
NINETEENTH ANNUAL REPORT

OF THE

SAN GABRIEL RIVER WATERMASTER

FOR

1981-1982

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

February 28, 1983

SAN GABRIEL RIVER WATERMASTER

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

WATERMASTERS
MAX BOOKMAN
M. E. SALSBUURY
THOMAS M. STETSON

February 28, 1983

MAILING ADDRESS
SECURITY BLDG., SUITE 600
102 N. BRAND BLVD.
GLENDALE, CALIF. 91203
TELEPHONE: 245-1883

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

Re: Watermaster Report for 1981-82 Water Year

Gentlemen:

We have the honor of submitting the Nineteenth Annual Report of the San Gabriel River Watermaster for water year 1981-82, 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 1981-82 water year is the third year in the second Long-term Accounting Period. Rainfall in San Gabriel Valley during the 1981-82 water year was 102 percent of the long-term average of 18.52 inches as defined in the Judgment. The ten-year average rainfall from 1972-73 through 1981-82 amounted to 20.7 inches, which, according to the Judgment, established the Lower Area Annual Entitlement at 111,900 acre-feet for 1981-82. The principal findings of the Watermaster under annual accounting for the year 1981-82 of the second Long-term Accounting Period are as follows:

	<u>Acre-feet</u>
1. Lower Area Annual Entitlement	111,900
2. Usable Water received by Lower Area	94,823
3. Debit for Water Year 1981-82	17,077
4. Accrued Credit of Upper Area as of September 30, 1981	9,792
5. Accrued Debit of Upper Area as of September 30, 1982	7,285
6. Amount of Make-up Water required to be delivered prior to October 1, 1983	2,428

The first Long-term Accounting Period covered the 16-year period 1963-64 through 1978-79 and resulted in a Long-term Accounting debit of 167,941 acre-feet. While the Judgment requires that the Debit under Long-term Accounting be delivered over a three-year period, Upper and Lower area representatives have agreed that it will be delivered over a five-year period, requiring that not less than one-fifth, or 33,588 acre-feet be delivered each year.

During the first three years, the Upper Area delivered 109,548 acre-feet which is 8,784 acre-feet in excess of the three-year Makeup requirement of 100,764 acre-feet (33,588 acre-feet times 3). Thus, the minimum amount of long-term Makeup Water which should be delivered in 1982-83 is 24,804 acre-feet.

The majority of the data required by the Watermaster is furnished by the Los Angeles County Flood Control District. The cooperation and assistance furnished by that District and other public agencies are gratefully acknowledged.

Very truly yours,

SAN GABRIEL RIVER WATERMASTER

By:

Max Bookman
Max Bookman

M. E. Salsbury
M. E. Salsbury

Thomas M. Stetson
Thomas M. Stetson

Enclosure

TABLE OF CONTENTS

	<u>Page</u>
CHAPTER I. ACTIVITIES OF WATERMASTER	1
Administration.....	1
Watermaster Personnel.....	3
Data Collection.....	3
Field Inspections.....	5
Preparation of Annual Report.....	5
Stream Gaging Stations.....	5
Rio Hondo Above Mission Bridge, F64.....	6
Mission Creek at San Gabriel Boulevard, F83.....	6
Whittier Narrows Flood Channel, E337-R.....	6
Rio Hondo By-pass Channel, F313-R.....	7
Memorandum of Understanding.....	7
Transfer of Water Rights, Change of Address and Change of Name.....	9
CHAPTER II. LOWER AREA ANNUAL ENTITLEMENT	10
CHAPTER III. USABLE WATER	12
Surface Flow.....	12
Rio Hondo Above Mission Bridge, Station F64.....	12
Mission Creek at San Gabriel Boulevard, Station F83.....	13
Rio Hondo By-Pass Channel (Zone I Ditch) Station F313-R.....	13
Whittier Narrows Flood Channel, Station E337-R.....	13
Sycamore Canyon.....	14
San Gabriel River Below Parkway Bridge Station F263C-R.....	14
Reclaimed Water Delivered to Rio Hondo below Station F64.....	14

TABLE OF CONTENTS (Cont'd.)

	<u>Page</u>
Reclaimed Water Delivered to San Gabriel	
River Below Station F263C-R.....	15
Adjustments to Surface Flow.....	16
Rio Hondo Adjustment.....	17
Summary of Surface Flow.....	19
Subsurface Flow.....	21
Export to Lower Area.....	21
Lower Area Replenishment and Make-up Water.....	22
Reclaimed Water.....	24
Whittier Narrows Water Reclamation Plant.....	24
Pomona Water Reclamation Plant.....	24
San Jose Creek Water Reclamation Plant.....	25
Summary of Reclaimed Water.....	25
Make-up Water by Surface Flow Delivery.....	26
Recirculation of Measured Water.....	26
Unusable Surface Flow.....	26
Determination of Usable Water.....	28
Quality of Water.....	28
 CHAPTER IV. ANNUAL ACCOUNTING AND MAKE-UP WATER REQUIREMENTS	 31
Accrued Debit as of September 30, 1982.....	31
Requirement for Make-up Water in 1982-83.....	31
Summary.....	31
 CHAPTER V. LONG-TERM ACCOUNTING	 33
First Long-term Accounting.....	33
Make-up Deliveries.....	34
Make-up Deliveries in 1979-80 and 1980-81...	34
Make-up Deliveries in 1981-82.....	34
Summary.....	35
Second Long-term Accounting.....	35

TABLES

<u>Table No.</u>		
1	Statement of Income and Expenditures for the Water Year 1981-82	2
2	Watermaster Budget for Water Year 1982-83	4
3	Average Annual Rainfall in San Gabriel Valley	11
4	Adjustment to Rio Hondo Inflow	18
5	Summary of Surface Flow through Whittier Narrows for Water Year 1981-82	20
6	Usable Water for Water Year 1981-82	29
7	Mineral Analyses Representative of Sources of Water Passing through Whittier Narrows Water Year 1981-82	30
8	Summary of Findings for Water Year 1981-82	32
9	Actual and Minimum Future Deliveries of Make-up Water for First Long-term Accounting Period	36
10	Summary of Operations Under Judgment in Second Long-term Accounting Period	37
11	Data for Second Long-term Accounting Period	38

PLATES (following text)

<u>Plate No.</u>	
1	Stream Gaging Stations, Rio Hondo-San Gabriel River System
2	Map of Whittier Narrows

APPENDIX

Parties to Judgment.....	A-1
Letter dated December 23, 1982 from R. J. Galletly, CPA, concerning audit of Watermaster funds.....	A-2
San Gabriel River Watermaster Statement of Income and Expenditures for the Water Year 1981-82.....	A-3
Letter regarding Transfer of Cross Water Company to City of Industry.....	A-4
Memorandum of Understanding between the Lower Area Parties and Upper Parties, dated May 13, 1982.....	A-6

CHAPTER I. ACTIVITIES OF WATERMASTER

This report covers the nineteenth 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. This average annual entitlement is based on long-term average annual rainfall for the San Gabriel Valley, determined under the Judgment to be 18.52 inches. The Twelfth Annual Watermaster Report 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 to September 30.

Administration

The official office and depository of records of the Watermaster is at 102 North Brand Boulevard, Glendale, California, and such records are available for inspection at the request of any party.

An audit of expenditures of the Watermaster for the water year 1981-82 was obtained. This audit was performed by the firm of R. J. Galletly, CPA. Presented in Table 1 is the Statement of Income and Expenditures for the water year 1981-82 based on Mr. Galletly's letter of December 23, 1982, which is presented in the Appendix.

TABLE 1
STATEMENT OF INCOME AND EXPENDITURES
FOR THE WATER YEAR 1981-82

Carried forward from year 1980-81		\$29,019.10
Income from assessments		12,000.00
Interest Income		<u>1,486.77</u>
Total Income		\$42,505.87
Expenditures:		
Administrative fees and general operating expenses	\$ 5,308.19	
Collection of data, field in- spections and maintenance of records	5,129.09	
Calculations and preparation of Watermaster Reports for the Water Year 1980-81	11,871.57	
Printing and reproduction costs	<u>732.99</u>	
Total expenditures		<u>\$23,041.84</u>
Balance		\$19,464.03

The tentative budget for the current water year (1982-83) was transmitted to the Parties on July 6, 1982. Following a period of 15 days after filing of the tentative budget, there being no objections thereto, the tentative budget became the final budget and is set forth in Table 2.

