4	168	967	595	100,023
5	164	980	603	98,954
6	160	985	606	97,033
7	157	989	609	95,600
8	151	961	592	89,344
9	150	947	583	87,459
10	146	962	592	86,475
11	118 ²	0	0	0
12	146	1010	622	90,790
13	165	1010	622	102,605
14	151	1010	622	93,899
15	159	990	610	96,916
16	169	999	615	103,948
17	151	993	611	92,319
18	158	981	604	95,431
19	147	972	598	87,972
20	151	976	601	90,738
21	149	977	602	89,628
22	150	982	605	90,691
23	154	982	605	93,110
24	154	997	614	94,532
25	165	980	603	99,557
26	179	952	586	104,919
27	178	944	581	103,456
28	183	923	568	103,996
29	186	916	564	104,899
30	185	916	564	104,335
31	178	920	566	100,826
Total	4,820			2,879,727
		Monthly Flow Weighted TDS =	597 mg/L	

1. TDS = EC x 0.615691 2. Aug-11 flow not included in Monthly TDS calculation.

TABLE H-2 (continued)

SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM
WATER YEAR 2003-04

SEPTEMBER 2004

Day	Prado Outflow (cfs)	Daily Mean EC (microsiemens/cm)	Computed TDS ¹	Outflow X TDS
1	178	915	563	100,278
2	185	894	550	101,829
3	181	915	563	101,968
4	184	896	552	101,505
5	185	887	546	101,032
6	186	879	541	100,662
7	180	870	536	96,417
8	180	914	563	101,294
9	185	885	545	100,804
10	170	908	559	95,038
11	157	919	566	88,834
12	161	907	558	89,908
13	168	912	562	94,334
14	173	921	567	98,100
15	176	941	579	101,968
16	179	938	578	103,376
17	197	919	566	111,467
18	195	918	565	110,215
19	194	866	533	103,439
20	196	851	524	102,695
21	196	855	526	103,178
22	235	797	491	115,316
23	246	787	485	119,199
24	252	794	489	123,192
25	243	825	508	123,431
26	190	897	552	104,932
27	168	944	581	97,644
28	160	978	602	96,343
29	158	970	597	94,361
30	205	979	603	123,566
Total	5,663			3,106,322
		Monthly Flow Weighted TDS =	549 mg/L	

1. TDS = EC x 0.615691

TABLE H-3

ANNUAL SUMMARY OF FLOW WEIGHTED TDS BELOW PRADO DAM

WATER YEAR 2003-04

Month	Monthly Flow (cfs-days)	Monthly Weighted TDS (mg/L)	Monthly Flow x TDS
<u>2003</u>			
October	7,187	518	3,724,891
November	8,088	540	4,369,420
December	7,729	540	4,171,063
<u>2004</u>			
January	11,738	526	6,171,516
February	20,503	330	6,770,203
March	11,983	397	4,754,352
April	10,118	581	5,874,881
May	8,358	582	4,864,510
June	5,947	569	3,385,010
July	5,691	574	3,265,820
August	4,820	597	2,879,727
September	5,663	549	3,106,322
Total	107,825		53,337,715
Yearly Flow-weighted TDS =		495	

APPENDIX I

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

WATER YEAR 2003-04

PREPARED BY

JOHN V. ROSSI

TABLE I-1

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

WATER YEAR 2003-04

MONTH	Discharge (acre -feet)	TDS (mg/L)	Discharge xTDS
<u>2003</u>			
October	201	724	145,524
November	194	744	144,336
December	197	672	132,384
<u>2004</u>			
January	198	684	135,432
February	180	692	124,560
March	199	712	141,688
April	191	760	145,160
May	198	792	156,816
June	193	712	137,416
July	197	744	146,568
August	199	684	136,116
September	198	712	140,976
Total	2,345		1,686,976

