UPPER LOS ANGELES RIVER AREA WATERMASTER

CITY OF LOS ANGELES VS. CITY OF SAN FERNANDO ET AL
CASE NO. 650079 - COUNTY OF LOS ANGELES

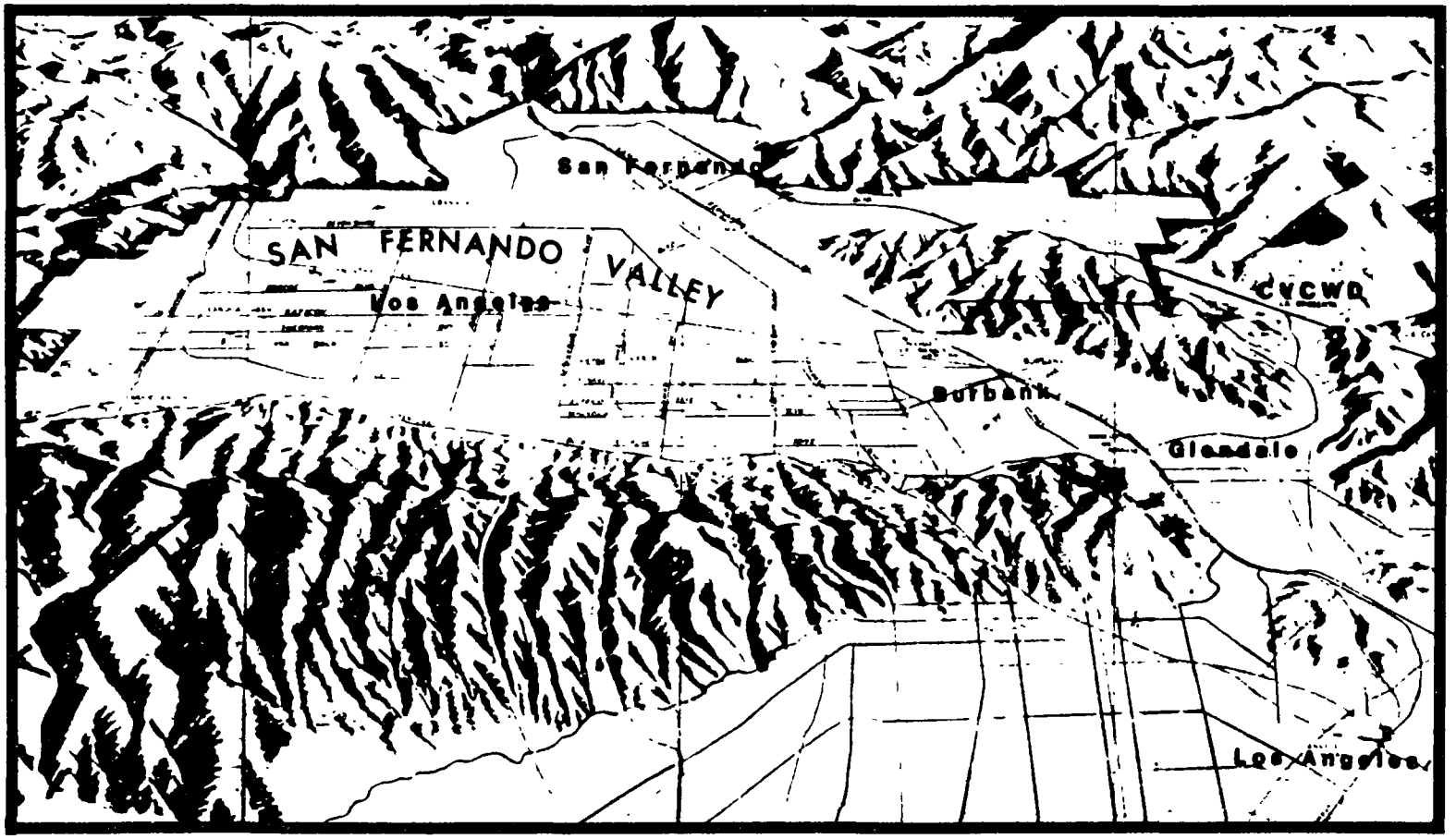
WATERMASTER SERVICE

IN THE

UPPER LOS ANGELES RIVER AREA

LOS ANGELES COUNTY

OCTOBER 1, 1985 - SEPTEMBER 30, 1986



MAY 1987

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MELVIN L. BLEVINS – WATERMASTER
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MAY 1987