Watermaster Personnel

The Judgment provided for the appointment of a three-man 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-man Watermaster was appointed and certified by the Court. The Upper Area is represented by Thomas M. Stetson, the Lower Area by Max Bookman, and both areas by M. E. Salsbury.

Since initiation of the Watermaster activities, much of the staff work has been accomplished or directed by Donald Howard of Stetson Engineers Inc., and Richard Rhone of Bookman-Edmonston Engineering, Inc.

Data Collection

The Watermaster collects data on streamflow, rainfall, water quality, ground water levels, export of ground water through Whittier Narrows, reclaimed water, replenishment water and other information as required. The principal source of data is the Los Angeles County Flood Control District. Copies of appropriate records were obtained from the District and many conferences were held between Flood Control District personnel and Watermaster personnel in order that the Watermaster would be fully informed on the facts necessary to make 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

TABLE 2
WATERMASTER BUDGET
FOR
WATER YEAR 1982-83

1.	Administrative fees of Watermaster and general operating expenses	\$ 9,000
2.	Hydrologic analyses, collection of data and field inspection	5,000
3.	Calculations and preparation of Watermaster Report for Water Year 1981-82	13,000
4.	Printing and reproduction costs	1,000
5.	Contingencies	<u>3,000</u>
	Total	\$31,000
	Estimated carryover from 1981-82	<u>19,000</u>
	To be financed for 1982-83	\$12,000

Proration for Payment Purposes

Upper San Gabriel Valley Municipal Water District	50%	\$ 6,000.00
Central Basin Municipal Water District	41.2%	4,944.00
City of Long Beach	7.125%	855.00
City of Compton	1.675%	<u>201.00</u>
Total		\$12,000.00

District, the San Gabriel Valley Municipal Water District, the San Gabriel Valley Water Company, the U. S. Army Corps of Engineers, and the U. S. Geological Survey.

Field Inspections

During the 1981-82 water year, Watermaster personnel made several field inspections of gaging stations and other facilities in the area.

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 other interested parties upon request.

Stream Gaging Stations

The Los Angeles County Flood Control District 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 1, entitled "Map of Whittier Narrows," shows in greater detail certain features in Whittier Narrows.

During the last several water years, there have been periods of high flow. The accuracy of measuring some of these high flows is at times questionable. Also, physical changes are occurring at several of the stream gaging stations. These problems and their resolutions are discussed in the following sections.

Rio Hondo Above Mission Bridge, F64

On August 17, 1978, the flow recorder at the station was removed (thus changing the designation from "F64-R" to "F64") reportedly due to high maintenance costs and very poor control at the station caused by a shifting sand bottom. The District has made periodic current meter measurements and a record has been synthesized utilizing the measured flow from Alhambra Wash (F81D-R) and Rio Hondo below Garvey (E326-R). During low flows, the Garvey station record appears to be accurate. At higher flow rates, the record at Garvey does not appear to be as reliable.

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".) The channel had also been realigned making reestablishment of the station difficult. Historically, the great majority of the water carried in Mission Creek was rising water. The Flood Control District made numerous current meter measurements at this station during 1981-82, which data were used to determine the annual flow.

Whittier Narrows Flood Channel, E337-R

Since construction work has 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 for 1981-82, 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 Station by Flood Control District 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. The existing station does, however, provide data on the relative magnitude of flows and days of flow.

Rio Hondo By-pass Channel, F313-R

The gaging station on the Rio Hondo By-pass Channel, Station F313-R (also known as the Zone 1 Ditch), is subject to numerous shifts in control due to weed growth. As discussed in Chapter III, it was found necessary to adjust the flow on several days. The Flood Control District has budgeted funds to install a Parshall Flume in the Zone I Ditch, thus solving this problem. This work is expected to occur in the summer of 1983.

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 included in the appendix of this report. The document recognizes the need for a continuing cooperative working relationship between the Upper and Lower Area Parties. The purpose of the agreement is to institute under present conditions certain practical accommodations which are not intended to constitute interpretations of or additions to the Judgment. Agreement in three areas is set forth in the Memorandum which are summarized below:

1. During years in which replenishment water may be short, the Upper Area Parties will assist the Lower Area Parties in trying to attain satisfaction of their declared rights under the Judgment, or to obtain adequate replenishment water, or otherwise to help protect the Lower Area against damage from any shortage. Such efforts by Upper Area shall not substitute, however, for any rights which the Lower Area Parties may have under the Long Beach Judgment.
2. Upper Area may make payments for replenishment water in lieu of surface flow delivery if there are temporary conditions which make it physically impossible to deliver Make-up Water. This provision excludes the mere unavailability of imported water for replenishment. The determination of these conditions is to be made by the Watermaster upon the written request of any of the Parties. Conditions contemplated in this section are similar to those which occurred in 1979-80 when the Upper Area was not able to make its full delivery of Make-up Water. This was because of construction activities in some of the channels.
3. The Upper Area may make payments for Reclaimed Water as Make-up Water from first the Whittier Narrows Plant and next the San Jose Plant up to the limits in the Judgment, so long as the Whittier Narrows Plant is capable of producing 14,735 acre-feet per year, but did not do so. This allows for flexibility in obtaining Reclaimed water for spreading and is possible so long as the Lower Area is obtaining all of the Reclaimed water for which it has a need.

The Memorandum of Understanding became effective on October 1, 1981, and can be terminated at the end of the water year by any party with 90 days written notice prior to the end of the water year or by any party with 90 days written notice for Item 3 above.

Transfer of Water Rights
Change of Address and Change of Name

In the event of a change in ownership of the water rights or change of address of any of the parties, the Judgment requires that the Watermaster shall be notified in writing of such changes along with certain specified information. The Watermaster is then required to advise all parties.

The Watermaster has been advised that the City of Industry has acquired interests in the Cross Water Company. A copy of the notice is included in the appendix. However, Cross Water Company and the City of Industry have not fully complied with Section 5(k) of the Judgment.

CHAPTER II. LOWER AREA ANNUAL ENTITLEMENT

The Lower Area Annual Entitlement for the water year 1981-82 is based on the average annual rainfall which occurred in the 10-year period ending with water year 1981-82 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 1981-82 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	22.08
102C	19711 East Valley Blvd., Walnut	16.15
108D	3615 North Santa Anita Avenue, El Monte	16.72
610B	City Hall, Pasadena	<u>20.56</u>
	Average rainfall	18.88

Table 3 presents the calculation of the 10-year average rainfall in the San Gabriel Valley for the water years 1972-73 through 1981-82.

Based on the 10-year average rainfall of 20.7 inches, the Lower Area Annual Entitlement for the water year 1981-82 is 111,900 acre-feet, determined from Table A of the Judgment.

TABLE 3
AVERAGE ANNUAL RAINFALL IN SAN GABRIEL VALLEY
1972-73 through 1981-82

<u>Water Year</u>	<u>Rainfall in Inches</u>
1972-73	22.4
1973-74	16.8
1974-75	14.9
1975-76	12.1
1976-77	14.5
1977-78	38.4
1978-79	23.9
1979-80	34.8
1980-81	10.3
1981-82	<u>18.9</u>
Total	207.0
10-Year Average	20.7

CHAPTER III. USABLE WATER

Presented in this Chapter is the determination of the quantity of Usable Water received by the Lower Area during the water year 1981-82. 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 flow where applicable. Some measurements were found to be in error and appropriate adjustments were made. These adjustments are discussed later in this Chapter.

Rio Hondo Above Mission Bridge, Station F64

As discussed in Chapter I, the recorder at Station F64 was removed as it was determined to be unreliable due to backwater and other conditions. The flow at Station F64 has been determined by using the recorded flow from Alhambra Wash (Station F81D-R), Rio Hondo below Garvey Avenue (Station E326-R) and Rio Hondo at Lower Azusa Road (Station F192-R). In addition, periodic current meter measurements are made at Station F64, which measurements constitute in part rising water which occurs below the other two stations.

Using this information, the flow at Station F64 was synthesized. During June and September 1982, water released from Morris Reservoir flowed past Station F64. The release was controlled so it would increase the amount of Usable Water reaching the Lower Area. During that time, flow data at the Rio Hondo Spreading Ground intakes and other stations were used to reconstruct the flow at Station F64. By using the above procedures, it was determined that the flow for

water year 1981-82 was 32,820 acre-feet. 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. Periodic measurements are made by the Flood Control District hydrographer. Using these measurements, it was determined that there was 53 acre-feet of flow at Station F83 for the water year 1981-82.

