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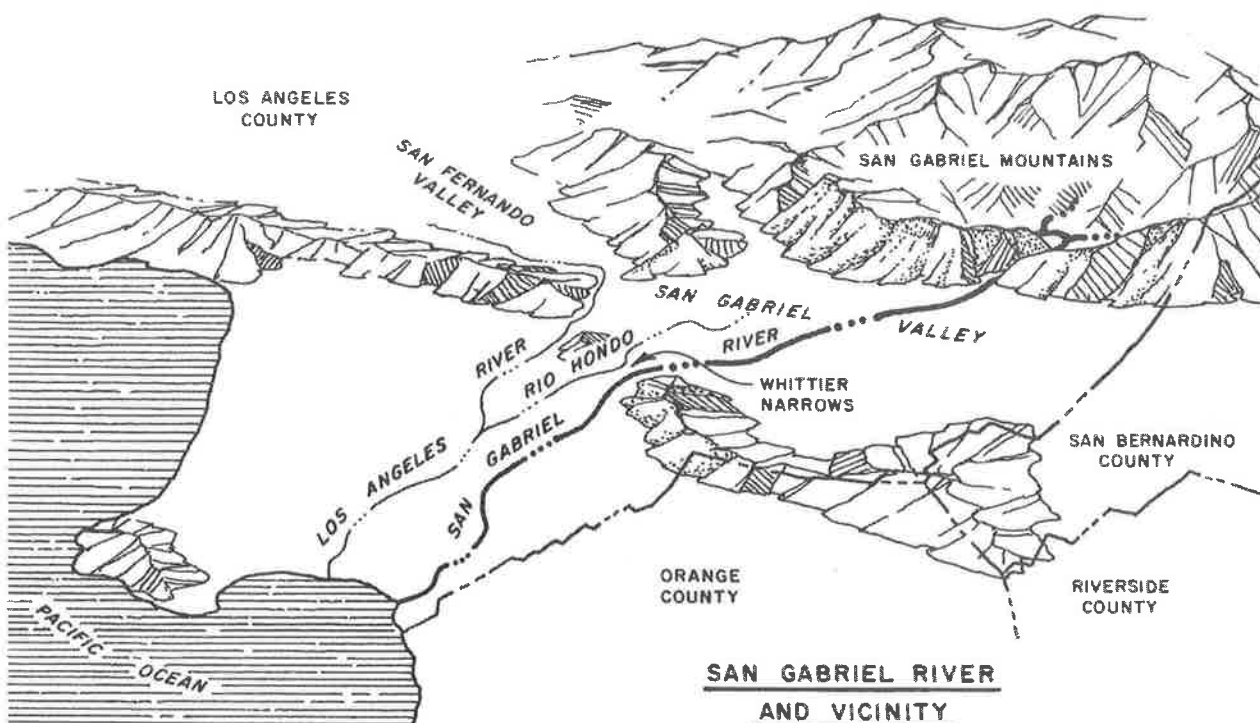
TWENTY-SEVENTH ANNUAL REPORT

OF THE

SAN GABRIEL RIVER WATERMASTER

FOR

1989-90



City of Long Beach, et al., vs. San Gabriel Valley Water Co., et al.
Case No. 722647 — Los Angeles County

February 28, 1991

SAN GABRIEL RIVER WATERMASTER

FOR
CITY OF LONG BEACH ET AL VS SAN GABRIEL VALLEY WATER CO. ET AL
CASE NO. 722647 - LOS ANGELES COUNTY

WATERMASTERS
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February 28, 1991

To: Clerk of Superior Court of Los Angeles
County and All Parties

Re: Watermaster Report for 1989-90 Water Year

Gentlemen:

We have the honor of submitting the Twenty-Seventh Annual Report of the San Gabriel River Watermaster for water year 1989-90, in accordance with the Judgment in Case No. 722647 entered September 24, 1965. A complete summary of Watermaster Findings is contained in this report.

The 1989-90 water year was the eleventh year in the second Long-Term Accounting Period. Rainfall in San Gabriel Valley during the 1989-90 water year was 12.4 inches or 67 percent of the long-term average of 18.52 inches as defined in the Judgment. The ten-year average rainfall from 1980-81 through 1989-90 amounted to 16.3 inches, which, according to the Judgment, established the Lower Area Annual Entitlement at 81,800 acre-feet for 1989-90.

The year 1989-90 was the fourth consecutive year of below average precipitation in the San Gabriel River watershed. The four-year average precipitation at the four stations used to represent San Gabriel Valley rainfall was 11.86 inches, or 64 percent of the long term average rainfall.

The principal findings of the Watermaster under annual accounting for the year 1989-90 are as follows:

	<u>Acre-Feet</u>
1. Lower Area Annual Entitlement	81,800
2. Usable Water received by Lower Area	67,709
3. Debit for Water Year 1989-90	14,091
4. Accrued Debit of Upper Area as of September 30, 1989	53,379
5. Amount of Make-up Water received by Lower Area in 1989-90	28,279
6. Accrued Debit of Upper Area as of September 30, 1990	39,191
7. Amount of Make-up Water required to be delivered prior to October 1, 1991	14,191

The majority of the data required by the Watermaster is furnished by the Los Angeles County Department of Public Works. The cooperation and assistance furnished by the County and other public agencies are gratefully acknowledged.

Sincerely,

SAN GABRIEL RIVER WATERMASTER

By:

Thomas M. Stetson
Thomas M. Stetson

Howard H. Haile
Howard H. Haile

Richard A. Rhone
Richard A. Rhone

Enclosure

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CHAPTER I. ACTIVITIES OF WATERMASTER

This report covers the twenty-seventh year of operation under the Judgment in Case No. 722647 (the Long Beach case). Parties to the Judgment are listed on page A-1 of the Appendix. The Judgment declared that the Lower Area of the San Gabriel River System, the area downstream of Whittier Narrows, is entitled to receive an annual average of 98,415 acre-feet of Usable Water from the Upper Area, the area upstream of Whittier Narrows. The first twelve Annual Watermaster Reports described the history of the litigation, the Judgment and related activities.

The activities of the Watermaster include administration of operations under the Judgment, performance of field inspections, collection of data and maintenance of records, analyses of data, preparation of the annual report presenting the required determinations and findings, and maintenance of records of transfers of defendant's water rights. All operations and reports are based on the "Water Year," which is from October 1 through September 30.

Administration

The official office and depository of records of the Watermaster is at 100 North Brand Boulevard, Suite 600, Glendale, California, and such records are available for inspection at that office upon the request of any Party.

An audit of income and expenditures of the Watermaster for the water year 1989-90 was performed by the firm of R. J. Galletly, CPA. Presented in Table 1 is the

TABLE 1

STATEMENT OF INCOME AND EXPENDITURES
FOR THE WATER YEAR 1989-90

Carried forward from year 1988-89		\$ 3,314.80
Income		55,000.00
Interest Income		<u>1,790.90</u>
		\$60,105.70
Expenditures:		
Administrative fees and general operating expenses	\$ 7,331.48	
Collection of data, field inspections and maintenance of records	4,596.74	
Calculations and preparation of Watermaster Report for water year 1988-89	27,672.12	
Printing and reproduction costs	<u>1,501.73</u>	
Total Expenditures		41,102.07
Balance		<u>\$19,003.63</u>

Statement of Income and Expenditures for the water year 1989-90 based on Mr. Galletly's letter of November 7, 1990, which is presented in the Appendix.

The tentative budget for the current water year (1990-91) was transmitted to the Parties on August 10, 1990. Following a period of 15 days after filing of the tentative budget, there being no objections thereto, the tentative budget became the final budget. The 1990-91 annual budget and proration of costs for payment thereof are shown in Table 2.

Watermaster Personnel

The Judgment provided for the appointment of a three-member Watermaster, one to represent the Upper Area, one to represent the Lower Area, and the third to represent both areas. On November 12, 1965, the three-member Watermaster was appointed and certified by the Court, namely Thomas M. Stetson representing the Upper Area, Max Bookman representing the Lower Area, and M. E. Salsbury representing both areas. Mr. Salsbury elected to conclude his years of service in 1985 and upon nomination from Upper District and Central Municipal, the Court appointed Howard H. Haile as his replacement effective February 7, 1985. Mr. Bookman elected to conclude his years of service in 1986 and upon nomination by the Lower Area Parties, the Court on January 14, 1986, appointed Richard A. Rhone to replace Mr. Bookman. This appointment was effective in February 1986.