ERRATA SHEET

1985-86 ULARA Watermaster Report

The following corrections are to be made to the 1985-86 ULARA Watermaster Report:

1. Table 8, page 25 under well number 5069F (CVCWD No. 12) has a NO_3 value of $\frac{23.0}{1.64}$ this should be corrected to $\frac{101}{7.21}$

2. Page 35 sentence four reads, "This allows poorer quality Verdugo Basin ground water to be blended with MWD water and now enables Glendale to pump its prescriptive right in the Verdugo Basin." Should be corrected to read, "... and now enables Glendale to approach pumping its prescriptive right..."

CONVERSION FACTORS

English to Metric System of Measurement

Quantity	English unit	Multiply by	To get metric equivalent
Length	feet (ft)	.3048	metres (m)
	miles (mi)	1.6093	kilometres (km)
Area	square feet (ft^2)	.092903	square metres (m^2)
	acres	4046.9	square metres (m^2)
		.40469	hectares (ha)
		.40469	square hectometres (hm^2)
		.0040469	square kilometres (km^2)
	square miles (mi^2)	2.590	square kilometres (km^2)
Volume	gallons (gal)	3.7854	litres (l)
		.0037854	cubic metres (m^3)
	million gallons (10^6 gal)	3785.4	cubic metres (m^3)
	cubic feet (ft^3)	.028317	cubic metres (m^3)
	cubic yards (yd^3)	.76455	cubic metres (m^3)
	acre-feet (ac-ft)	1233.5	cubic metres (m^3)
		.0012335	cubic hectometres (hm^3)
		1.233×10^{-6}	cubic kilometres (km^3)
Volume/Time (Flow)	cubic feet per second (ft^3/s)	28.317	litres per second (l/s)
		.028317	cubic metres per second (m^3/s)
	gallons per minute (gal/min)	.06309	litres per second (l/s)
		6.309×10^{-5}	cubic metres per second (m^3/s)
	million gallons per day (mgd)	.043813	cubic metres per second (m^3/s)
	miners inch*	.70792 (.56634)	litres per second (l/s)
Temperature	Degrees Fahrenheit (°F)	$\frac{tF - 32}{1.8} = tC$	Degrees Celsius (°C)

* Section 24 of Water Code = 1/40 ft^3/s

( ) 1/50 ft^3/s commonly used in Southern California

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FOREWORD

As Watermaster for the Upper Los Angeles River Area (ULARA), I am pleased to submit this report of the water supply conditions in ULARA during the 1985-86 Water Year. It was prepared in accordance with the provisions of the Final Judgment, signed by the Honorable Harry L. Hupp of the Los Angeles Superior Court on January 26, 1979. On April 30, 1985, Judge Vernon G. Foster replaced Judge Hupp as Judge of Record for the San Fernando Judgment.

This report describes the water rights in each basin, lists the allowable pumping for the Water Year 1986-87, and indicates the water in storage to the credit of each party as of October 1, 1986. In addition, this report includes background information on the history of the San Fernando Case; information as to each basin and the ULARA in total on water supply, ground water extractions, ground water levels, quantities of imported water use, recharge operations including amounts thereof, water quality conditions; and other pertinent information occurring during the water year pursuant to the provisions of the Judgment.

During this past Water Year, I contacted Judge Foster regarding an amendment to the Upper Los Angeles River Area Judgment. This amendment would allow individuals other than those specified in the Judgment to pump water from the ULARA for the purpose of evaluation and cleanup of the basin. This amendment to the Judgment has been delayed in being implemented, but I do not anticipate any problems in obtaining this amendment. All parties to the Judgment are expected to stipulate to this amendment.

I wish to acknowledge and express appreciation to all parties that have provided information and data which were essential to the completion of this report.