Rio Hondo By-pass Channel (Zone I Ditch), Station F313-R

The measured flow at Station F313-R for the water year 1981-82 as determined by the Flood Control District was 22,760 acre-feet. Detailed analysis of this record and comparison with other stations indicated that the quantity should be adjusted to a total flow for the water year of 24,623 acre-feet.

Whittier Narrows Flood Channel, Station E337-R

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. During water year 1981-82, the flow recorded at Station E337-R was 41,810 acre-feet. The record for this year also included Rio Hondo By-pass flow and a portion of the Whittier Narrows Water Reclamation Plant flow, which amounts had previously not been included in the flow as they are measured more accurately elsewhere. Also, as stated in Chapter I, this station is subject to considerable error for numerous reasons, including backwater conditions from the recently increased conservation

pool. 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 Whittier Narrows Dam on the San Gabriel River side. Using this information, the flow into the flood channel for the 1981-82 water year was determined to be 29,930 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 Merced Hills northwesterly of Whittier Narrows and enters the Rio Hondo below Station F64, Rio Hondo above Mission Bridge. During the water year 1981-82, precipitation at Station 170F was 15.55 inches. Referring to Table 6 of Exhibit B of the Judgment, the runoff from Sycamore Canyon was determined to be 125 acre-feet.

San Gabriel River Below Parkway Bridge, Station F263C-R

The flow at the San Gabriel River below Parkway Bridge for the 1981-82 water year was recorded by the Flood Control District to be 23,160 acre-feet.

Reclaimed Water Delivered to Rio Hondo Below Station F64

Water from the Whittier Narrows Water Reclamation Plant is delivered to either the San Gabriel River or Rio Hondo. Of the total production of 14,256 acre-feet of Reclaimed Water during the 1981-82 water year, 10,399 acre-feet was delivered to Rio Hondo. This flow was delivered below the F64 gage and must, therefore, be added as Surface Flow.

The balance of the Reclaimed Water from the Whittier Narrows Plant in the amount of 3,857 acre-feet was delivered to the San Gabriel River and accounted for in the flows at the Parkway Bridge Station, F263C-R.

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

Prior to November of 1972, all Reclaimed Water delivered to the San Gabriel River was delivered above the gaging station near Parkway Bridge. In November of 1972, the Central and West Basin Water Replenishment District began purchasing and taking delivery of treated effluent from the San Jose Creek Water Reclamation Plant.

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. Treated effluent from this plant is carried in a pipeline which generally parallels the San Gabriel River to a point south of Florence Avenue where the effluent 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 pipeline so that Reclaimed Water can be delivered to either the San Gabriel River Spreading Grounds or the unlined portion of the San Gabriel River for ground water recharge.

During the 1981-82 water year, 15,284 acre-feet of Reclaimed Water from the San Jose Creek Water Reclamation Plant was delivered to the spreading grounds or unlined portion of the river for replenishment purposes. The water is metered by use of a propeller meter in the turnout facility. The balance of the treated effluent was delivered to the lined channel of the San Gabriel River and was not used for ground water replenishment. The amount of Reclaimed Water delivered for ground water replenishment has been

included as Surface Flow but is deducted in calculating Usable Water.

Adjustments to Surface Flow

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

During the 1981-82 water year, high runoff conditions occurred during and following storms. However, the frequency of hydrographers visiting stream gaging stations was less than in prior years because of staffing problems of the Flood Control District. As a result, certain inconsistencies 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, therefore, greatly distort the determination of Usable Surface Flow. It is also noted that in recent years the amount of storm runoff through Whittier Narrows has increased over that which occurred during the base period and through the 1960's. This increase is the result of urbanization and channel lining and results in not only an increase in the total flow but also tends to produce higher peak flows of a shorter duration, both of which tend to make less reliable the measuring program.

Accordingly, the Watermaster, after evaluating the available data, determined that for certain periods of time adjustments should be made in the 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 spread in Rio Hondo Spreading Grounds (measured by flumes) 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 as to which of the methods is the more reliable.

Changes in the method of determining Surface Flow can be made under the terms of the Judgment. Reference is made to Exhibit B, Article III, Section A of the Judgment 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 water year 1981-82, the Watermaster decided to apply the alternative method during certain periods of time to the Rio Hondo side of Whittier Narrows. It was not necessary to make an adjustment to flow on the San Gabriel River side as set forth earlier in this Chapter.

Rio Hondo Adjustment - 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 19 of the days for the period November 26, 1981 through April 1, 1982.

TABLE 4
ADJUSTMENT TO RIO HONDO INFLOW

Item	Amounts in Acre-feet for 19 of the days during the period November 26, 1981 through April 1, 1982	
A. <u>UNADJUSTED INFLOW</u>		
Rio Hondo above Mission Bridge, F64	16,582	
Mission Creek at San Gabriel Boulevard, F83	4	
Rio Hondo By-pass Channel	857	
Whittier Narrows Flood Channel, E337-R	28,243	
Sycamore Canyon	35	
Ungaged Reclaimed Water	<u>644</u>	
Total Unadjusted Inflow		46,365
B. <u>ADJUSTED INFLOW</u>		
Infiltration		
Spreading grounds infiltration	12,764	
Reservoir area infiltration	1,428	
Total Infiltration		14,192
Change in Reservoir Storage		+3,870
Outflow at Stewart and Gray Road		<u>16,177</u>
Total Adjusted Inflow		34,239
C. <u>ADJUSTMENT</u>		
Adjustment to Rio Hondo Inflow (B-A)		-12,126

The unadjusted inflow in the Rio Hondo as set forth in Table 4 was 46,365 acre-feet during the 19 days of the critical period. The outflow during the same days (calculated on a daily basis from stream gaging measurements as provided in the Judgment) was 16,177 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 outflow as measured at Stewart and Gray Road was accepted.

The infiltration in Montebello Forebay during the 19 days was calculated to be 14,192 acre-feet. This included the amount delivered to the spreading grounds (measured by weirs or flumes) 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 3,870 acre-feet during the 19 days. The inflow is therefore adjusted by adding the quantity of infiltration (14,192 acre-feet) to the outflow (16,177 acre-feet) and adding the increase in storage (3,870 acre-feet) to determine the adjusted inflow in the amount of 34,239 acre-feet.

As determined, the adjustment to the Rio Hondo inflow is a decrease of 12,126 acre-feet. As discussed above, the adjustment relies on the spreading ground inflow (measured by flumes) and estimated infiltration in Whittier Narrows Reservoir. These latter values provide a more accurate determination of Usable Water during high flows than taking the difference between high storm flow measurements.

Summary of Surface Flow

A total of 124,268 acre-feet of surface water flowed through Whittier Narrows during the water year 1981-82. Table 5 shows the components and the total Surface Flow.

TABLE 5
SUMMARY OF SURFACE FLOW THROUGH WHITTIER NARROWS
FOR WATER YEAR 1981-82

	<u>Amount in acre-feet</u>
Rio Hondo above Mission Bridge, Station F64	32,820
Mission Creek at San Gabriel Boulevard, Station F83	53
Rio Hondo By-pass Channel, Station F313-R	24,623
Whittier Narrows Flood Channel, Station E337-R	29,930
Sycamore Canyon	125
San Gabriel River below Parkway Bridge, Station F263C-R	23,160
Reclaimed Water from Whittier Narrows Plant Delivered to Rio Hondo below Station F64	10,399
Reclaimed Water from San Jose Plant Delivered to San Gabriel River below Station F263C-R	15,284
Adjustment to Rio Hondo Inflow (Table 4)	<u>-12,126</u>
Total Surface Flow	124,268

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.

In the spring of 1981, the Los Angeles County Flood Control District drilled a new observation well in the Whittier Narrows Area. This well (designated 2938U) is located in an area where wells have been abandoned and is very helpful in determining Subsurface Flow. The location of the well is shown on Plate 2.

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 water year 1981-82 which amounted to 29,900 acre-feet.