TABLE 2
WATERMASTER BUDGET
FOR
WATER YEAR 1990-91

1.	Administrative fees of Watermaster and general operating expenses	\$ 9,000
2.	Hydrologic analyses, collection of data and field inspection	9,000
3.	Calculations and preparation of Watermaster Report for Water Year 1989-90	30,000
4.	Printing and reproduction costs	2,000
5.	Contingencies	<u>4,000</u>
	Total	\$54,000
	Estimated carryover from 1989-90	18,000
	To be financed for 1990-91	\$36,000

Proration for Payment Purposes

Upper San Gabriel Valley Municipal Water District	50%	\$18,000.00
Central Basin Municipal Water District	41.2%	14,832.00
City of Long Beach	7.125%	2,565.00
City of Compton	1.675%	<u>603.00</u>
Total		\$36,000.00

The staff work for this report was directed by William O'Brien for Bookman-Edmonston Engineering, Inc. and Steve Johnson and Kevin Smead for Stetson Engineers, Inc.

Data Collection

The Watermaster collects data on streamflow, rainfall, water quality, ground water levels, export of ground water through Whittier Narrows, reclaimed water, imported replenishment water and other information as required. The principal source of data is the Los Angeles County Flood Control District which is now a part of the Los Angeles County Department of Public Works (hereinafter County). Copies of appropriate records were obtained from the County and many conferences were held between County personnel and Watermaster personnel in order that the Watermaster would be fully informed on the facts necessary to make the determinations required by the Judgment. Other data were obtained from the Metropolitan Water District of Southern California, the County Sanitation Districts of Los Angeles County, the Central and West Basin Water Replenishment District, the Upper San Gabriel Valley Municipal Water District, the San Gabriel Valley Municipal Water District, the Central Basin Municipal Water District, the San Gabriel Valley Water Company, Main San Gabriel Basin Watermaster, the U. S. Army Corps of Engineers, and the U. S. Geological Survey.

The collected data is summarized in a daily operation computer model. This model, developed by Watermaster personnel, aids in the speed and accuracy of the analyses.

Field Inspections

During the 1989-90 water year, Watermaster staff made several field inspections of gaging stations and other facilities in the area. Facilities inspected included spreading grounds in the San Gabriel Valley, stream gaging stations, imported water delivery points and river channels.

Preparation of Annual Report

One of the required functions of the Watermaster is the preparation of the annual report presenting the findings required by the Judgment. The Judgment provides that a report be prepared and submitted within five months after the end of each water year, and copies of the report are to be filed with the Court and furnished to each of the Parties. Copies are also furnished to others upon request.

Stream Gaging Stations

The County and the U. S. Geological Survey operate the stream gaging stations on the San Gabriel River System, data from which are essential for determinations required of the Watermaster.

Plate 1, entitled "Stream Gaging Stations, Rio Hondo - San Gabriel River System," shows the general vicinity of the Whittier Narrows area. Plate 2, entitled "Map

of Whittier Narrows," shows in greater detail certain features in Whittier Narrows including wells used for calculating subsurface flow.

The accuracy of measuring some of the higher surface water flows is at times questionable. Also, physical changes occur in the channel sections at several of the stream gaging stations. These problems and their resolutions are discussed in the following sections.

Rio Hondo Above Mission Bridge, F64-R

In August of 1978, the flow recorder at this station was removed due to high maintenance costs and very poor control caused by a shifting sand bottom at the station. Also, the use of Whittier Narrows Reservoir for storage of storm waters for conservation purposes causes frequent backwater at the station. The recorder was reinstalled at this station in 1985. The County hydrographer schedules weekly current meter measurements. Using these measurements and the recorder chart, a good record of flow is developed. For periods when reservoir storage causes backwater, the record of upstream stations is used to calculate the flow. The record produced is considered to be reasonably accurate.

Mission Creek at San Gabriel Boulevard, F83

The recorder was removed from this station during water year 1977-78 because of construction work by Los Angeles County Road Department. (The designation was changed from "F83-R" to "F83", a non-recording station.) The channel has also been realigned making reestablishment of the station difficult. Historically, the great majority of the water carried in Mission Creek was rising water. The County made numerous

current meter measurements at this station during the 1989-90 water year, which were used to determine the annual flow.

Whittier Narrows Flood Channel, F337-R

Since construction work in 1978-79 removed a levee which directed flow past the station, the rating curve at this station is questionable. Poor communication exists between the channel and the stilling well. In addition, the station is subject to backwater from the Rio Hondo side of Whittier Narrows Reservoir. However, water entering the Flood Channel crosses over a stabilizer weir. By using the record of water surface elevations on the San Gabriel River side of Whittier Narrows Reservoir, the flow in the Flood Channel was estimated by the Watermaster. These estimates were prepared by applying an appropriate weir formula. During 1981-82 a flow measurement was made at the weir by County personnel. This measurement confirmed the calculations of flow by the weir formula. When appropriate flow balances are made, the Watermaster considers the use of the stabilizer weir a better means of determining flow than the existing station.

County personnel, with Watermaster concurrence, discontinued station F337-R in December 1987.

San Gabriel River at Florence Avenue, F262C-R

This new recording station replaced F262B-R, which was discontinued during the summer of 1988 because the County constructed a rubber dam in the channel. The new recording gage is now located about 5,100 feet downstream at the beginning of the lined portion of the San Gabriel River. The County, with Watermaster concurrence, located

the new station to provide a more accurate measurement of flow to the ocean, and to allow simplified spreading operations in the San Gabriel River. The new station, designated F262C-R, began to record flows commencing in water year 1988-89.

Rio Hondo Spreading Grounds Intake (Headworks)

The County constructed a low level intake to the Rio Hondo East Side Spreading Grounds. This intake supplements the original higher level intake and allows water to be diverted into the spreading grounds when the radial gates are raised. The spreading grounds inflow data are used to verify other records of inflow and to make adjustments. These records have been very useful to the Watermaster.

Metering of the new intake was provided by means of an acoustical meter. The meter has not always operated successfully and there are periods of time during which a good record of spreading grounds inflow does not exist. The County has assured Watermaster that it would take whatever steps were necessary to provide accurate measurements at the new low level intake. The other spreading grounds intakes are equipped with Parshall Flumes.

Memorandum of Understanding

On May 13, 1982, a Memorandum of Understanding was executed by representatives of Upper and Lower Area Parties. A copy of the Memorandum of Understanding is appended to the Nineteenth Annual Watermaster Report. That document recognizes the need for a continuing cooperative working relationship between the Upper and Lower Area Parties. The purpose of the agreement was to institute under

present conditions certain practical accommodations which are not intended to constitute interpretations of or additions to the Judgment. That Memorandum of Understanding is still in effect.

Transfer of Water Rights, Change of Address and Change of Name

During the 1989-90 water year there were no transfers of water rights or changes of address reported to the Watermaster.

CHAPTER II. LOWER AREA ANNUAL ENTITLEMENT

The Lower Area Annual Entitlement for the water year 1989-90 is based on the average annual rainfall which occurred in the 10-year period ending September 30, 1990, and the corresponding entitlement shown in Table A of the Judgment. Four precipitation stations are utilized to determine the average annual precipitation for San Gabriel Valley. The four stations are located at San Dimas, Walnut, El Monte and Pasadena.

Precipitation during the 1989-90 water year at the four stations was as follows:

<u>Station Number</u>	<u>Location</u>	<u>Depth of Precipitation in Inches</u>
95	114 East First Street, San Dimas	12.04
102D	700 Fairway Drive, Walnut	14.34
108D	3615 North Santa Anita Avenue, El Monte	11.41
610B	City Hall, Pasadena	<u>11.62</u>
	Average Annual Rainfall	12.35

Table 3 presents the calculation of the 10-year average rainfall in the San Gabriel Valley for the water years 1980-81 through 1989-90.

Based on the 10-year average rainfall of 16.3 inches, the Lower Area Annual Entitlement for the 1989-90 water year is 81,800 acre-feet, determined from Table A of the Judgment.

TABLE 3
AVERAGE ANNUAL RAINFALL IN SAN GABRIEL VALLEY
1980-81 THROUGH 1989-90

<u>Water Year</u>	<u>Rainfall in Inches</u>
1980-81	10.3
1981-82	18.9
1982-83	39.3
1983-84	10.6
1984-85	14.6
1985-86	22.0
1986-87	9.1
1987-88	14.9
1988-89	11.2
1989-90	<u>12.4</u>
Total	163.3
10-Year Average	16.3

CHAPTER III. USABLE WATER RECEIVED BY LOWER AREA

Presented in this Chapter is the determination of the quantity of Usable Water received by the Lower Area during the water year 1989-90. Also included is a discussion of the quality of water received by the Lower Area.

Surface Flow

The items to be included in Surface Flow through Whittier Narrows are set forth in Section III.A of Exhibit B of the Judgment. The measured flows and estimated flows are described below. The Judgment provides for adjustments to the measured flows where applicable. Some measurements in water year 1989-90 were found to be unreliable, questionable, or in error and appropriate adjustments were made. These adjustments are discussed later in this chapter.