Sincerely,

MELVIN L. BLEVINS
Senior Hydrologic Engineer
and ULARA Watermaster
(Reg. C.E. No. 12863)

TABLE OF CONTENTS

TABLES

PLATES

Appendix D

UPPER LOS ANGELES RIVER AREA WATERMASTER

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ULARA WATERMASTER REPORT FOR WATER YEAR 1985-86

Report Prepared By:

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I. INTRODUCTION

Upper Los Angeles River Area (ULARA) encompasses all the watershed of the Los Angeles River and its tributaries above a point in the river designated as Los Angeles County Department of Public Works (LACDPW) Gaging Station F-57C-R, near the junction of the Los Angeles River and the Arroyo Seco (Plates 1 and 2). ULARA encompases 328,500 acres, composed of 122,800 acres of valley fill, referred to as the ground water basins, and 205,700 acres of hills and mountains. ULARA is bounded on the north and northwest by the Santa Susana Mountains; on the north and northeast by the San Gabriel Mountains; on the east by the San Rafael Hills, which separate it from the San Gabriel Basin; on the south by the Santa Monica Mountains, which separate it from the Los Angeles Coastal Plain; and on the west by the Simi Hills.

ULARA has four distinct ground water basins. The water supplies of these basins are separate and are replenished by deep percolation from rainfall and from a portion of the water that is delivered for use within these basins. The four ground water basins in ULARA are the San Fernando, Sylmar, Verdugo, and Eagle Rock Basins (Plate 2).

The San Fernando Basin, the largest of the four basins, consists of 112,000 acres and comprises 91.2 percent of the total valley fill. It is bounded on the east and northeast by the San Rafael Hills, Verdugo Mountains, and San Gabriel Mountains; on the north by the San Gabriel Mountains and the eroded south limb of the Little Tujunga Syncline which separates it from the Sylmar Basin; on the northwest and west by the Santa Susana Mountains and Simi Hills; and on the south by the Santa Monica Mountains.

The Sylmar Basin, in the northerly part of ULARA, consists of 5,600 acres and comprises 4.6 percent of the total valley fill. It is bounded on the north and east by the San Gabriel Mountains; on the west by a topographic divide in the valley fill between the Mission Hills and the San Gabriel Mountains; on the southwest by the Mission Hills; on the east by the Upper Lopez Canyon Saugus formation along the east bank of the Pacoima Wash; and on the south by the eroded south limb of the Little Tujunga syncline, which separates it from the San Fernando Basin.

The Verdugo Basin, north and east of the Verdugo Mountains in ULARA, consists of 4,400 acres and comprises 3.6 percent of the total valley fill. It is bounded on the north by the San Gabriel Mountains, on the east by a ground water divide separating it from the Monk Hill Subarea of the Raymond Basin, on the southeast by the San Rafael Hills, and on the south and southwest by the Verdugo Mountains.

The Eagle Rock Basin, the smallest of the four basins, is in the extreme southeast corner of ULARA. It comprises 800 acres and consists of 0.6 percent of the total valley fill.

History of Adjudication

The water rights in ULARA were established by the JUDGMENT AFTER TRIAL BY COURT in Superior Court Case No. 650079, entitled The City of Los Angeles, a Municipal Corporation, Plaintiff, vs. City of San Fernando, it al., Defendants, signed March 14, 1968 by the Honorable Edmund M. Moor, Judge of the Superior Court. Prior to the judgment, numerous pretrials were held subsequent to the filing of the action by the City of Los Angeles in 1955 and before the trial commenced on March 1, 1966.

On March 19, 1958, an Interim Order of Reference was entered by the Court directing the State Water Rights Board, now known as the State Water Resources Control Board (SWRCB), to study the availability of all public and private records, documents, reports, and data relating to a proposed order of reference in the case. The Court subsequently entered on June 11, 1958 an "Order of Reference to State Water Rights Board to Investigate and Report upon the Physical Facts (Section 2001, Water Code)."