$$\text{Flow weighted TDS} = \frac{1,686,976}{2,345} = 719 \text{ mg/L}$$

APPENDIX J

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

WATER YEAR 2003-04

PREPARED BY

JOHN V. ROSSI

TABLE J-1

WATER QUALITY SAMPLES AT RIVERSIDE NARROWS
WATER YEAR 2003-04

	Date Sampled	EC (microsiemens/cm)	TDS (mg/L)	Source of Data	Ratio	Average
<u>2003</u>	10/01/03	953	616	C of R	0.65	
	10/07/03	957	582	USGS	0.61	
	10/10/03	889	672	C of R	0.76	
	10/15/03	996	620	C of R	0.62	
	10/21/03	948	592	USGS	0.62	
	10/24/03	988	584	C of R	0.59	
	10/29/03	990	624	C of R	0.63	613
	11/04/03	936	586	USGS	* 0.63	
	11/07/03	966	592	C of R	0.61	
	11/12/03	804	540	C of R	0.67	
	11/18/03	920	566	USGS	0.62	
	11/21/03	931	572	C of R	0.61	
	11/26/03	985	604	C of R	0.61	575
	12/05/03	963	616	C of R	0.64	
	12/08/03	922	568	USGS	0.62	
	12/10/03	956	600	C of R	0.63	
	12/17/03	947	592	USGS	* 0.63	
	12/19/03	1000	652	C of R	* 0.65	
	12/24/03	998	596	C of R	0.60	595
<u>2004</u>	01/02/04	966	608	C of R	* 0.63	
	01/07/04	927	586	USGS	* 0.63	
	01/07/04	961	584	C of R	0.61	
	01/16/04	955	544	C of R	0.57	
	01/20/04	921	583	USGS	0.63	
	01/21/04	987	624	C of R	0.63	
	01/30/04	1007	632	C of R	0.63	593

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

C of R City of Riverside
USGS U.S. Geological Survey

TABLE J-1

WATER QUALITY SAMPLES AT RIVERSIDE NARROWS
WATER YEAR 2003-04

Date Sampled	EC (microsiemens/cm)	TDS (mg/L)	Source of Data	Ratio	Average
02/03/04	553	-	USGS		
02/05/04	904	544	C of R	* 0.60	
02/13/04	937	584	C of R	0.62	
02/18/04	767	-	USGS	*	
02/18/04	929	604	C of R	* 0.65	
02/27/04	482	472	C of R	* 0.98	584
03/01/04	954	589	USGS	* 0.62	
03/03/04	742	504	C of R	* 0.68	
03/12/04	949	614	USGS	* 0.65	
03/12/04	1014	628	C of R	* 0.62	
03/17/04	992	688	C of R	0.69	
03/26/04	947	601	USGS	0.63	
03/26/04	1034	656	C of R	0.63	
03/31/04	721	488	C of R	* 0.68	648
04/05/04	945	600	USGS	* 0.63	
04/07/04	1024	696	C of R	0.68	
04/16/04	1047	644	C of R	0.62	
04/20/04	941	600	USGS	* 0.64	
04/21/04	1016	644	C of R	* 0.63	
04/30/04	1031	640	C of R	0.62	660
05/04/04	979	618	USGS	0.63	
05/05/04	1038	664	C of R	0.64	
05/14/04	1041	660	C of R	0.63	
05/18/04	968	617	USGS	0.64	
05/19/04	1036	648	C of R	0.63	
05/28/04	1045	676	C of R	0.65	647