Rio Hondo Above Mission Bridge, Station F64-R

As discussed in Chapter I, the recorder at Station F64-R was reinstalled in 1985. It had previously been removed as it had been unreliable due to backwater and other conditions. The County's hydrographer attempts to make weekly current meter measurements at the station and other measurements as conditions warrant. During the 1989-90 water year there were 39 current meter measurements made at the station. From the recorder data and measurements the hydrographer has developed a record for the majority of the water year. At times when the station was inoperative because of backwater, the hydrographer developed a record using primarily upstream gaging stations measuring inflow to Rio Hondo.

Using this procedure the County determined that the flow at Station F64-R for the 1989-90 water year was 21,414 acre-feet. Comparisons by the Watermaster of daily flows reported by the County indicated that for most days a good record was produced. Additional work in balancing all inflow stations with the outflow stations and the amount of water spread indicated some inconsistencies during days of very high flow. In these cases, appropriate adjustments were made, which are described later in this Chapter.

Mission Creek at San Gabriel Boulevard, Station F83

As stated in Chapter I, the recorder at this station has been removed. Weekly visits to the station are made by the County hydrographer. Unless the station is dry, a flow measurement is made at each visit. There was no flow at Station F83 for the 1989-90 water year.

Rio Hondo By-Pass Channel (Zone I Ditch), Station F313B-R

The measured flow at Station F313B-R for the 1989-90 water year was recorded by the County to be 55,699 acre-feet.

Whittier Narrows Flood Channel

The Whittier Narrows Flood Channel is used to convey storm waters from the San Gabriel River side of Whittier Narrows Reservoir to the Rio Hondo side. As stated in Chapter I, the stream gaging station F337-R was discontinued in 1987.

It has been determined that a better estimate of the flow can be made by utilizing the stabilizing weir at the entrance to the Flood Channel and the record of water surface elevations from the recorder on the San Gabriel River side of the Whittier Narrows Dam. Using this information, the flow into the Flood Channel for the 1989-90 water year was determined to be 14,790 acre-feet. Again, as there were several days of extremely high flows, a balance of the

flows was made and an overall adjustment to recorded inflow was made, as discussed later in this chapter.

Sycamore Canyon

The determination of runoff from Sycamore Canyon, which flows through Whittier Narrows, is based on a correlation with precipitation at Potrero Heights (Station 170F). Sycamore Canyon is located in the La Merced Hills northwesterly of Whittier Narrows and enters the Rio Hondo below Station F64-R, Rio Hondo above Mission Bridge. During the 1989-90 water year, precipitation at Station 170F was 12.30 inches. Referring to Table 6 of Exhibit B of the Judgment, the runoff from Sycamore Canyon was determined to be 60 acre-feet.

San Gabriel River Below Parkway Bridge, Station F263C-R

The flow at the San Gabriel River below Parkway Bridge for the 1989-90 water year was recorded by the County to be 28,679 acre-feet.

Reclaimed Water Delivered to Rio Hondo Below Station F64-R

Water from the Whittier Narrows Water Reclamation Plant is delivered to either the San Gabriel River, Rio Hondo below Station F64-R, or to the Rio Hondo Bypass Channel (Zone I Ditch). The total water production from this plant was 15,110 acre-feet during the 1989-90 water year, of which 44 acre-feet was used by a commercial nursery near the plant site. The balance of 15,066 acre-feet was delivered to stream channels. Of this quantity, 10,147 acre-feet were delivered directly to Rio Hondo below the F64-R gage and must, therefore, be added as Surface Flow.

Reclaimed Water from the Whittier Narrows Plant can also be delivered to the Zone I Ditch. In 1984, the location of the gaging station on the Zone I Ditch was moved from

upstream of the point of delivery to downstream of the point of delivery. Thus, Reclaimed Water now delivered to the Zone I Ditch is included with the water measured at Station F313B-R. During the 1989-90 water year, 755 acre-feet was so delivered and included with the flow recorded at F313B-R.

The balance of the Reclaimed Water from the Whittier Narrows Plant, in the amount of 4,164 acre-feet, was delivered to the San Gabriel River and accounted for in the recorded flows at the Parkway Bridge Station, F263C-R.

Reclaimed Water Delivered to San Gabriel River Below Station F263C-R

The San Jose Creek Water Reclamation Plant is located near the intersection of San Gabriel River and San Jose Diversion Channel, as shown on Plate 1. Reclaimed Water from this plant is carried in an outfall pipeline which generally parallels the San Gabriel River to a point south of Florence Avenue, where the flow can be released to the lined channel of the San Gabriel River. At the San Gabriel River Spreading Grounds Headworks, there is a turnout from this outfall pipeline so that Reclaimed Water can be delivered to the San Gabriel River Spreading Grounds or the unlined portion of the San Gabriel River for ground water recharge. This outlet is located immediately downstream of Station F263C-R.

During the 1989-90 water year, 13,202 acre-feet of reclaimed water from the San Jose Creek Water Reclamation Plant was delivered via this outfall pipeline to the San Gabriel River Spreading Grounds Headworks for replenishment purposes. This water was metered by use of a propeller meter in the turnout facility.

The flow in the San Jose Creek outfall pipeline not diverted for replenishment use is delivered to the lined portion of the San Gabriel River. During the 1989-90 water year, such flow amounted to approximately 20,233 acre-feet, and is not included as Surface Flow.

A second turnout for replenishment purposes from the San Jose Plant was first used in December 1986 to provide the option of releasing reclaimed water directly to the San Jose Diversion Channel. The operation of this turnout allows San Jose Plant reclaimed water to be diverted to the Rio Hondo via the Zone I Ditch. This turnout is equipped with a propeller meter to measure flow. The reclaimed water released from this turnout is measured at either the Zone I Ditch (Station F313B-R) or at the San Gabriel River below Parkway Bridge (Station F263C-R). For the 1989-90 water year, 20,296 acre-feet of reclaimed water was released through this turnout and purchased by the Lower Area.

Adjustments to Surface Flow

The quantity of Surface Flow is, for the most part, based upon stream flow measurements made by the County. In essence, the method set forth in the Judgment is to measure the surface inflow to the Lower Area through Whittier Narrows and deduct that portion which leaves the Montebello Forebay at its lower end. The difference in these measurements represents a determination of the quantity of Surface Flow which infiltrates to the Montebello Forebay.

High runoff conditions occur during and following certain storms. The frequency of hydrographic measurements at stream gaging stations during 1989-90 was less than in prior years. Certain inconsistencies can result from the inflow minus outflow calculations. While the stream gaging measurements may be within the accuracy of normal stream gaging measurements, the amount of Usable Surface Flow on some days is only a small portion of the total

flow. Inaccuracies in the gaging of total flow will affect the determination of Usable Surface Flow. It also should be noted that storm runoff through Whittier Narrows has increased as a result of urbanization which increases the total flow and also tends to produce higher peak flows of a shorter duration, making the measuring program less reliable. The storm measurement problem is also affected by backwater at gaging station F64-R caused by the increased use of Whittier Narrows Reservoir for water conservation.

Accordingly, the Watermaster, after evaluating the available data, determined that for certain periods of time adjustments should be made in the quantities of Surface Flow as derived from the measurements. An alternative method of determining Surface Flow for the Rio Hondo was outlined in the Fifth Annual Watermaster Report. In this method, an adjustment is made by first determining the amount delivered to Rio Hondo Spreading Grounds and adding thereto the estimated amount of water infiltrated in the Rio Hondo portion of the Whittier Narrows Reservoir. This is compared to the measured inflow minus the outflow and a determination is made by the Watermaster as to the most reliable quantities.

Changes in the method of determining Surface Flow can be made under the terms of the Judgment. Reference is made to Exhibit B of the Judgment, Article III, Section A entitled, "Surface Water Measurements and Calculations", which reads in part:

"In the event that any of the aforementioned gaging stations are inoperative for any reason and for any period of time the Watermaster shall estimate the quantity that would have been measured at the station had it been operative. The estimate shall be based on correlation to nearby operative measuring stations or on other reasonable engineering methods."

The Watermaster considers that stations are inoperative for the purposes of the Judgment when the measurements obtained are not of sufficient accuracy to produce reasonable results.

For the 1989-90 water year, the Watermaster decided to apply the alternative method during certain periods of time to the Rio Hondo side of Whittier Narrows.

Presented in Table 4 is an adjustment to Rio Hondo inflow. This table presents a summary of the calculations utilizing the alternative method. Analysis of the daily inflow and outflow data indicated that the alternative method should be applied during 14 days of the 1989-90 water year. The unadjusted inflow in the Rio Hondo as set forth in Table 4 was 23,028 acre-feet during those 14 days. The outflow during the same 14 days (calculated on a daily basis from stream gaging measurements as provided in the Judgment) was 8,754 acre-feet. (This latter value is water from San Gabriel Valley since local inflow below Whittier Narrows has been deducted.) In making the adjustment, the unusable outflow as measured at Stewart and Gray Road was accepted.