<u>Time</u>	<u>Subsurface Flow in Acre-feet</u>
Spring 1980	24,500
Fall 1980	33,200
Spring 1981	30,700
Fall 1981	29,200
Spring 1982	28,500
Fall 1982	<u>33,200</u>
Subsurface Flow 1981-82	29,900

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 water year 1981-82, 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 total export for each of the four exporters in water year 1981-82, as shown by reports filed with the Main San Gabriel Basin Watermaster, is shown below.

<u>Exporter</u>	<u>Acre-feet</u>
California Domestic Water Company	9,766
San Gabriel Valley Water Company	266
Southwest Suburban Water	9,337
City of Whittier	<u>6,605</u>
Total	25,974

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 and Make-up Water

Imported water for Lower Area Replenishment and Make-up Water was delivered to the Lower Area from The Metropolitan Water District of Southern California and also by the San Gabriel Valley Municipal Water District.

The Lower Area purchases replenishment water from Metropolitan Water District. 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 Flood Control District.

The Upper Area also used some of these Metropolitan connections to deliver imported Make-up Water to the Lower Area. During water year 1981-82, the amount of imported water purchased from Metropolitan for replenishment was 25,721 acre-feet. Of this amount, 23,665 acre-feet was delivered to San Dimas Wash and 2,056 acre-feet was delivered to Thompson Creek. Of the amount of water delivered, 21,125 acre-feet was purchased by the Upper Area as Make-up Water and the remaining amount of 4,596 acre-feet was purchased by or on behalf of the Lower Area.

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 a District pipeline into the 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 data of the Flood Control District. During the 1981-82 water year, the delivery to the Lower Area as Make-up Water by the San Gabriel Valley Municipal Water District amounted to 9,738 acre-feet.

Provision is made in the Judgment for the deduction of evaporation losses upstream of Whittier Narrows occurring during conveyance of replenishment water through San Gabriel Valley to Whittier Narrows. The calculated amount of evaporation during the 1981-82 water year was 148 acre-feet. This amounted to 133 acre-feet evaporating from the San Dimas releases and 15 acre-feet from the Thompson Creek releases. Based on daily flows, 147 acre-feet of evaporation was assigned to the Upper Area and one acre-foot of evaporation was assigned to the Lower Area.

The net amount of Lower Area Replenishment Water after deducting evaporation losses amounted to 4,595 acre-feet and the net amount of Upper Area Make-up Water after deducting evaporation losses is 20,978 acre-feet delivered through Metropolitan connections and 9,738 acre-feet delivered by the San Gabriel Valley Municipal Water District. The amount of Make-up Water delivered by the Upper Area totaled 30,716 acre-feet.

Reclaimed Water

During 1981-82, Reclaimed Water used for replenishment of the Montebello Forebay came from three separate treatment plants, each of which is operated by the Los Angeles County Sanitation Districts.

Whittier Narrows Water Reclamation Plant

The total amount of Reclaimed Water produced at the Whittier Narrows Water Reclamation Plant during 1981-82 was 14,256 acre-feet. During storm periods, 123 acre-feet of such Reclaimed Water delivered to the Rio Hondo was included in the outflow from the Montebello Forebay. Therefore, a total of 14,133 acre-feet of such Reclaimed Water was spread in the Montebello Forebay during 1981-82.

Pomona Water Reclamation Plant

County Sanitation District No. 21 owns and operates a sewage treatment and water reclamation plant near the City of Pomona. A portion of the reclaimed water is sold for industrial, agricultural, landscaping and other uses. During 1981-82, 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 Valley. A study was conducted in water year 1975-76 to verify the factors utilized in determining the portion of Pomona Plant effluent generated in San Gabriel Valley. As a result of the study, it was concluded that the factors had not changed from those developed for the Fifth Annual Watermaster Report.

The total production at the Pomona Water Reclamation plant during 1981-82 was 9,997 acre-feet. The total sales were 5,419 acre-feet, resulting in 4,630 acre-feet of Reclaimed Water discharged to San Jose Creek. It was determined by the Watermaster that 1,215 acre-feet percolated and commingled with ground water in the San Gabriel Valley above Whittier Narrows; that 263 acre-feet wasted to the ocean and that 3,152 acre-feet percolated in the Montebello Forebay. The portion of this Reclaimed Water which was generated in the watershed of the San Gabriel River System was calculated to be 1,734 acre-feet.

San Jose Creek Water Reclamation Plant

As discussed earlier in this chapter, the Central and West Basin Water Replenishment District purchases Reclaimed Water from the San Jose Creek Water Reclamation Plant. During the 1981-82 water year, 15,284 acre-feet of Reclaimed Water from the San Jose Creek Water Reclamation Plant was delivered to the Lower Area for replenishment. The total plant effluent in 1981-82 was approximately 32,800 acre-feet.

Summary of Reclaimed Water

The total amount of reclaimed water which should be deducted from the inflow is 31,151 acre-feet for the water

year 1981-82. This is comprised of 14,133 acre-feet from the Whittier Narrows Water Reclamation Plant, 1,734 acre-feet from the Pomona Water Reclamation Plant which originated within the San Gabriel River watershed, and 15,284 acre-feet from the San Jose Creek Water Reclamation Plant.

Make-up Water by Surface Flow Delivery

During 1981-82, the Upper Area purchased 21,125 acre-feet of Metropolitan Water District Replenishment Water for delivery to the Lower Area as Make-up Water. This water was delivered through Metropolitan connections at San Dimas Wash and Thompson Creek. The San Gabriel Valley Municipal Water District added 9,738 acre-feet of State Project water from its own facilities which was delivered as Make-up Water. The evaporation of Make-up Water was determined to be 147 acre-feet, resulting in a net delivery of Make-up Water of 30,716 acre-feet from that source. This water was delivered for the purpose of eliminating the debit which resulted from the first Long-term Accounting.

Recirculation of Measured Water

During the water year 1981-82, there was no recirculation of measured water as defined in Paragraph 3(1) (6) of the Judgment.

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 F262B-R. This surface outflow may be comprised of water from the San Gabriel Valley and of local

storm water which enters the channels downstream of Whittier Narrows.

During water year 1981-82, measured surface outflow from the Montebello Forebay in the Rio Hondo at Station F45B-R was 20,771 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 4,517 acre-feet and the Unusable Surface Flow in the Rio Hondo was 16,254 acre-feet. The total amount of Local Storm Inflow was calculated to be 4,823 acre-feet.

The total flow of the San Gabriel River at Florence Avenue, Station F262B-R, was gaged to be 723 acre-feet for the 1981-82 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 2,764 acre-feet based on a correlation with the Montebello Storm Drain. The Local Storm Outflow on the San Gabriel River was determined to be 677 acre-feet.

The gaging station at Florence Avenue has been relocated upstream a distance of 1,400 feet from the location used in the Judgment. An adjustment in the Surface Outflow calculations has been made by the Watermaster to allow for infiltration in the 1,400 feet of channel between the present

location of the station and the original location. Analyses of daily flows, in accordance with provisions in the Judgment (along with an adjustment to allow for the moving of the gaging station), indicated a total outflow from the Montebello Forebay in the San Gabriel River of San Gabriel Valley water in the amount of 24 acre-feet during 1981-82 which is Unusable Surface Flow.

The total Unusable Surface Flow passing through the Montebello Forebay in the Rio Hondo and San Gabriel River in water year 1981-82 was 16,278 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 and Unusable Surface Flow. Table 6 presents the determination of Usable Water for water year 1981-82.

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, Los Angeles County Sanitation Districts, Los Angeles County Flood Control District, and the Metropolitan Water District. Table 7 is illustrative of the quality of the different sources of water supply.