A final Report of Referee was approved on July 27, 1962 and filed with the Court. The Report of Referee made a complete study of the geology, insofar as it affects the occurence and movement of ground water and the surface and ground water hydrology of the area. In addition, investigations were made of the history of the horizontal and vertical locations of the beds, banks, and channels of the Los Angeles River and its tributaries; the areas, limits, and directions of flow of all groundwater within the area; the historic extractions of ground water in the basin and their quality; and all sources of water, whether they be diverted, extracted, or imported, etc. Said Report of Referee served as the principal basis for geological and hydrological facts for the original Trial Court Judgment in 1968 and Decision of the Supreme Court in 1975 (14 Cal 3d 199, 123 Cal Rept 1) and the Trial Court Judgment on remand on January 26, 1979.

The City of Los Angeles filed an appeal from the Judgment of the Trial Court with the Court of Appeals, which held a hearing on November 9, 1972, and issued its opinion on November 22, 1972. The opinion, prepared by Judge Compton and concurred in by Judges Roth and Fleming, reversed, with direction, the original judgment handed down by Judge Moor. In essence, the City of Los Angeles was given rights to all water in ULARA including the use of the underground basins. The defendants, however, were given the right to capture "return water," which is water purchased from the Metropolitan Water District of Southern California (MWD) that percolates into the basin.

A petition for rehearing was filed on December 7, 1972, but was denied by the Court of Appeals. On January 2, 1973, the defendants filed a petition for hearing with the State Supreme Court. The Court on March 2, 1973 advised the parties it would hear the case. The hearing was held on January 14, 1975.

On May 12, 1975, the California Supreme Court filed its opinion on the 20-year San Fernando Valley water litigation. This opinion, which became final on August 1, 1975, upheld the Pueblo Water Rights of the City of Los Angeles to all ground water in the San Fernando Basin derived from precipitation within ULARA. The City of Los Angeles' Pueblo Water Rights were not allowed to extend to the ground waters of the Sylmar and Verdugo Basins.

The City of Los Angeles was also given rights to all San Fernando Basin ground water derived from water imported by it from outside ULARA and either spread or delivered within ULARA. The Cities of Glendale and Burbank each were given rights to all San Fernando Basin ground water derived from water that each imports from outside ULARA and delivered within ULARA. San Fernando was not a member of MWD until the end of 1971, and had never prior thereto imported any water from outside ULARA.

The Supreme Court reversed the principal judgment of the Trial Court and remanded the case back to the Superior Court for further proceedings consistent with the Supreme Court's opinion. On remand the case was assigned to the Honorable Harry L. Hupp, Judge of the Superior Court of Los Angeles County.

The Final Judgment, signed by the Honorable Harry L. Hupp, was entered on January 26, 1979. Copies of the Final Judgment are available from th ULARA Watermaster, Post Office Box 111, Room 1466, Los Angeles, California 90051. The water rights set forth in the judgment are consistent with the opinion of the Supreme Court described above. In addition, the Final Judgment includes provisions and stipulations regarding water rights, the calculation of imported return water credit, storage of water, stored water credit, and arrangements for a physical solution for certain parties as suggested by the Supreme Court.

On August 26, 1983, the Wastermaster reported to the Court pursuant to Section 10.2 of the Judgment that the Sylmar Basin was in a condition of overdraft. In response to the Watermaster's letter and a Minute Order of this Court, the Cities of Los Angeles and San Fernando responded by letters to the Court, agreeing with the Watermaster's report on overdraft. On March 22, 1984, Judge Harry L. Hupp signed a stipulation ordering, effective October 1, 1984, that the Cities of Los Angeles and San Fernando shall be limited in their pumping to bring the total pumping within the safe yield of the basin, less any rights exercised by the private parties.

Extraction Rights

The extraction rights under the Judgment and Sylmar Basin Stipulation are as follows:

San Fernando Basin

Native Water. Los Angeles has an exclusive right to extract and utilize all the native water which, under the judgment, is evaluated to be 43,660 acre-feet per year.