The infiltration during the 14-day period was calculated to be 8,510 acre-feet. This included the amount delivered to the spreading grounds and the water infiltrated in the Whittier Narrows Reservoir westerly of Rosemead Boulevard. In addition, the amount of water stored on the Rio Hondo side of the Reservoir increased by 82 acre-feet during the 14 days. The inflow is therefore adjusted by adding the quantity of infiltration (8,510 acre-feet) to the outflow (8,754 acre-feet) and adding the increase in storage (82 acre-feet) to determine the adjusted inflow in the amount of 17,346 acre-feet.

As determined, the adjustment to the Rio Hondo inflow is -5,682 acre-feet. As discussed above, the adjustment relies on the spreading grounds inflow and estimated infiltration in Whittier Narrows Reservoir. These latter values provide a more accurate determination of

TABLE 4
ADJUSTMENT TO RIO HONDO INFLOW

Item	: Amounts in Acre-Feet : for 14 days ^(a) of the : water year 1989-90
A. UNADJUSTED INFLOW	
Rio Hondo above Mission Bridge, F64-R	8,050
Mission Creek at San Gabriel Boulevard, F83	0
Rio Hondo By-Pass Channel (Zone I Ditch)	290
Whittier Narrows Flood Channel	14,147
Sycamore Canyon	49
Ungaged Reclaimed Water	<u>492</u>
Total Unadjusted Inflow	23,028
B. ADJUSTED INFLOW	
Infiltration	
Spreading grounds infiltration	7,994
Reservoir area infiltration	516
Total Infiltration	8,510
Change in Reservoir Storage	+ 82
Outflow at Stewart and Gray Road	<u>8,754</u>
Total Adjusted Inflow	17,346
C. ADJUSTMENT	
Adjustment to Rio Hondo Inflow	- 5,682

(a) Days adjusted were October 22; January 1-2, 13-18; February 17-19, and May 28-29.

Usable Water during high flows than taking the difference between high storm flow measurements of inflow and outflow. Until water year 1986-87 all inflow to the Rio Hondo Spreading Grounds was measured by flumes. In that year, a low level intake was constructed and an acoustical meter installed to serve the Rio Hondo Eastside Grounds. This meter is sometimes inoperative, and in some cases, it was necessary to use Station E327-R as a means of estimating spreading grounds inflow.

Summary of Surface Flow

A total of 138,309 acre-feet of surface water flowed through Whittier Narrows during the 1989-90 water year. Table 5 shows the components and the total Surface Flow.

Subsurface Flow

The method utilized to determine Subsurface Flow through Whittier Narrows is set forth in Exhibit B of the Judgment. The data used for computing Subsurface Flow are the spring and fall ground water elevations in Whittier Narrows.

The Subsurface Flow for any year is the average of the six spring and fall computations of Subsurface Flow for the three years ending with the year of calculation. Shown in the following tabulation is the result of the calculation of Subsurface Flow for the 1989-90 water year which amounted to 32,100 acre-feet.

TABLE 5
SUMMARY OF SURFACE FLOW THROUGH WHITTIER NARROWS
FOR WATER YEAR 1989-90

	<u>Amount in Acre-Feet</u>
Rio Hondo above Mission Bridge, Station F64-R	21,414
Mission Creek at San Gabriel Boulevard, Station F83	0
Rio Hondo By-Pass Channel, Station F313B-R	55,699
Whittier Narrows Flood Channel	14,790
Sycamore Canyon	60
San Gabriel River below Parkway Bridge, Station F263C-R	28,679
Reclaimed Water From Whittier Narrows Plant Delivered to Rio Hondo below Station F64-R	10,147
Reclaimed Water from San Jose Plant Delivered to San Gabriel River below Station F263C-R	13,202
Adjustment to Rio Hondo Inflow (Table 4)	<u>- 5,682</u>
Total Surface Flow	138,309

Time	Subsurface Flow in Acre-Feet
Spring 1988	37,100
Fall 1988	35,000
Spring 1989	30,000
Fall 1989	33,100
Spring 1990	32,100
Fall 1990	<u>25,200</u>
Subsurface Flow 1989-90	32,100

Export to Lower Area

The Watermaster is required to determine the amount of water which is pumped from ground water or diverted from surface streams in the Upper Area and transported in conduits through Whittier Narrows.

During the 1989-90 water year, there were four entities which transported water by pipeline through Whittier Narrows. All of the water exported through the Narrows was ground water produced in the San Gabriel Valley. The annual export for each of the four exporters is shown below:

Exporter	Acre-feet
California Domestic Water Company	13,338
San Gabriel Valley Water Company	221
Suburban Water Systems	7,112
City of Whittier	<u>8,166</u>
Total	28,837

The Judgment provides that the maximum annual allowance for export in the determination of Usable Water shall not exceed 23,395 acre-feet.

Lower Area Replenishment Water

The Lower Area purchases imported replenishment water from The Metropolitan Water District of Southern California. This imported water may be delivered at four Metropolitan connections: (1) Alhambra Wash (CenB-36); (2) San Gabriel River below Ramona Boulevard (CenB-37); (3) Foothill Feeder at San Dimas Wash (CenB-48); and (4) Upper Feeder at Thompson Creek (CenB-28). All connections are metered and delivered amounts are recorded by the Metropolitan Water District. These amounts are verified by personnel of the County.

During water year 1989-90, the total amount of imported water purchased from Metropolitan for replenishment was 65,618 acre-feet. Of the amount of water delivered, 11,082 acre-feet were purchased by the Upper District as Make-up Water and 54,536 acre-feet were purchased by or on behalf of the Lower Area.

MWD Connection	Imported Water (Acre-Feet)
San Dimas Wash (Cen B-48)	25,033
Thompson Creek (Cen B-28)	33,506
Alhambra Wash (Cen B-36)	7,079
San Gabriel River: Romona Blvd. (Cen B-37)	<u>0</u>
Total	65,618

The San Gabriel Valley Municipal Water District obtains imported water directly from the State Water Project under a long-term water supply contract. Delivery is taken from the State at the afterbay of the Devil Canyon Power Plant located northerly of San Bernardino. Water is delivered by the Devil Canyon-Azusa Pipeline into San Gabriel Valley. The District released water into San Dimas Wash for spreading in the Upper Area and for delivery to the

Lower Area as Make-up Water. The amount of this release actually reaching the Lower Area is determined monthly from County records. During the 1989-90 water year, the total actual delivery to the Lower Area of Make-up Water by the San Gabriel Valley Municipal Water District amounted to 2,768 acre-feet, including 252 acre-feet of evaporation losses.

Provision is made in the Judgment for the deduction of evaporation losses upstream of Whittier Narrows occurring during conveyance of Lower Area Replenishment Water through San Gabriel Valley to Whittier Narrows. The total calculated amount of evaporation during the 1989-90 water year was 831 acre-feet, 525 acre-feet assignable to the Lower Area and 306 acre-feet assignable to the Upper Area Make-up Water.

After evaporation losses, the net amount of Lower Area Replenishment Water amounted to 54,011 acre-feet, and the net amount of Upper Area Make-up Water was 11,028 acre-feet through Metropolitan connections and 2,516 acre-feet from the San Gabriel Valley Municipal Water District. The total amount of Make-up Water delivered by the Upper Area as surface flow was 13,544 acre-feet.

Reclaimed Water

Reclaimed Water used for replenishment of the Montebello Forebay came from three separate plants, each of which is operated by the County Sanitation Districts.

Whittier Narrows Water Reclamation Plant

The total amount of Reclaimed Water produced at the Whittier Narrows Water Reclamation Plant during the 1989-90 water year, and delivered to stream channels, was 15,066 acre-feet. During storm periods, 23 acre-feet of such Reclaimed Water delivered to the Rio Hondo was included as Surface Water outflow from the Montebello Forebay. Therefore, a total

of 15,043 acre-feet of such Reclaimed Water was purchased by Central and West Basin Water Replenishment District and spread in the Montebello Forebay.

Pomona Water Reclamation Plant

County Sanitation District No. 21 owns and operates a water reclamation plant near the City of Pomona. A portion of the reclaimed water is sold for industrial, agricultural, landscaping and other uses. During the 1989-90 water year a substantial quantity of reclaimed water from this plant reached Whittier Narrows. The plant facilities, discharge of effluent from the plant, and the method of determining the amount of discharge generated within the San Gabriel River system and reaching Whittier Narrows were described in the Fifth Annual Watermaster Report. Reclaimed Water is defined in the Judgment as water reclaimed from sewage generated in the watershed of the San Gabriel River System above Whittier Narrows. The area served by the Pomona Plant includes areas inside and outside of the San Gabriel River System. A study was conducted during 1985 to review the factors utilized in apportioning Pomona Plant influent generated in the San Gabriel River System. As a result of the study, it was concluded that 70 percent of the effluent of the Pomona Plant originates from sewage generated within the San Gabriel River System. This apportionment will be reviewed periodically in the future.