TABLE 6

USABLE WATER FOR WATER YEAR 1981-82

	Amount in Acre-feet	
Surface Flow	124,268	
Subsurface Flow	29,900	
Export to Lower Area	<u>23,395</u>	
Subtotal		177,563
Less:		
Lower Area Replenishment Water	4,595	
Reclaimed Water	31,151	
Make-up Water by Surface Flow Delivery	30,716	
Recirculation of Measured Water	0	
Unusable Surface Flow	<u>16,278</u>	
Subtotal		<u>82,740</u>
Usable Water		94,823

TABLE 7
MINERAL ANALYSES REPRESENTATIVE OF SOURCES
OF WATER PASSING THROUGH WHITTIER NARROWS
WATER YEAR 1981-82

	Untreated State Project Water (a)	Untreated Colorado River Water (b)	Whittier Narrows Water Recla- mation Plant	San Jose Creek Water Recla- mation Plant	Pomona Water Recla- mation Plant	Storm Flow (c)	Sub- surface Flow (d)
Date	5-17-82	5-17-82	4-5-82	4-6-82	4-12-82	1-5-82	3-24-82
pH	8.06	8.18	6.90	7.00	7.20	7.1	8.0
EC x 10 ⁶	380	1,120	945	995	1,045	89	438
<u>CATIONS, mg/l</u>							
Calcium	21	84	41	52	59	8	64
Magnesium	10	30	12	15	14	1	6
Sodium	36	108	94	100	103	4	20
Potassium	2	5	13	13	13	2	3
<u>ANIONS, mg/l</u>							
Carbonate	0	0	0	0	0		
Bicarbonate	79	154	285	251	293	22	153
Sulfate	45	300	75	77	106	9	39
Chloride	40	94	150	117	104	3	16
Nitrate as NO ₃	3.4	0.9					
Fluoride	0.15	0.38	0.88	0.67	0.61	0.14	0.29
Total Dissolved Solids	209 (e)	708 (e)	467 (g)	550 (g)	558 (g)	88 (g)	272 (g)
Total Hardness as CaCO ₃	92	333	164	197	212	23	183
Boron	0.18	0.14	0.69	0.70	0.44	0.12	0.21
<u>TRACE CONSTITUENTS, mg/l</u>							
Arsenic	0.002	0.004	0.0024	0.0028	0.0011		
Barium	0.025	0.058	0.02	0.03	0.03	0.022	
Cadmium	0.0001 (f)	0.0001 (f)	0.008	0.005	0.001	0.001 (f)	
Chromium, Total	0.0009	0.0004	0.02	0.01	0.02	0.020	
Lead	0.001 (f)	0.001	0.01 (f)	0.01 (f)	0.01 (f)	0.010 (f)	
Mercury	0.0002 (f)	0.0002 (f)	0.0001 (f)	0.0001	0.0001 (f)	0.001 (f)	
Selenium	0.001 (f)	0.004	0.001	0.0005 (f)	0.0011		
Silver	0.005 (f)	0.005 (f)	0.005	0.007	0.001 (f)	0.010 (f)	
<u>NUTRIENTS as N, mg/l</u>							
Ammonia			18.1	12.4	15.2	1.41	0.010 (f)
Nitrate			1.1	3.4	2.2	0.92	0.70
Organic Nitrogen			1.1	2.1	1.5	0.9	0.010 (f)

- (a) Sampled at Lake Silverwood. Trace analyses reported from 1982 semiannual report.
(Sample taken from Devil Canyon Afterbay).
(b) Sampled at Lake Mathews. Trace analyses reported are from 1982 semiannual report.
(c) At Rio Hondo Headworks.
(d) Well No. 2S/11W-5G1 (LACFCD No. 2947Q as shown on Plate 2).
(e) By summation, including one-half of bicarbonates plus silica.
(f) Actual amount is less than value shown.
(g) By evaporation at 180°C.

CHAPTER IV. ANNUAL ACCOUNTING AND MAKE-UP WATER REQUIREMENTS

Under terms of the Judgment, 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.

Accrued Debit as of September 30, 1982

The Lower Area Annual Entitlement as heretofore determined for 1981-82 was 111,900 acre-feet. The Usable Water received was 94,823 acre-feet, which resulted in a debit of the Upper Area for the water year of 17,077 acre-feet. As of September 30, 1981, there was an Accrued Credit of 9,792 acre-feet. The Accrued Debit as of September 30, 1982 is thus 7,285 acre-feet.

Requirement for Make-up Water for 1982-83

In accordance with the provisions of the Judgment, Make-up Water amounting to at least one-third of the Accrued Debit, plus that portion of the remaining Accrued Debit, if any, in excess of 25,000 acre-feet, must be delivered during water year 1982-83. Therefore, Upper District must deliver a minimum of 2,428 acre-feet of Make-up Water to the Lower Area prior to October 1, 1983.

Summary

Table 8 presents a summary of the findings of the Watermaster for the water year 1981-82.

TABLE 8
SUMMARY OF FINDINGS FOR WATER YEAR 1981-82

Item	: Quantities	
	: in	: Acre-feet
1. Rainfall 1981-82, 18.88 inches		
2. Ten-year average rainfall, 20.7 inches		
3. Lower Area Annual Entitlement		111,900
4. Surface Flow through Whittier Narrows		124,268
5. Subsurface Flow through Whittier Narrows		29,900
6. Water exported through Whittier Narrows		23,395
7. Total Flow through Whittier Narrows		177,563
8. Lower Area Replenishment Water		4,595
9. Reclaimed Water		31,151
10. Make-up Water (Surface Flow Delivery)		30,716
11. Recirculation of Measured Water		0
12. Unusable Surface Flow		16,278
13. Usable Water Received by Lower Area		94,823
14. Debit for Water Year 1981-82		17,077
15. Accrued Credit of Upper Area as of September 30, 1981		9,792
16. Amount of Make-up Water delivered during Water Year 1981-82 ^(a)		
a. Payment for Reclaimed Water		0
b. Surface Flow Delivery		0
Total		0
17. Adjusted Accrued Credit of Upper Area as of September 30, 1981		9,792
18. Accrued Debit of Upper Area as of September 30, 1982		7,285

(a) Excludes Make-up Water delivered to satisfy debit of first Long-term Accounting Period.

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, to make a Long-term Accounting of the aggregate amount of Usable Water and Make-up Water received by the Lower Area. 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). 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.

First Long-term Accounting

As reported in the Sixteenth Annual Report, it was established that 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 an entitlement of 1,544,031 acre-feet. 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 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, or 33,588 acre-feet, be delivered each year. Use of credit for Reclaimed Water, however, is limited to the first three years of the repayment period.

During 1979-80, 1980-82 and 1981-82, the Upper Area delivered 109,548 acre-feet of Make-up Water to the Lower Area. As required by the Judgment, surface deliveries of Make-up Water were scheduled through the Watermaster. The Make-up by Surface Flow Delivery was accomplished by purchase of imported water which was released to upstream channels. The Los Angeles County Flood Control District took control of the water released and spread it in the Lower Area.

Make-up Deliveries in 1979-80 and 1980-81. The Upper San Gabriel Valley Municipal Water District reimbursed the Central Basin Municipal Water District for 25,284 acre-feet of Reclaimed Water for credit in 1979-80 and 1980-81. In addition, the Upper District purchased 42,440 acre-feet of imported replenishment water, which was released to upstream channels for delivery to the Lower Area. The estimated evaporation loss from this delivery was 356 acre-feet, leaving a net surface delivery of 42,084 acre-feet and a total credit for Make-up Water delivery for the two years of 67,368 acre-feet. Thus, Make-up Water deliveries through 1980-81 water year were 192 acre-feet in excess of the minimum required deliveries which reduced the amount necessary for 1981-82 by that amount.

Make-up Deliveries in 1981-82. The Upper San Gabriel Valley Municipal Water District reimbursed the Central Basin Municipal Water District for 11,464 acre-feet of Reclaimed

Water for credit in 1981-82. In addition, the Upper San Gabriel Valley Municipal Water District and the San Gabriel Valley Municipal Water District purchased 30,863 acre-feet of imported replenishment water, which was released to upstream channels. The estimated evaporation loss from this delivery was 147 acre-feet, leaving a net surface delivery of 30,716 acre-feet and a total credit for Make-up Water delivery for 1981-82 of 42,180 acre-feet. Thus, Make-up Water deliveries for the year were 8,784 acre-feet in excess of the minimum required deliveries and will reduce the amount necessary for 1982-83 by that amount.

Summary. Shown in Table 9 is a summary of Make-up Water deliveries and requirements for the first Long-term Accounting Period.

Second Long-term Accounting

Table 10 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.

A long-term accounting is to be made sooner than 25 years 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 11 are the data which will be used for the second Long-term Accounting period. As shown on Table 11, the annual rainfall for the first three years of operation under the second Long-term Accounting period has averaged 21.35 inches.