Imported Return Water. Los Angeles, Glendale, and Burbank each have a right to extract from the San Fernando Basin the following amounts:

Los Angeles:	20.8 percent of all delivered water (including reclaimed water) to valley fill lands of San Fernando Basin.
Burbank:	20.0 percent of all delivered water (including reclaimed water) to San Fernando Basin and its tributary hill and mountain areas.
Glendale:	20.0 percent of all delivered water (including reclaimed water) to San Fernando Basin and its tributary hill and mountain areas (i.e., total delivered water [including reclaimed water] less 105 percent of total sales by Glendale in Verdugo Basin and its tributary hills).

Physical Solution Water. Several parties are granted limited rights to extract water chargeable to the rights of others upon payment of specified charges. The parties and their maximum physical solution quantities are as follows:

As to Los Angeles' Water:

Glendale	5,500 acre-feet per year
Burbank	4,200 acre-feet per year
Van de Kamp	120 acre-feet per year
Toluca Lake	100 acre-feet per year
Sportsmens Lodge	25 acre-feet per year

As to Glendale's Water:

Forest Lawn	400 acre-feet per year
Environmentals Inc.	75 acre-feet per year

As to Burbank's Water:

Valhalla	300 acre-feet per year
Lockheed	25 acre-feet per year

Stored Water. Los Angeles, Glendale, and Burbank each have rights to store water in the San Fernando Basin and the right to extract equivalent amounts.

Sylmar Basin

Native and Imported Return Water. San Fernando and Los Angeles have equal rights to pump the safe yield of the basin (6,210 acre-feet), less private party pumping, with each party allowed to pump approximately 3,105 acre-feet per year. Private parties Meurer Engineering and Kisag Moordigian have overlying rights to extract and use on their lands overlying the Sylmar Basin all native water reasonably necessary for the acreage owned by them to meet beneficial uses.

Stored Water. Los Angeles and San Fernando each have a right to store water in the Sylmar Basin.

Verdugo Basin

Glendale and Crescenta Valley own mutually prescriptive rights to extract 3,856 acre-feet and 3,294 acre-feet per year, respectively.

Eagle Rock Basin

Native Water. The Eagle Rock Basin has no significant native safe yield.

Imported Return Water. Los Angeles has the right to extract or cause to be extracted the recharge to the basin.

Physical Solution Water. Sparkletts and Deep Rock have rights to extract water chargeable to Los Angeles.

Watermaster Service

In preparing the 1985-86 annual report, the Watermaster collected and reported all information affecting and relating to the water supply and disposal within ULARA. Such information includes the following items:

1. Water supply

    a. Precipitation and runoff
    b. Imports and exports

2. Water use and disposal

    a. Extractions
        (1) Used in valley fill area
        (2) Exported from each basin

b. Water outflow
   (1) Surface
   (2) Subsurface
   (3) Sewers

3. Water levels

4. Water quality

5. Ownership and location of new wells

Administrative Committee

Section 8, Paragraph 8.3 of the ULARA judgment established an Administrative Committee for the purpose of advising the Watermaster in the administration of his duties. The duly appointed members of the Committee, as of September 30, 1986, are:

City of Burbank

Martindale Kile, Jr. (President)
Thomas H. McCauley (Alternate)

City of Glendale

Michael Hopkins (Vice-President)
Don Baker (Alternate)

City of Los Angeles

Le Val Lund
Dennis C. Williams (Alternate)

City of San Fernando

Arthur Kidman
Rick Navarro (Alternate)

Crescenta Valley County Water District

Robert K. Argenio
Ray Marsden (Alternate)

Private Parties

Charles Meurer
Roger Meurer

The Administrative Committee may be convened by the Watermaster at any time in order to seek its advice. In addition, the Committee is responsible for reviewing with the Watermaster the proposed annual report.

During the 1985-86 water year, the Administrative Committee met on April 22, 1986. The following items were discussed at this meeting:

1. Amount of Groundwater Stored in San Fernando Basin by Parties.

2. Status of Groundwater Quality Studies in the San Fernando Valley - Parties' Needs.
   a) North Hollywood/Burbank Aeration Tower Facility
   b) Superfund Study
   c) Underground Tank Leakage Problems
   d) San Fernando Groundwater Quality Study - ICC Committee
   e) AB 1803 - Programs on Water Quality Monitoring - Status

3. Verdugo Basin Groundwater Development - Status.

4. Tujunga Spreading Ground Operations Related to Sheldon-Arleta Landfill.

5. Stipulation Between all Parties and Non-Parties Regarding Pumping High Level TCE-Groundwater for Evaluation and Cleanup.