The total production at the Pomona Water Reclamation Plant during the 1989-90 water year was 9,921 acre-feet. The majority of the effluent was delivered to the City of Pomona for resale. The undelivered portion, amounting to 2,489 acre-feet was delivered to San Jose Creek. It was determined by the Watermaster that 15 acre-feet was wasted to the ocean, and that 1,740 acre-feet percolated in the Montebello Forebay. The portion of this Reclaimed Water which was

generated within the watershed of the San Gabriel River System was calculated to be 1,218 acre-feet.

San Jose Creek Water Reclamation Plant

The Central and West Basin Water Replenishment District purchases Reclaimed Water from the San Jose Creek Water Reclamation Plant. During the 1989-90 water year, 33,556 acre-feet of Reclaimed Water from the San Jose Creek Water Reclamation Plant was delivered to the Lower Area for replenishment. Of that amount, 58 acre-feet was wasted to the ocean, during storm periods, resulting in 33,498 acre-feet being purchased and spread. The total plant effluent for the 1989-90 water year was approximately 68,000 acre-feet.

Summary of Reclaimed Water

The total amount of reclaimed water which should be deducted from the inflow is 49,759 acre-feet for the 1989-90 water year. This is comprised of 15,043 acre-feet from the Whittier Narrows Water Reclamation Plant, 1,218 acre-feet from the Pomona Water Reclamation Plant which originated within the San Gabriel River watershed, and 33,498 acre-feet from the San Jose Creek Water Reclamation Plant.

Make-Up Water by Surface Flow Delivery

During 1989-90, the Upper Area purchased 13,950 acre-feet of imported water for delivery to the Lower Area as Make-Up Water. Of this water, 11,082 acre-feet were delivered from the Metropolitan connections at San Dimas Wash and Thompson Creek. The San Gabriel Valley Municipal Water District added 2,868 acre-feet of State Water Project water. The evaporation of Make-Up Water in transit to the Lower Area was estimated to be 306 acre-feet, resulting in a net delivery of 13,644 acre-feet from both sources. This water was delivered for

the purpose of reducing the accrued debit of the Upper Area which resulted from the Annual Accounting of 1988-89.

Recirculation of Measured Water

There was no recirculation of measured water as defined in Paragraph 3(1) (6) of the Judgment during the 1989-90 water year.

Unusable Surface Flow

The water from the San Gabriel Valley which leaves Montebello Forebay as surface flow is called Unusable Surface Flow and is determined in accordance with Exhibit B of the Judgment. Surface outflow from the Montebello Forebay is accounted for in the Rio Hondo at Stewart and Gray Road, Station F45B-R, and in the San Gabriel River at Florence Avenue, Station F262C-R. This surface outflow may be comprised of water from the San Gabriel Valley and local storm water which enters the channels downstream of Whittier Narrows.

During the 1989-90 water year, measured surface outflow from the Montebello Forebay in the Rio Hondo at Station F45B-R was 12,099 acre-feet. This included water from the San Gabriel Valley and local inflow originating downstream of Whittier Narrows. The Local Storm Outflow on days when the radial gates at the Rio Hondo headworks were open was estimated by correlating the drainage areas of the unmeasured storm drains with the Montebello Storm Drain, which is equipped with a stream flow recorder. By analysis of flows on days when the radial gates were open, it was possible to segregate the flow at Stewart and Gray Road into Local Storm Outflow and Unusable Surface Flow. It was determined that the Local Storm

Outflow was 3,265 acre-feet and the Unusable Surface Flow in the Rio Hondo was 8,781 acre-feet. The total amount of Local Storm Inflow was calculated to be 5,088 acre-feet.

The total flow of the San Gabriel River at Florence Avenue, Station F262C-R, was gaged to be 65 acre-feet for the 1989-90 water year. This flow consisted of Local Storm Inflow through storm drains located in the Montebello Forebay and surface inflow from the San Gabriel Valley. Most of the storm water in the San Gabriel River entering Whittier Narrows Reservoir in excess of the spreading capacity in the San Gabriel River below Whittier Narrows Dam was conveyed by the Flood Channel to the Rio Hondo. The Local Storm Inflow was calculated to be 3,215 acre-feet based on a correlation with the Montebello Storm Drain. The Local Storm Outflow on the San Gabriel River was determined to be 65 acre-feet.

The gaging station at Florence Avenue has been relocated a distance of 3,700 feet downstream of the location used in the Judgment. Infiltration along the entire unlined portion of the San Gabriel River is now accounted for by this new station, F262C-R. Analyses of daily flows indicated a total Unusable Surface Flow from the Montebello Forebay in the San Gabriel River of zero acre-feet during the 1989-90 water year.

The total Unusable Surface Flow passing through the Montebello Forebay in the Rio Hondo and San Gabriel River in the 1989-90 water year was 8,781 acre-feet.

Determination of Usable Water

Usable Water under the terms of the Judgment is defined as the sum of Surface Flow, Subsurface Flow and Export to Lower Area less the sum of Lower Area Replenishment Water, Reclaimed Water, Make-up Water by Surface Flow Delivery and Unusable Surface Flow. Table 6 presents the determination of Usable Water for the 1989-90 water year.

TABLE 6
USABLE WATER FOR WATER YEAR 1989-90

	<u>Amount in Acre-Feet</u>
Surface Flow	138,309
Subsurface Flow	32,100
Export to Lower Area	<u>23,395</u>
Subtotal	193,804
Less:	
Lower Area Replenishment Water	54,011
Reclaimed Water	49,759
Make-Up Water by Surface Flow Delivery	13,544
Recirculation of Measured Water	0
Unusable Surface Flow	<u>8,781</u>
Subtotal	126,095
Usable Water	67,709

Quality of Water

The Judgment (Exhibit B, Section IV.E) provides that the Watermaster gather readily available data from public and private agencies relating to the quality of water. During the water year, quality data were obtained from the State Department of Water Resources, the County Sanitation Districts, Los Angeles County Department of Public Works, and the Metropolitan Water District. Ground water quality data was also obtained from programs of the Main San Gabriel Basin Watermaster, Central Basin Municipal Water District, Central and West Basin Water Replenishment District and the Environmental Protection Agency (EPA). Reference was also made of the Annual Report on Results of Water Quality Monitoring prepared for the Central and West Basin Water Replenishment District. In the last few years increasing concern has developed over the trace constituents found in drinking water. Table 7 includes these constituents for illustrating both the quality of different sources of water supply and the increasing quantity of regulated constituents.

TABLE 7

**WATER QUALITY ANALYSIS REPRESENTATIVE OF WATER
SOURCES PASSING THROUGH WHITTIER NARROWS
WATER YEAR 1989-90(a)**

CATEGORY	DRINKING WATER STANDARDS (a)	IMPORTED WATER		RECLAIMED WATER			RUNOFF WATER	
		UNTREATED STATE PROJECT WATER (b)	UNTREATED COLORADO RIVER WATER (c)	WHITTIER NARROWS PLANT	SAN JOSE CREEK PLANT	POMONA PLANT	STORM FLOW (d)	SUBSURFACE FLOW (e)
		4-3-90	4-3-90	4-9-90	4-16-90	4-3-90	2-4-90	8-2-90
DATE		4-3-90	4-3-90	4-9-90	4-16-90	4-3-90	2-4-90	8-2-90
pH	6.5-8.5	8.2	8.3	7.2	7.1	7.2	7.5	8.0
EC x 10 ⁶ (umho/cm)		588	943	1025	1130	1060	514	586
CATIONS								
Calcium		22	72	53	56	57	44	72
Magnesium		16	28	16	16	19	12	10
Sodium		68	86	106	121	129	19	39
Potassium		4	4	10	11	12	50	2
ANIONS								
Carbonate		0	0	0	0	0	0	0
Bicarbonate		93	162	252	266	250	127	194
Sulfate	250	46	236	114	122	79	95	81
Chloride	250	96	72	89	129	113	36	37
Nitrate as NO ₃	45	3.65	0.7					
Fluoride	1.8	0.1	0.28	101	0.63	0.5	ND	0.2
Total Dissolved Solids (f)	500-1500	316	590	714	618	560	329	337
Total Hardness as CaCO ₃		119	296	197	203	205	160	222
Boron				0.54	0.52	0.64	ND	ND
INORGANIC TRACE CONSTITUENTS								
Arsenic	0.05	0.002	0.003	0.004	0.004	0.002	ND	ND
Barium	1	0.039	0.15	0.04	0.05	0.04	0.04	0.11
Cadmium	0.01	ND	ND	ND	ND	ND	ND	ND
Chromium, Total	0.05	ND	ND	ND	ND	ND	ND	ND
Lead	0.05	ND	ND	ND	ND	ND	ND	ND
Mercury	0.002	ND	ND	ND	ND	ND	ND	ND
Selenium	0.01	ND	ND	ND	ND	ND	ND	ND
Silver	0.05	ND	ND	ND	ND	ND	ND	ND
NUTRIENTS as N								
Ammonia				19.7	17.4	15.3	1.2	ND
Nitrate				0.3	0.1	0.4	1.3	1.7
Organic Nitrogen				1.9	1.8	1		ND

(a) All constituents in mg/l unless noted. ND = None Detected.