TABLE 9

ACTUAL AND MINIMUM FUTURE DELIVERIES OF
MAKE-UP WATER FOR FIRST LONG-TERM ACCOUNTING PERIOD
(Acre-feet)

Water	: Minimum Rate of	:	:	: Minimum
Year	: Make-up Delivery	:	: Actual	: Future
	: Annual	: Accumulative	: Deliveries	: Deliveries
1979-80	33,588	33,588	21,559	
1980-81	33,588	67,176	45,809	
1981-82	33,588	100,764	42,180	
1982-83	33,588	134,352		24,804
1983-84	<u>33,589</u>	167,941		<u>33,589</u>
Total	167,941		<u>109,548</u>	58,393

TABLE 10
SUMMARY OF OPERATIONS
UNDER JUDGMENT IN SECOND 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	<u>111,900</u>	<u>94,823</u>	<u>0</u>	<u>94,823</u>	- 7,285
Totals	325,200	317,915	0	317,915	

TABLE 11
DATA FOR SECOND
LONG-TERM ACCOUNTING PERIOD

: Rainfall, :						
: in Inches :						
: : Accumulated: Water Received by Lower Area						
: : Average : in Acre-feet						
: : Annual : : : Accumulated						
Water	:Amount:	Amount	:Usable:	Make-up:	Total :	Total
1979-80	34.85	34.85	137,175	0	137,175	137,175
1980-81	10.31	22.58	85,917	0	85,917	223,092
1981-82	18.88	21.35	94,823	0	94,823	317,915

STREAM GAGING STATIONS

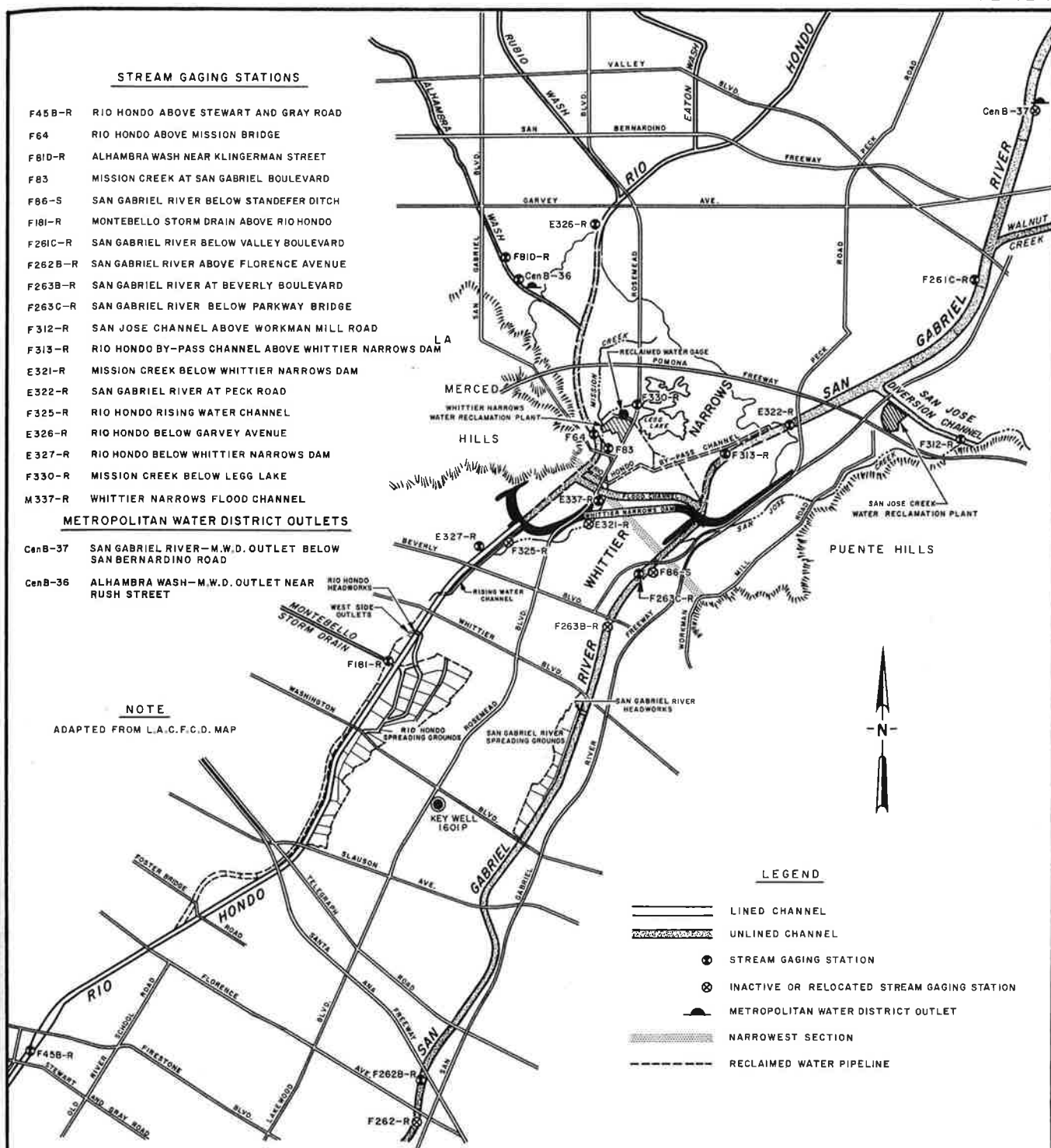
- F45B-R RIO HONDO ABOVE STEWART AND GRAY ROAD
- F64 RIO HONDO ABOVE MISSION BRIDGE
- F81D-R ALHAMBRA WASH NEAR KLINGERMAN STREET
- F83 MISSION CREEK AT SAN GABRIEL BOULEVARD
- F86-S SAN GABRIEL RIVER BELOW STANDEFER DITCH
- F181-R MONTEBELLO STORM DRAIN ABOVE RIO HONDO
- F261C-R SAN GABRIEL RIVER BELOW VALLEY BOULEVARD
- F262B-R SAN GABRIEL RIVER ABOVE 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
- F313-R RIO HONDO BY-PASS CHANNEL ABOVE WHITTIER NARROWS DAM
- E321-R 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
- M337-R WHITTIER NARROWS FLOOD CHANNEL