6. Review of Draft 1984-85 Watermaster Report.

Summary of 1985-86 Operating Conditions

Table 1 compares statistics for this period of record and the prior water year.

Rainfall on the valley fill area was 128 percent of normal as compared to 67 percent of normal the year before. Surface runoff leaving the valley at Gage F-57C-R for 1985-86 was 155,090 acre-feet. The amount conserved by the LACDPW in its spreading basins was 26,917 acre-feet, an increase of 58 percent over last year. Total precipitation falling on the San Fernando Valley and its tributary hill and mountain areas was estimated to be 628,086 acre-feet for the 1985-86 water year. Of this total, approximately 106,720 acre-feet flowed from the valley as storm runoff and rising water, leaving 521,366 acre-feet which was beneficially used within the area (83 percent of the total).

TABLE I

UPPER LOS ANGELES RIVER AREA
SUMMARY OF OPERATING CONDITIONS
1984-85 AND 1985-86

Item		Water Year 1984-85	Water Year 1985-86
1. Parties		22	22
2. Active pumpers		19	19
3. Active nonpumpers (within valley fill)		0	0
4. Valley rainfall, in inches		11.00	20.27
5. Spreading operations, in acre-feet[a/]			
a. LACFCD		17,073	26,917
b. Los Angeles, City of		5,496	1,433
6. Extractions, in acre-feet		118,151	102,752
a. Used in ULARA		27,150	25,609
7. Gross imports, in acre-feet			
a. MWD water		73,406	72,568
b. Owens River water[b/]		595,807	594,500
	Total	669,213	667,068
8. Exports in acre-feet			
a. Owens River water		331,777	324,509
b. Groundwater by Los Angeles		90,727	76,956
	Total	422,504	401,465
9. Imports used in ULARA, in acre-feet		337,436	342,559
10. Reclaimed water, in acre-feet		15,853	44,350
a. Used in ULARA		2,492	2,637
11. Total delivered water used in ULARA, in acre-feet		367,078	370,805
12. Sewage export, in acre-feet[c/]		127,769	153,131

a/ Breakdown of spreading operations as to sources of water is shown in Table 6. Values include native and imported water.

b/ This value represents the summation of the gross amount of water delivered to and exported from ULARA. It does not include operational releases, reservoir evaporation, and water spread during the year.

c/ Total of sewage outflow from all four basins, including reclaimed water which is discharged into flood control channel and flows out of basin.

Ground water extractions decreased in the San Fernando and Sylmar Basins and increased in the Verdugo and Eagle Rock Basins during 1985-86. Total ULARA extractions amounted to 102,752 acre-feet as compared to an allowable pumping of 116,192 acre-feet. Of this total, 113,001 acre-feet represents the 1985-86 extraction rights of parties in the San Fernando Basin (see 1985-86 Table 15) plus the safe yield values of Sylmar and Verdugo Basins. The remaining 3,181 acre-feet is non-consumptive use pumping (see Table 13). Extractions used within ULARA decreased by 6 percent (1,541 acre-feet) from last year.

For ULARA, gross imports decreased by 2,145 acre-feet, or less than 1 percent, while imports used within ULARA increased less than 2 percent (5,123 acre-feet). Exports of Owens River water decreased by 7,268 acre-feet, or 2 percent. The total amount delivered to water users within ULARA increased by 3,727 acre-feet, or about 1 percent.

Sewage export was 153,131 acre-feet in 1985-86, an increase of 20 percent. Total reclaimed water used in ULARA (cooling towers, irrigation, etc.) increased 6 percent (145 acre-feet), while the total water reclaimed increased from 15,853 acre-feet to 44,350 acre-feet, an increase of 180 percent. Most of the reclaimed water is discharged to the Los Angeles River.

A total of 28,350 acre-feet of water, 26,917 native and 1,433 Owens River, was spread during the year, which was a 26 percent increase from last year in spreading of imported and native water.