(b) Sampled at Lake Silverwood. Trace inorganics sampled 11/89; Organics in 2/90.

(c) Sampled at Lake Mathews. Trace inorganics sampled 11/89; Organics in 2/90.

(d) At San Gabriel Spreading Grounds.

(e) Well No. 2S/11W-5G (LACFCD No. 2947LM). Sample taken by County. Other Samples show no detected volatile organics.

(f) By evaporation at 180° C.

(g) Total Trihalomethanes is not to exceed 100 mg/l.

(h) Sum not to exceed 130.0 mg/l.

(i) Sum not to exceed 0.5 mg/l.

TABLE 7 (con't)

**WATER QUALITY ANALYSIS REPRESENTATIVE OF WATER
SOURCES PASSING THROUGH WHITTIER NARROWS
FOR THE WATER YEAR 1989-90(a)**

CATEGORY	DRINKING WATER STANDARDS (a)	IMPORTED WATER		RECLAIMED WATER			RUNOFF WATER	
		UNTREATED STATE PROJECT WATER (b)	UNTREATED COLORADO RIVER WATER (c)	WHITTIER NARROWS PLANT	SAN JOSE CREEK PLANT	POMONA PLANT	STORM FLOW (d)	SUBSURFACE FLOW (e)
DATE		4-3-90	4-3-90	4-9-90	4-16-90	4-3-90	2-4-90	8-2-90
PURGEABLE ORGANICS, ug/l								
Methylene Chloride	40	ND	ND	10.4	3.4	3.1		
Chloroform	100 (g)	ND	0.33	5.5	6.1	5.4		
Bromodichloromethane	100 (g)	ND	0.35	ND	1.0	0.9		
Dibromochloromethane	100 (g)	ND	0.30	ND	ND	ND		
Bromoform	100 (g)	ND	ND	ND	ND	ND		
Carbon Tetrachloride	0.5	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5	ND	ND	ND	0.6	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	200	ND	ND	1.2	33.8	0.6	ND	ND
1,1,2-Trichloroethane	32	ND	ND	ND	ND	ND		
1,1-Dichloroethylene	6	ND	ND	ND	ND	ND		
Trichloroethylene	5	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	5	ND	ND	3.6	0.6	2.3		
Benzene	1	ND	ND	ND	ND	ND	ND	ND
Toluene	100	ND	ND	ND	ND	ND		
Chlorobenzene	30	ND	ND	ND	ND	ND		
O-Dichlorobenzene	130 (h)	ND	ND	ND	0.6	ND		
M-Dichlorobenzene	130 (h)	ND	ND	ND	ND	ND		
P-Dichlorobenzene	5	ND	ND	1.0	1.3	ND	ND	ND
Trans-1,2-Dichloroethylene	10	ND	ND	ND	ND	ND		
Bromomethane		ND	ND	ND	ND	ND		
Chloroethane		ND	ND	ND	ND	ND		
2-Chloroethylvinylether		ND	ND	ND	ND	ND		
Chloromethane		ND	ND	ND	ND	ND		
1,2-Dichloropropane	5	ND	ND	ND	ND	ND		
Cis-1,3-Dichloropropene	0.5(i)	ND	ND	ND	ND	ND		
Trans-1,3-Dichloropropene	0.5(i)	ND	ND	ND	ND	ND		
1,1,2,2-Tetrachloroethane	1	ND	ND	ND	ND	ND		
Vinyl Chloride	0.5	ND	ND	ND	ND	ND	ND	ND
NON-PURGEABLE ORGANICS, ug/l								
Bis(2-ethylhexyl)phthalate	4	ND	ND	ND	16.0	ND		
1,2,4-Trichlorobenzene				ND	ND	ND		
2,4,6-Trichlorophenol		ND	ND	ND	ND	ND		
2,4,5-Trichlorophenol		ND	ND	ND	ND	ND		
2,3,4-Trichlorophenol				ND	ND	ND		
2,3,6-Trichlorophenol				ND	ND	ND		
3,4,5-Trichlorophenol				ND	ND	ND		
Pentachlorophenol	30	ND	ND	ND	ND	ND		
Phenanthrene		ND	ND	ND	ND	ND		
Fluoranthene				ND	ND	ND		
Atrazine	3	ND	ND	ND	ND	ND		
Simazine	10	ND	ND	ND	ND	ND		
Phenylacetic Acid				ND	ND	ND		
Phenol	1	ND	ND	ND	ND	ND		
CHLORINATED HYDROCARBONS, ug/l								
DDT		ND	ND	ND	ND	ND	ND	ND
BHC	0.3-0.7	ND	ND	ND	ND	ND	ND	ND
Lindane	4	ND	ND	0.05	0.04	0.02	ND	ND
Heptachlor	0.01	ND	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	0.01	ND	ND	ND	ND	ND	ND	ND
Aldrin	0.05			ND	ND	ND	ND	ND
Dieldrin	0.05			ND	ND	ND	ND	ND
Endrin	0.2	ND	ND	ND	ND	ND	ND	ND
Toxaphene	5	ND	ND	ND	ND	ND	ND	ND
Aroclor 1242		ND	ND	ND	ND	ND	ND	ND
Aroclor 1254		ND	ND	ND	ND	ND	ND	ND

CHAPTER IV. ANNUAL ACCOUNTING AND MAKE-UP WATER REQUIREMENTS

Under the terms of the Judgement, the Watermaster is required to annually determine the Accrued Debit or Credit of the Upper Area and the obligations, if any, of the Upper Area to deliver Make-up Water during the ensuing water year.

Delivery of Make-up Water During 1989-90

Because of the existence of an Accrued Debit at the end of 1988-89, the Upper Area was obligated to deliver 28,379 acre-feet of Make-up Water to the Lower Area during the 1989-90 water year. This delivery was accomplished in two ways, by Surface Flow delivery and by making payments under provisions of the Judgment for Reclaimed Water.

The Upper San Gabriel Valley Municipal Water District and the San Gabriel Valley Municipal Water District purchased 13,850 acre-feet of imported replenishment water as Make-up Water, which was released to upstream channels. The estimated evaporation loss was 306 acre-feet, leaving a net surface delivery of 13,544 acre-feet of Make-up Water credited in 1989-90.

By letter dated September 18, 1990, the Upper Area enclosed payment in the amount of \$104,779.83 for Reclaimed Water, which credited the Upper Area with 14,735 acre-feet of Make-up Water delivered during the 1989-90 water year for the 1988-89 debit.

The total Make-up Water credited for 1989-90 was 28,279 acre-feet.

Accrued Debit as of September 30, 1990

The Lower Area Annual Entitlement as heretofore determined for the 1989-90 water year was 81,800 acre-feet. The Usable Water received was 67,709 acre-feet, which resulted in a debit of the Upper Area for the water year of 14,091 acre-feet. As of September 30, 1989, there was an Accrued Debit of 53,379 acre-feet. During 1989-90, 28,279 acre-feet of Make-up water were delivered to the Lower Area. The Accrued Debit as of September 30, 1990 is thus 39,191 acre-feet.

Requirement for Make-up Water Delivery in 1990-91

Because of the existence of an Accrued Debit on September 30, 1990, the Upper Area is under obligation to deliver Make-up Water to the Lower Area during 1990-91. Paragraph 5(f) of the Judgment outlines the procedure for such deliveries. The Upper Area's obligation to provide Make-up Water during water year 1990-91 will be an amount not less than the sum of: (1) one-third of the Accrued Debit of the Upper Area; and (2) that portion of such Accrued Debit of Upper Area over 25,000 acre-feet which remains after deducting said one-third. The calculation for the required delivery of Make-up Water (in acre-feet) is as follows:

39,191	Accrued Debit
<u>-13,064</u>	One-Third of Debit
26,127	Remaining Debit
1,127	Balance to reduce Accrued Debit to 25,000 acre-feet.
14,191	Required Delivery of Make-up Water during 1990-91

Summary

Table 8 presents a summary of the findings of the Watermaster for the 1989-90 water year.