METROPOLITAN WATER DISTRICT OUTLETS

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

NOTE

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



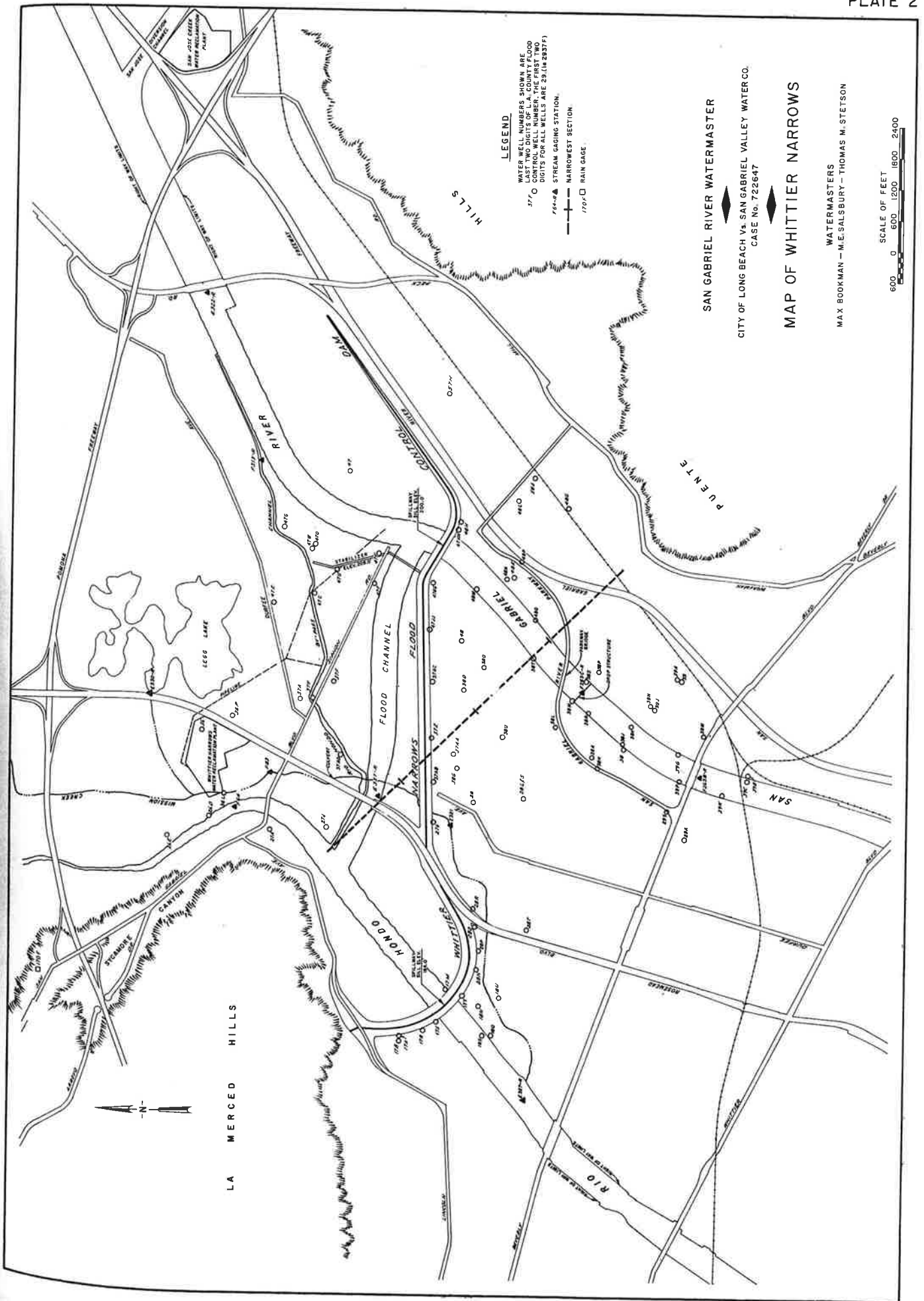
SAN GABRIEL RIVER WATERMASTER

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

**STREAM GAGING STATIONS
RIO HONDO – SAN GABRIEL RIVER SYSTEM**

WATERMASTERS
MAX BOOKMAN—M.E. SALSBUURY—THOMAS M. STETSON

SCALE OF FEET
0 4000 8000



SAN GABRIEL RIVER WATERMASTER

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

MAP OF WHITTIER NARROWS

WATERMASTERS
 MAX BOOKMAN - M.E. SALSBUURY - THOMAS M. STETSON

APPENDIX

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

Plaintiffs

Board of Water Commissioners
of the City of Long Beach
Central Basin Municipal Water District
City of Compton

Defendants

San Gabriel Valley Water Company (also includes by
merger Vallecito Water Company)
Azusa Agricultural Water Company
Azusa Valley Water Company
California-American Water Company (successor to
California Water and Telephone Company)
Covina Irrigating Company
Cross Water Company^(a)
East Pasadena Water Company, Ltd.
Glendora Irrigating Company (now City of Glendora)
Southern California Water Company
Southwest Suburban Water (formerly known as Suburban
Water Systems)
Sunny Slope Water Company
City of Alhambra
City of Arcadia
City of Azusa
City of Covina
City of El Monte
City of Glendora
City of Monrovia
City of Monterey Park
City of South Pasadena
San Gabriel County Water District
Valley County Water District (formerly known as
Baldwin Park County Water District)

Intervenors

Upper San Gabriel Valley Municipal Water District
California Domestic Water Company

(a) Acquired by City of Industry which is not yet a party.

R. J. GALLETTY

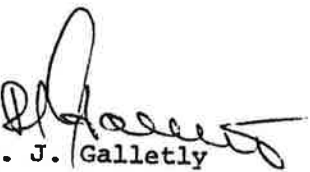
Certified Public Accountant

GLENDALFE FEDERAL SAVINGS & LOAN BUILDING
401 NORTH BRAND BOULEVARD
GLENDALFE, CALIFORNIA 91203
TELEPHONE (213) 245-2402

December 23, 1982

San Gabriel River Watermaster
Security Building
102 North Brand Boulevard
Glendale, California 91203

In our opinion, the accompanying statement of Income and Expenditures for the San Gabriel River Watermaster for the water Year 1981-1982 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 1981-1982

Carried forward from year 1980-1981		\$ 29,019.10
Income		12,000.00
Interest Income		<u>1,486.77</u>
		42,505.87
Expenditures:		
Administrative fees and general operating expenses	\$ 5,308.19	
Collection of data, field inspections and maintenance of records	5,129.09	
Calculations and preparation of Watermaster Reports for water years 1980-1981	11,871.57	
Printing and reproduction costs	<u>732.99</u>	
Total expenditures		<u>23,041.84</u>
Balance		\$ <u><u>19,464.03</u></u>



CITY OF INDUSTRY

Incorporated June 18, 1957

April 3, 1981

San Gabriel River Watermaster
Security Building, Suite 600
102 N. Brand Boulevard
Glendale, California 91203

Gentlemen:

Pursuant to the requirements of Paragraph 16 of the Judgment entered in Los Angeles County Superior Court Case No. 722647, City of Long Beach, et al, vs. San Gabriel Valley Water Company, et al, the City of Industry does hereby notify said Watermaster of its acquisition of the water rights of Cross Water Company, an original party to this adjudication action. The effective date of transfer was May 25, 1978. As a result of this transfer, City of Industry furnishes San Gabriel River Watermaster with the following information:

- a. The identity of the transferor is Cross Water Company.
- b. The identity of the transferee is City of Industry, c/o Phil Iriarte, P. O. Box 3366, City of Industry, California 91744.
- c. The effective date of transfer was May 25, 1978.
- d. The transfer was made through an Acquisition Agreement between Cross Water Company and City of Industry whereby the City acquired all facilities and assets of the Company, including water rights. The agreement was approved by the City Council at its regular meeting on May 25, 1978.
- e. The transfer was voluntary.
- f. The transferor, Cross Water Company, does not claim to have any of the water rights which are the subject of Paragraph 5(j) of the Judgment above referred to.

P.O. Box 3366, City of Industry, California 91744

Administrative Offices: 15651 E. Stafford St.

(213) 333-2211

A-4

San Gabriel River Watermaster
April 3, 1981
Page 2

The transferee, City of Industry, hereby assumes all obligations imposed upon original Defendant, Cross Water Company, under this Judgment as related to such transferred water rights.

Very truly yours,

A handwritten signature in cursive script that reads "Robert Baker".

Robert Baker
City Manager

RB/mlw

MEMORANDUM OF UNDERSTANDING

Memorandum of Understanding made this 13 day of May, 1982 among the Board of Water Commissioners of the City of Long Beach, the Central Basin Municipal Water District and the City of Compton (hereinafter called the "Lower Area Parties"), and the Upper San Gabriel Valley Municipal Water District (as representative of the "Upper Area Parties" and hereinafter so called), and the Main San Gabriel Watermaster as to Paragraph 9 hereof only.

RECITALS

1. The Parties to this Memorandum of Understanding are either parties to the Judgment entered September 24, 1965 in the case of City of Long Beach, et al. vs. San Gabriel Valley Water Company, et al., Los Angeles Superior Court No. 722647 (hereinafter called the "Judgment" or "Long Beach Judgment"), or are concerned with the administration of the Judgment. Terms defined in such Judgment and used herein shall have the same meaning unless otherwise stated.

2. Since 1979 discussions have been held among the Parties concerning differences over the intent of certain provisions of the Judgment, and also concerning whether

modifications to improve the operation of the Judgment should be sought based upon experience since 1965.

3. One of the major points of difference, which still remains and is not resolved by this Memorandum of Understanding, has been whether the San Jose Creek Water Reclamation Plant constitutes a future addition to the Whittier Narrows Water Reclamation Plant within the meaning of Section (5)(i)(2) of the Long Beach Judgment. The Upper Area Parties believe that it does. The Lower Area Parties believe that it does not. Neither this Paragraph nor any other provision of this Memorandum of Understanding is intended to limit the claims that may be asserted by any Party.

4. The Parties recognize, however, that their interests, as well as those of the watershed as a whole, are best served by continuing to develop cooperative working relationships between the Upper and Lower Area Parties which may also eliminate adversary proceedings. Accordingly, it is the purpose of this Memorandum of Understanding to institute under present conditions certain practical accommodations which are not intended to constitute interpretations of or additions to the Judgment but which provide for matters which may not be specifically covered thereby, or about which differing legal views may exist.

5. It is not the intent of this Memorandum of Understanding to change, waive or in any way affect any of the rights and obligations established pursuant to the Long Beach Judgment, nor to resolve finally any legal disputes which may exist concerning such Judgment. Rather, this Memorandum reflects certain practical solutions which may be temporary but for the present will defer any legal disputes without prejudice to any of the Parties, and will bring the prior discussions among the Parties to a close.