Ground water storage for the San Fernando and Sylmar Basins decreased by 7,980 acre-feet and 120 acre-feet, respectively, and increased in the Verdugo Basin by 130 acre-feet during 1985-86.

Summary of Allowable Pumping for 1986-87

Table 2 gives a summary of allowable pumping for the Cities of Los Angeles, Burbank, Glendale, San Fernando and Crescenta Valley County Water District. Stored water is also shown as a credit for these parties as of October 1, 1986.

TABLE 2

SUMMARY OF ALLOWABLE PUMPING FOR ENSUING YEAR 1986-87

(In Acre-Feet)

	Extractions			Stored Water Credit*
	Native	Import Credit	Total	
San Fernando Basin				
Los Angeles	43,660	47,770	91,430	189,873
Burbank	--	4,636	4,636	29,386
Glendale	--	5,025	5,025	20,574
Sylmar Basin				
Los Angeles	--	--	3,095	(10)[a/]
San Fernando	--	--	3,032	(73)[a/]
Verdugo Basin				
Crescenta	--	--	3,294	--
Glendale	--	--	3,856	--

* As of October 1, 1986

a/ Parenthesis indicate deficit stored water credit.

Note: Calculation of these values shown in more detail in Tables 14, 15, and 16.

II. WATER SUPPLY CONDITIONS

The present water supply of ULARA consists of ground water recharge from imported water, hill and mountain runoff, and direct precipitation on the valley floor area. This includes runoff from precipitation falling on portions of the San Gabriel, Verdugo, Santa Monica, and Santa Susana Mountains; imports from the Mono Basin-Owens River system; imports from the Colorado River; imports from Northern California made available by the State Water Project; and reclaimed water.

Precipitation

ULARA has the climate of an interior valley and is hotter in summer and wetter in the winter than the coastal areas.

Precipitation varies considerably throughout ULARA, depending on topography and elevation. Mean seasonal precipitation ranges from about 14 inches at the western end of the San Fernando valley to 35 inches in the San Gabriel Mountains. Approximately 80 percent of the annual rainfall occurs from December through March.

The 1985-86 water year experienced above average rainfall. The Valley floor received 20.27 inches of rain, whereas the mountains received approximately 24.54 inches. The weighted average of both valley and mountain areas was 23.27 inches, an increase of 9.96 inches from last year. The 100-year (1881-1981) average precipitation for the valley and mountains is 16.48 inches and 21.91 inches, respectively. Table 3 presents a record of rainfall at 17 key precipitation stations which were used to develop the 100-year average rainfall and are described in the Report of Referee.

In the safe yield evaluation, precipitation on the valley is determined separately from that on the hills and mountains. The valley is made up of the four ground water basins, whereas the hills and mountains comprise the remaining areas in ULARA. Precipitation in the hills and mountains is evaluated to relate the runoff from the watersheds of Big Tujunga, Pacoima Creek, and Sycamore Canyon to the runoff records which are included in this report and also to calculate the ground water recharge. See Plate 5 for location of precipitation stations.

Runoff and Outflow from ULARA

The drainage area of ULARA contains 328,500 acres, of which 205,700 acres are hills and mountains. The drainage system, in turn, is made up of the Los Angeles River and its tributaries. Surface flow originates as storm runoff from the hills and mountains; storm runoff from the impervious areas of the valley; operational spills of imported water; industrial and sanitary waste discharges; and rising water.

TABLE 3

PRECIPITATION[a/]
(Inches)