TABLE 8
SUMMARY OF FINDINGS FOR WATER YEAR 1989-90

		: Quantities
		: in
Item		: Acre-feet
1.	Rainfall 1989-90, 12.4 inches	
2.	Ten-year average rainfall, 16.3 inches	
3.	Lower Area Annual Entitlement	81,800
4.	Surface Flow through Whittier Narrows	138,309
5.	Subsurface Flow through Whittier Narrows	32,100
6.	Water exported through Whittier Narrows	23,395
7.	Total Flow through Whittier Narrows	193,804
8.	Lower Area Replenishment Water	54,011
9.	Reclaimed Water	49,759
10.	Make-up Water (Surface Flow Delivery)	13,544
11.	Recirculation of Measured Water	0
12.	Unusable Surface Flow	8,781
13.	Usable Water Received by Lower Area	67,709
14.	Debit for Water Year 1989-90	14,091
15.	Accrued Debit of Upper Area as of September 30, 1989	53,379
16.	Amount of Make-up Water delivered during Water Year 1989-90	
	a. Payment for Reclaimed Water	14,735
	b. Surface Flow Delivery	13,544
	Total	28,279
17.	Adjusted Accrued Debit of Upper Area as of September 30, 1989	25,100
18.	Accrued Debit of Upper Area as of September 30, 1990	39,191
19.	Required Make-up Water to be delivered during Water Year 1990-91	14,191

CHAPTER V. LONG-TERM ACCOUNTING

Long-term Accounting is required by paragraph 5(h) of the Judgment. The first Long-term Accounting period under the Judgment included the 16 water years from 1963-64 through 1978-79. The second Long-term Accounting period began October 1, 1979. The first and second Long-term Accounting periods are discussed in this Chapter.

The Watermaster is required from time to time, but not sooner than 15 years nor more than 25 years after September 30, 1963 and after the close of each Long-term Accounting period, to make a Long-term Accounting of the aggregate amount of Usable Water and Make-up Water received by the Lower Area. A Long-term Accounting is to be made sooner than 25 years if the average annual rainfall for a period of 15 or more years is at least 18 inches but not more than 19 inches.

The amount of such water received during the Long-term Accounting period is compared to a theoretical amount comprised of the base period annual entitlement (98,415 acre-feet) multiplied by the number of years in the period and then adjusted by the ratio of the average annual rainfall for the period to the long-term average annual rainfall (18.52 inches).

First Long-term Accounting

As reported in the Sixteenth Annual Report, the First Long-term Accounting under the Judgment occurred as of September 30, 1979 for the period of 16 water years 1963-64 through 1978-79. The rainfall for the period averaged 18.16 inches resulting in a total entitlement of 1,544,031 acre-feet for the 16-year period. The amount of

Usable Water and Make-up Water received was 1,376,090 acre-feet resulting in a Long-term Accounting Debit of 167,941 acre-feet.

Make-up Water Deliveries

The Judgment provides that the debit under Long-term Accounting be made up over a three-year period. Representatives of the Upper Area and Lower Area agreed that Make-up Water for the first Long-term Accounting Period could be delivered over a five-year period, requiring not less than one-fifth be delivered each year. Use of credit for Reclaimed Water, however, was limited to the first three years of the repayment period.

During the five years 1979-80 through 1983-84, the Upper Area delivered 167,941 acre-feet of Make-up Water to the Lower Area. Thus, the Make-up Water delivery for the First Long-term Accounting Period was fully satisfied. A detailed description of the deliveries is contained in the Twenty-Second Annual Report.

Second Long-term Accounting

Table 9 is a summary of operations under the Judgment showing Lower Area Annual Entitlement, Usable Water and Make-up Water received by the Lower Area and the Accrued Debit or Credit of Upper Area for each year of operation during the Second Long-term Accounting period commencing October 1, 1979.

As previously mentioned, Long-term Accounting is to be made sooner than the 25th year if the average rainfall for a period of 15 or more years is at least 18 inches but not more than 19 inches. Shown in Table 10 are the data which will be used for the Second Long-term Accounting period. As shown on Table 10, the annual rainfall for the

TABLE 9
SUMMARY OF OPERATIONS
UNDER JUDGMENT IN LONG-TERM ACCOUNTING PERIOD

(In Acre-feet)

Water Year	Entitlement	Water Received by			Accrued Credit (+) or Debit (-)
		Usable	Lower Area Make-Up	Total	
1979-80	107,600	137,175	0	137,175	+29,575
1980-81	105,700	85,917	0	85,917	+ 9,792
1981-82	111,900	94,823	0	94,823	- 7,285
1982-83	122,200	185,014	7,285	192,299	+62,814
1983-84	118,600	99,725	0	99,725	+43,939
1984-85	118,100	90,965	0	90,965	+16,804
1985-86	123,900	119,457	0	119,457	+12,361
1986-87	121,000	63,192	0	63,192	- 45,447
1987-88	106,300	85,251	20,447	105,698	- 46,049
1988-89	98,800	70,280	21,190	91,470	- 53,379
1989-90	<u>81,800</u>	<u>67,709</u>	<u>28,279</u>	<u>95,988</u>	- 39,191
Totals	1,215,900	1,099,507	77,201	1,176,709	

TABLE 10

**DATA FOR SECOND
LONG-TERM ACCOUNTING PERIOD**

Water Year	Rainfall In Inches		Water Received by Lower Area in Acre-feet			Accumulated Total	Entitlement Using Application of Long-term Accounting Formula ^(a) in Acre-feet
	Amount	Accumulated Average Annual Amount	Usable	Make-up	Total		
1979-80	34.85	34.85	137,175	0	137,175	137,175	185,192
1980-81	10.31	22.58	85,917	0	85,917	223,092	239,980
1981-82	18.88	21.35	94,823	0	94,823	317,915	340,361
1982-83	39.26	25.82	185,014	7,285	192,299	510,214	548,828
1983-84	10.56	22.77	99,725	0	99,725	609,939	604,997
1984-85	14.58	21.41	90,965	0	90,965	700,904	682,635
1985-86	21.96	21.48	119,457	0	119,457	820,361	799,011
1986-87	9.06	19.93	63,192	0	63,192	883,553	847,262
1987-88	14.88	19.37	85,251	20,447	105,698	989,251	926,387
1988-89	11.15	18.55	70,280	21,470	91,470	1,080,721	985,744
1989-90	12.35	17.99	67,709	28,279	95,988	1,176,709	1,051,585

(a) The figures shown are for informational purposes only. The second long-term accounting will be determined in accordance with paragraph 5(h) of the Judgment.

first eleven years of operation under the second Long-term Accounting period has averaged 17.99 inches.

STREAM GAGING STATIONS

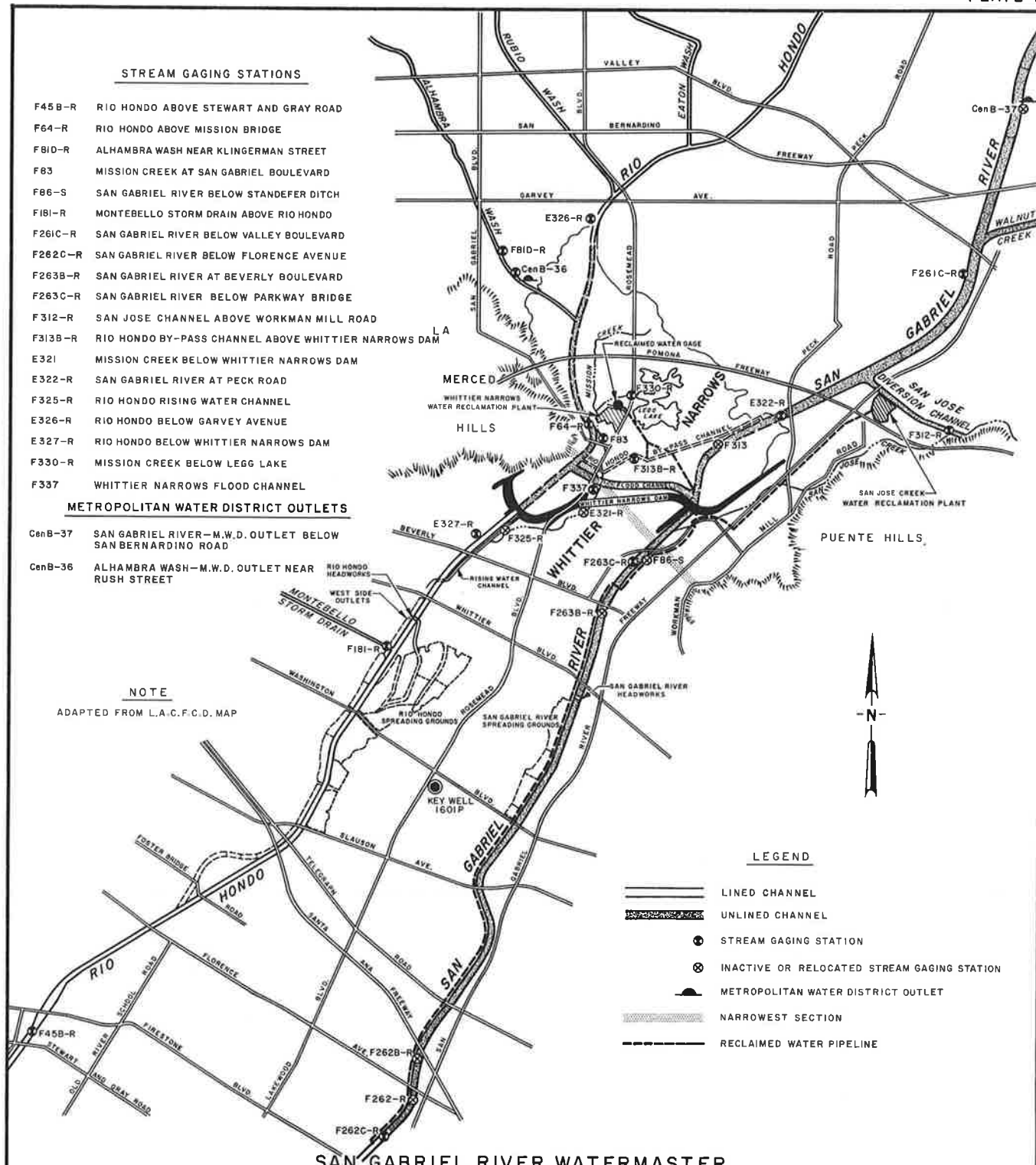
- F45B-R RIO HONDO ABOVE STEWART AND GRAY ROAD
- F64-R RIO HONDO ABOVE MISSION BRIDGE
- F81D-R ALHAMBRA WASH NEAR KLINGERMANN STREET
- F83 MISSION CREEK AT SAN GABRIEL BOULEVARD
- F86-S SAN GABRIEL RIVER BELOW STANDEFER DITCH
- F181-R MONTEBELLO STORM DRAIN ABOVE RIO HONDO
- F261C-R SAN GABRIEL RIVER BELOW VALLEY BOULEVARD
- F262C-R SAN GABRIEL RIVER BELOW FLORENCE AVENUE
- F263B-R SAN GABRIEL RIVER AT BEVERLY BOULEVARD
- F263C-R SAN GABRIEL RIVER BELOW PARKWAY BRIDGE
- F312-R SAN JOSE CHANNEL ABOVE WORKMAN MILL ROAD
- F313B-R RIO HONDO BY-PASS CHANNEL ABOVE WHITTIER NARROWS DAM
- E321 MISSION CREEK BELOW WHITTIER NARROWS DAM
- E322-R SAN GABRIEL RIVER AT PECK ROAD
- F325-R RIO HONDO RISING WATER CHANNEL
- E326-R RIO HONDO BELOW GARVEY AVENUE
- E327-R RIO HONDO BELOW WHITTIER NARROWS DAM
- F330-R MISSION CREEK BELOW LEGG LAKE
- F337 WHITTIER NARROWS FLOOD CHANNEL