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

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USGS U.S. Geological Survey

TABLE J-1

WATER QUALITY SAMPLES AT RIVERSIDE NARROWS
WATER YEAR 2003-04

Date Sampled	EC (microsiemens/cm)	TDS (mg/L)	Source of Data	Ratio	Average
06/02/04	1052	704	C of R	0.67	
06/07/04	924	604	USGS	0.65	
06/11/04	1033	664	C of R	0.64	
06/16/04	1054	692	C of R	0.66	
06/22/04	963	632	USGS	0.66	
06/25/04	1062	640	C of R	0.60	
06/30/04	1061	732	C of R	0.69	667
07/01/04	934	619	USGS	0.66	
07/09/04	1035	696	C of R	0.67	
07/16/04	1065	664	C of R	0.62	
07/20/04	925	608	USGS	0.66	
07/23/04	1061	676	C of R	0.64	
07/28/04	1077	676	C of R	0.63	657
08/03/04	930	616	USGS	0.66	
08/06/04	1044	656	C of R	0.63	
08/11/04	1055	632	C of R	0.60	
08/20/04	1063	656	C of R	0.62	
08/23/04	946	609	USGS	0.64	
08/25/04	1049	664	C of R	0.63	639
09/03/04	1040	628	C of R	0.60	
09/08/04	966	620	USGS	0.64	
09/08/04	1047	668	C of R	0.64	
09/17/04	1035	632	C of R	0.61	
09/21/04	950	610	USGS	0.64	
09/22/04	1020	604	C of R	0.59	627

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

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TABLE J-2

ANNUAL SUMMARY OF FLOW WEIGHTED TDS AT RIVERSIDE NARROWS
WATER YEAR 2003-04

Month	Stream Flow ¹ (acre-feet)	Monthly Average TDS (mg/L)	Monthly Flow x TDS
<u>2003</u> October	4,196	613	2,571,544
November	4,346	575	2,498,081
December	4,536	595	2,698,920
<u>2004</u> January	5,672	593	3,365,765
February	5,198	584	3,035,632
March	5,556	648	3,602,153
April	4,591	660	3,030,060
May	4,556	647	2,948,491
June	4,176	667	2,784,795
July	3,936	657	2,583,984
August	4,043	639	2,582,781
September	3,982	627	2,496,714
Total	54,788		34,198,921
<p>Flow-weighted TDS = $\frac{34,198,921}{54,788}$ = 624 mg/L</p>			

- (1) USGS measured flow minus storm flow.
(2) TDS based on water quality data from Table J-1.

APPENDIX K

WMWD TRANSFER PROGRAM WATER
DISCHARGED TO THE SANTA ANA RIVER
ABOVE RIVERSIDE NARROWS

WATER YEAR 2003-04

TABLE K-1

WMWD TRANSFER PROGRAM WATER
DISCHARGED TO THE SANTA ANA RIVER ABOVE RIVERSIDE NARROWS
WATER YEAR 2003-04
(acre-feet)

Month	Discharge Above Riverside Narrows ¹	Flow Arriving At Riverside Narrows ¹	Flow Arriving At Prado Dam ¹
<u>2003</u>			
October	462	462	462
November	422	422	422
December	140	140	140
<u>2004</u>			
January	0	0	0
February	513	513	513
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	1,537	1,537	1,537

(1) Unadjusted for evapotranspiration loss per agreement between WMWD and OCWD.

TABLE K-2

WMWD TRANSFER PROGRAM WATER
DISCHARGED TO THE SANTA ANA RIVER ABOVE RIVERSIDE NARROWS
WATER YEAR 2003-04
OCTOBER 2003

Day	Discharge Above Riverside Narrows (cfs)	Flow Arriving At Riverside Narrows ¹ (cfs)	Flow Arriving At Prado Dam ¹ (cfs)
1	14.0	14.0	14.0
2	14.1	14.1	14.1
3	14.0	14.0	14.0
4	15.9	15.9	15.9
5	6.0	6.0	6.0
6	6.2	6.2	6.2
7	7.5	7.5	7.5
8	5.6	5.6	5.6
9	6.4	6.4	6.4
10	9.7	9.7	9.7
11	7.1	7.1	7.1
12	7.4	7.4	7.4
13	6.9	6.9	6.9
14	6.5	6.5	6.5
15	7.1	7.1	7.1
16	7.4	7.4	7.4
17	7.5	7.5	7.5
18	7.8	7.8	7.8
19	6.5	6.5	6.5
20	2.5	2.5	2.5
21	6.4	6.4	6.4
22	7.5	7.5	7.5
23	5.4	5.4	5.4
24	8.3	8.3	8.3
25	8.1	8.1	8.1
26	4.7	4.7	4.7
27	3.6	3.6	3.6
28	6.3	6.3	6.3
29	4.8	4.8	4.8
30	5.4	5.4	5.4
31	6.3	6.3	6.3
Total in cfs-days	232.9	232.9	232.9
Total in AF	462	462	462