BASED UPON THE FOREGOING FACTS, AND IN CONSIDERATION OF THE MUTUAL COVENANTS OF THE PARTIES, IT IS HEREBY AGREED AS FOLLOWS:

6. Spirit of Cooperation re Possible Shortages of Replenishment Supplies. The Long Beach Judgment recognizes rights of the Lower Area Parties in the water supply of the San Gabriel River System, and provides a physical solution for satisfaction of the declared right under the Judgment. That solution involves in part the obligation to provide Make-up Water if the Lower Area's annual entitlement to Usable Water is not otherwise met. At the present time the ready availability of replenishment supplies as a source of Make-up Water can no longer be completely assured. Furthermore, the amount of groundwater which can be stored within the Lower Area, and which may be used during any temporary

shortage of replenishment water, is far less than the groundwater storage capacity within the Upper Area. Accordingly, during years in which replenishment supplies may be short, the Upper Area Parties will assist the Lower Area Parties in trying to attain satisfaction of their declared rights under the Judgment, or to obtain adequate replenishment water, or otherwise to help protect the Lower Area against damage from any shortage. Such efforts by Upper Area shall not substitute, however, for any rights which the Lower Area Parties may have under the Long Beach Judgment.

7. Payments in Lieu of Surface Flow Delivery of Make-up Water. Section 5(i)(1) of the Long Beach Judgment provides for the delivery of Make-up Water by means of Surface Flow Delivery if necessary to meet the entitlement of the Lower Area. Conditions may arise, however, that temporarily make it physically impossible to deliver Make-up Water by Surface Flow Delivery. By way of example, but not limitation, such conditions might exist if the river channels or spreading grounds could not be used because of abundant local runoff or seasonal operation of storage capacity, or if there were extended periods of ongoing maintenance or obstruction of required river channels. The conditions to which this Paragraph shall apply, however, are to be distinguished from and shall not include the mere unavail-

ability of replenishment water from The Metropolitan Water District of Southern California (hereinafter "MWD"), or from the San Gabriel Valley Municipal Water District. Upon the written request of any of the Parties, the Watermaster under the Long Beach Judgment shall make a determination as to whether conditions exist or have existed that temporarily make or have made it physically impossible to deliver or percolate required amounts of Make-up Water by means of Surface Flow Delivery. At the end of any Water Year during which any such determination of physical impossibility is made, the Upper District may make payments to the Central Basin Municipal Water District in lieu of Make-up Water that otherwise would have been required and delivered under the Long Beach Judgment as Surface Flow Delivery. Such payments shall be deemed Surface Flow Delivery of Make-up Water pursuant to Section 5(i)(1) of the Long Beach Judgment in an amount equal to the quantity of replenishment water that could be purchased with such payment at the MWD price for replenishment water (now under the MWD classification of "interruptible") in effect at the time such payment is made; provided that if the Watermaster should determine that the inability to deliver such Make-up Water was caused by actions of the Lower Area, then the price in effect when the water would have been delivered, if such price is lower, shall be used. All determinations of the Watermaster made pursuant to this Paragraph shall be final. The Watermaster shall

include in his Annual Report any payments so made, the reasons therefor, and the amount of Surface Flow Delivery of Make-up Water for which the Upper District has been credited by making such payments.

8. Reclaimed Water Credits. The Whittier Narrows Water Reclamation Plant presently can be operated to produce approximately ten million gallons per day of reclaimed water at a current price of \$7 per acre foot. The Plant is capable of additional production, but only at surcharge rates. The Lower Area Parties, as well as the Upper Area Parties, have an interest in the continued operation of the Whittier Narrows Plant. However, the present capacity of and demands upon the San Jose Creek Water Reclamation Plant make it possible, at least at this time, to avoid the surcharge rates of the Whittier Narrows Plant.

The Central & West Basin Water Replenishment District (hereinafter "Replenishment District") is one of the contracting parties with County Sanitation Districts of Los Angeles County (hereinafter "Sanitation Districts") with respect to both the Whittier Narrows Plant and the San Jose Creek Water Reclamation Plant. Neither Lower Area Parties nor Upper Area Parties have any present contractual interest in either of said plants. Nothing herein contained, nor any action of Replenishment District pursuant to this Memorandum of Understanding, shall cause the Replenishment District to become a party to or be bound by any of the provisions of

the "Long Beach Judgment" or of this Memorandum of Understanding.

Accordingly, and subject to the terms of this Memorandum of Understanding, the Lower Area Parties commencing with the 1981-82 Water Year under the Long Beach Judgment will use their best efforts to cause the Replenishment District (consistent with its contract obligations from time to time with Sanitation District) to limit the Replenishment District's purchases of the production of the Whittier Narrows Plant to the unsurcharged rate, which is currently about ten million gallons per day. It is intended that such amount of reclaimed water shall be the first reclaimed water purchased for replenishment of the Lower Area, and shall be the first water as to which the Upper Area shall exercise any rights to a Reclaimed Water Credit under Section (5)(i)(2) of the Long Beach Judgment.

To the extent that the Replenishment District purchases additional amounts of reclaimed water from the San Jose Creek Water Reclamation Plant for replenishment of the Lower Area, such purchases shall also be subject to the Reclaimed Water Credit provisions of the Judgment, commencing with deliveries made after October 1, 1981, provided and to the extent that the Upper Area still remains in a debit situation after providing reimbursement for the Whittier Narrows Plant purchases. This arrangement shall not result in any change in the Judgment provisions concerning the

maximum amount of Make-up Water which can be provided by reimbursement for reclaimed water purchases. Reimbursement for any reclaimed water from the San Jose Plant shall be made at the cost thereof.

The arrangements included in this Paragraph shall apply only so long as the Whittier Narrows Plant remains in operation and is capable, although at surcharge rates, of producing 14,735 acre feet of reclaimed water annually. Nothing in this Paragraph shall be construed to apply if the Whittier Narrows Plant should cease to operate altogether, or no longer be capable of producing approximately 10 mgd at unsurcharged rates, or any amount less than 14,735 acre feet annually. Cancellation of this Memorandum of Understanding for these reasons, irrespective of Paragraph 11, may be given at any time upon 90 days' written notice. These arrangements do not determine the issue, among others, of whether the San Jose Plant is an addition to the Whittier Narrows Plant within the meaning of the Long Beach Judgment. There is no long-term contract for the production of reclaimed water from the Whittier Narrows Plant, and the arrangements provided herein are temporary. They are also subject to the exercise by the governing body of the Replenishment District from time to time of its discretion.

9. Lack of Prejudice. Nothing contained in this Memorandum of Understanding, nor any action of any of the

Parties taken pursuant thereto, nor any statement or offer made in connection with the discussions among the Parties since 1979 concerning the Long Beach Judgment, shall be used in any court proceeding or otherwise as an admission, or as a basis for laches, estoppel or other loss of rights, or to determine the intent or otherwise interpret the meaning of the Long Beach Judgment, or as a basis for any modification of such Judgment.

10. Effective Date. This Memorandum of Understanding shall be effective for the full Water Year of 1981-82 commencing October 1, 1981, and shall remain in effect for each Water Year thereafter until terminated.

11. Cancellation. This Memorandum of Understanding may be terminated by any party thereto at the end of any Water Year, by written notice given to the other Parties at least 90 days prior to the end of the Water Year. Time is of the essence as to such notice to permit time for proper planning.

12. Representative Capacities. To the extent legally possible, the Parties to this Memorandum of Under-

standing are acting in their respective representative capacities.

IN WITNESS WHEREOF the Parties have executed this Memorandum of Understanding.

BOARD OF WATER COMMISSIONERS
of the CITY OF LONG BEACH

By: Ida Frances Loring

CENTRAL BASIN MUNICIPAL
WATER DISTRICT

By: Paul Deltman

CITY OF COMPTON

By: R. Nelson

UPPER SAN GABRIEL VALLEY
MUNICIPAL WATER DISTRICT

By: Burt E. Jones

MAIN SAN GABRIEL BASIN
WATERMASTER as to Paragraph 9
only

By: Lin E. Magoff



[Signature]
5-13-82

DATE: 5/12/82
APPROVED AS TO FORM
[Signature]
CITY ATTORNEY