METROPOLITAN WATER DISTRICT OUTLETS

- CanB-37 SAN GABRIEL RIVER-M.W.D. OUTLET BELOW SAN BERNARDINO ROAD
- CanB-36 ALHAMBRA WASH-M.W.D. OUTLET NEAR RUSH STREET

NOTE

ADAPTED FROM L.A.C.F.C.D. MAP



LEGEND

- LINED CHANNEL
- - - UNLINED CHANNEL
- STREAM GAGING STATION
- ⊗ INACTIVE OR RELOCATED STREAM GAGING STATION
- METROPOLITAN WATER DISTRICT OUTLET
- NARROWEST SECTION
- RECLAIMED WATER PIPELINE

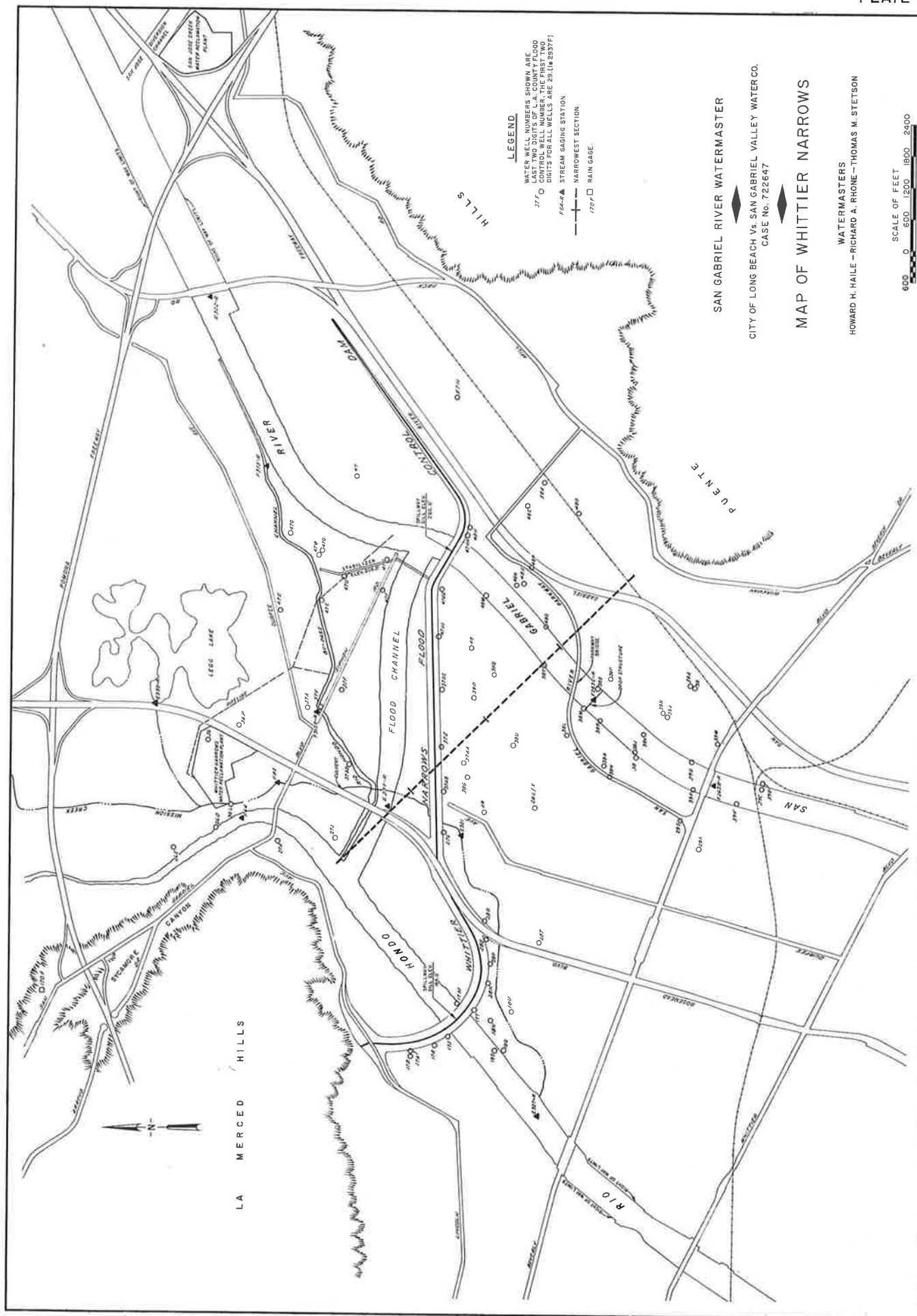
SAN GABRIEL RIVER WATERMASTER

CITY OF LONG BEACH Vs. SAN GABRIEL VALLEY WATER CO.
CASE No. 722647

STREAM GAGING STATIONS
RIO HONDO - SAN GABRIEL RIVER SYSTEM

WATERMASTERS
HOWARD H. HAILE - RICHARD A. RHONE - THOMAS M. STETSON

SCALE OF FEET
0 4000 8000



APPENDIX

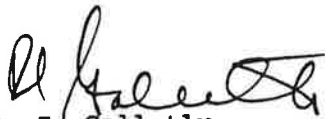
R. J. GALLETTY & CO.

Certified Public Accountants

November 7, 1990

San Gabriel River Watermaster
Security Building
100 North Brand Boulevard, Suite 600

In our opinion, the accompanying statement of Income and Expenditures for the San Gabriel Watermaster for the water year 1989-1990 presents fairly the results of its operations for the year in conformity with generally accepted accounting principles. Our examination was made in accordance with generally accepted auditing standards and accordingly included tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.



R. J. Galletly
Certified Public Accountant

SAN GABRIEL RIVER WATERMASTER
Statement of Income and Expenditures
For the Water Year 1989-1990

Carried forward from year 1988-1989		\$ 3,314.80
Income		55,000.00
Interest Income		<u>1,790.90</u>
		60,105.70
Expenditures:		
Administrative fees and general operating expenses	\$ 7,331.48	
Collection of data, field inspections and maintenance of records	4,596.74	
Calculations and preparation of Watermaster Reports for water years 1988-1989	27,672.12	
Printing and reproduction costs	<u>1,501.73</u>	
Total Expenditures		<u>41,102.07</u>
Balance		<u><u>\$19,003.63</u></u>