(1) Unadjusted for evapotranspiration loss per agreement between WMWD

TABLE K-2 (continued)

WMWD TRANSFER PROGRAM WATER
DISCHARGED TO THE SANTA ANA RIVER ABOVE RIVERSIDE NARROWS
WATER YEAR 2003-04
NOVEMBER 2003

Day	Discharge Above Riverside Narrows (cfs)	Flow Arriving At Riverside Narrows ¹ (cfs)	Flow Arriving At Prado Dam ¹ (cfs)
1	9.9	9.9	9.9
2	4.4	4.4	4.4
3	5.2	5.2	5.2
4	6.5	6.5	6.5
5	6.6	6.6	6.6
6	6.4	6.4	6.4
7	8.7	8.7	8.7
8	5.2	5.2	5.2
9	7.9	7.9	7.9
10	3.6	3.6	3.6
11	9.3	9.3	9.3
12	6.3	6.3	6.3
13	7.3	7.3	7.3
14	7.4	7.4	7.4
15	8.5	8.5	8.5
16	7.7	7.7	7.7
17	5.6	5.6	5.6
18	6.5	6.5	6.5
19	4.4	4.4	4.4
20	10.2	10.2	10.2
21	7.5	7.5	7.5
22	8.4	8.4	8.4
23	6.5	6.5	6.5
24	6.5	6.5	6.5
25	7.3	7.3	7.3
26	7.3	7.3	7.3
27	8.3	8.3	8.3
28	7.8	7.8	7.8
29	7.1	7.1	7.1
30	8.3	8.3	8.3
Total in cfs-days	212.9	212.9	212.9
Total in AF	422	422	422

(1) Unadjusted for evapotranspiration loss per agreement between WMWD

TABLE K-2 (continued)

WMWD TRANSFER PROGRAM WATER
DISCHARGED TO THE SANTA ANA RIVER ABOVE RIVERSIDE NARROWS
WATER YEAR 2003-04
DECEMBER 2003

Day	Discharge Above Riverside Narrows (cfs)	Flow Arriving At Riverside Narrows ¹ (cfs)	Flow Arriving At Prado Dam ¹ (cfs)
1	5.0	5.0	5.0
2	7.3	7.3	7.3
3	7.3	7.3	7.3
4	7.3	7.3	7.3
5	8.4	8.4	8.4
6	8.8	8.8	8.8
7	6.5	6.5	6.5
8	5.4	5.4	5.4
9	7.3	7.3	7.3
10	7.3	7.3	7.3
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0
15	0.0	0.0	0.0
16	0.0	0.0	0.0
17	0.0	0.0	0.0
18	0.0	0.0	0.0
19	0.0	0.0	0.0
20	0.0	0.0	0.0
21	0.0	0.0	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0
25	0.0	0.0	0.0
26	0.0	0.0	0.0
27	0.0	0.0	0.0
28	0.0	0.0	0.0
29	0.0	0.0	0.0
30	0.0	0.0	0.0
31	0.0	0.0	0.0
Total in cfs-days	70.5	70.5	70.5
Total in AF	140	140	140

(1) Unadjusted for evapotranspiration loss per agreement between WMWD

TABLE K-2 (continued)

WMWD TRANSFER PROGRAM WATER
DISCHARGED TO THE SANTA ANA RIVER ABOVE RIVERSIDE NARROWS
WATER YEAR 2003-04
JANUARY 2004

Day	Discharge Above Riverside Narrows (cfs)	Flow Arriving At Riverside Narrows ¹ (cfs)	Flow Arriving At Prado Dam ¹ (cfs)
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	0.0	0.0	0.0
5	0.0	0.0	0.0
6	0.0	0.0	0.0
7	0.0	0.0	0.0
8	0.0	0.0	0.0
9	0.0	0.0	0.0
10	0.0	0.0	0.0
11	0.0	0.0	0.0
12	0.0	0.0	0.0
13	0.0	0.0	0.0
14	0.0	0.0	0.0
15	0.0	0.0	0.0
16	0.0	0.0	0.0
17	0.0	0.0	0.0
18	0.0	0.0	0.0
19	0.0	0.0	0.0
20	0.0	0.0	0.0
21	0.0	0.0	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0
25	0.0	0.0	0.0
26	0.0	0.0	0.0
27	0.0	0.0	0.0
28	0.0	0.0	0.0
29	0.0	0.0	0.0
30	0.0	0.0	0.0
31	0.0	0.0	0.0
Total in cfs-days	0.0	0.0	0.0
Total in AF	0	0	0

(1) Unadjusted for evapotranspiration loss per agreement between WMWD

TABLE K-2 (continued)

WMWD TRANSFER PROGRAM WATER
DISCHARGED TO THE SANTA ANA RIVER ABOVE RIVERSIDE NARROWS
WATER YEAR 2003-04
FEBRUARY 2004

Day	Discharge Above Riverside Narrows (cfs)	Flow Arriving At Riverside Narrows ¹ (cfs)	Flow Arriving At Prado Dam ¹ (cfs)
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	11.1	11.1	11.1
4	13.2	13.2	13.2
5	13.8	13.8	13.8
6	13.8	13.8	13.8
7	15.2	15.2	15.2
8	14.5	14.5	14.5
9	11.9	11.9	11.9
10	14.5	14.5	14.5
11	14.5	14.5	14.5
12	14.4	14.4	14.4
13	17.5	17.5	17.5
14	13.8	13.8	13.8
15	14.5	14.5	14.5
16	13.9	13.9	13.9
17	12.5	12.5	12.5
18	15.0	15.0	15.0
19	14.0	14.0	14.0
20	14.5	14.5	14.5
21	6.0	6.0	6.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0
25	0.0	0.0	0.0
26	0.0	0.0	0.0
27	0.0	0.0	0.0
28	0.0	0.0	0.0
29	0.0	0.0	0.0
Total in cfs-days	258.5	258.5	258.5
Total in AF	513	513	513

(1) Unadjusted for evapotranspiration loss per agreement between WMWD

TABLE K-3

SUMMARY OF TDS OF WMWD TRANSFER PROGRAM WATER
DISCHARGED TO THE SANTA ANA RIVER ABOVE RIVERSIDE NARROWS
WATER YEAR 2003-04

Month	WMWD Transfer Program Discharge (acre-feet)	TDS ¹ (mg/L)	Discharge x TDS
<u>2003</u>			
October	462	470	217,140
November	422	394	166,268
December	140	427	59,827
<u>2004</u>			
January	0	---	0
February	513	418	214,434
March	0	---	0
April	0	---	0
May	0	---	0
June	0	---	0
July	0	---	0
August	0	---	0
September	0	---	0
Total	1,537		657,669

Flow-weighted TDS of pumped groundwater releases to the Santa Ana River: ²

$$\text{TDS} = \frac{657,669}{1,537} = 428 \text{ mg/L}$$

(1) Water quality data is from the Riverside Canal; Since there was no data for December, an average of the other months was used.

(2) Unadjusted for evaporation loss per agreement between WMWD and OCWD.