LACFCD Number	Name	100-Year Mean	1984-85 Precipitation	1985-86	
				Precipitation	Percent of 100-Year Mean
11C	Upper Franklin Canyon Reservoir	18.50	12.25	24.17	131
13C	Hollywood-Blix[b/]	16.63	12.11	22.21	134
14C	Roscow-Merrill[b/]	14.98	10.83	15.31	102
15A	Van Nuys[b/]	15.30	8.03	18.07	118
17	Sepulveda Canyon-Mulholland Highway	19.82	12.69	27.42	138
21B	Woodland Hills[b/]	14.60	9.69	20.61	141
23B-E	Chatsworth Reservoir[b/]	15.19	10.43	21.55	142
25C	Northridge-LADWP[b/]	15.16	9.83	18.83	124
33A-E	Pacoima Dam	19.64	13.00	21.64	110
47D	Clear Creek-City School	33.01	19.75	35.72	108
53D	Colby's Ranch	29.04	18.30	23.80	82
54C	Loomis Ranch-Alder Creek	18.62	14.28	21.24	114
210B	Brand Park	18.13	11.90	23.90	132
251C	LaCrescenta[b/]	23.31	14.85	26.71	115
259D	Chatsworth-Twin Lakes[b/]	18.70	13.08	16.68	89
293E	Los Angeles Reservoir[b/]	17.32	13.27	22.01	127
1190	Pacoima Canyon-North Park Ranger Station	23.06	18.14	30.92	134

Weighted average for valley stations - 20.27 inches (1985-86)
Weighted average for mountain stations - 24.54 inches (1985-86)

a/ Data furnished by Los Angeles County Flood Control District (LACFCD)
b/ Valley Station

A number of stream-gaging stations are maintained throughout ULARA, either by LACDPW or United States Geological Survey (USGS). The Watermaster has selected six key gaging stations which, in effect, record runoff from hydrologic areas in ULARA.

Table 4 summarized the monthly runoff for these gaging stations and compares the 1984-85 water year with the 1985-86 year. The changes in runoff reflect the increase in rainfall in the valley and in the mountains.

Station F-57C-R registers all surface outflow from ULARA.

Station F-252-R registers flow from Verdugo Canyon plus flows from Dunsmore and Pickens Canyons.

Station E-285-R registers flow from the westerly slopes of the Verdugo Mountains and some flow east of Lankershim Boulevard. It also records any releases of reclaimed wastewater discharged by the City of Burbank.

Station F-300-R registers all flow east of Lankershim Boulevard plus outflow from Hansen Dam that is not spread. These records also include releases from Sepulveda Dam, which may include extractions from Reseda wells.

Station F-168-R registers all releases from Big Tujunga Dam, which collects runoff from Tujunga Canyon northeast of the dam. Runoff below this point flows to Hansen Dam.

Station 118B-R registers all releases from Pacoima Dam that originate in Pacoima Canyon. Runoff below this point flows to the Lopez and Pacoima spreading grounds and on down to the Los Angeles River through lined channels.

The locations of these key gaging stations are shown on Plate 5. The mean daily discharge rates for these six gaging stations during 1985-86 are summarized in Appendix B.

The Watermaster has computed the surface flow of the Los Angeles River at Gaging Station F-57C-R as to the sources, i.e. storm runoff from precipitation, Owens River water, rising water, and industrial and reclaimed wastewater discharges. The Watermaster utilized the procedures outlined in the Report of Referee for estimating the approximate flow rates and sources of water passing Gaging Station F-57C-R. A similar calculation was made for Station F-252-R. A summary of the procedures used follows, and a tabulation of the computed flows is shown in Table 5.

TABLE 4

MONTHLY RUNOFF AT SELECTED GAGING STATIONS*
(In Acre-Feet)

Station	Water Year	Month												
		Oct.	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Total
F-57C-R	1984-85	2750	8360	23900	5300	8040	5910	3230	3330	2440	2630	2480	2790	71,160
Los Angeles River	1985-86	4360	19810	6340	22180	33970	29250	8510	5540	5370	5530	5530	8690	155,090
F-252-R	1984-85	237	820	2330	574	907	578	251	230	182	158	177	239	6,683
Verdugo	1985-86	192	1120	118	1680	1910	1920	297	220	299	315	195	473	8,739
E285-R	1984-85	469	752	2200	612	696	548	352	349	402	203	228	172	6,983
Burbank Storm Drain	1985-86	600	1190	421	1670	1780	1760	795	394	303	340	233	619	10,105
F-300-R	1984-85	1040	4500	14320	2460	3960	2820	888	955	857	935	711	869	34,315
L.A. River Tujunga Ave.	1985-86	2610	11100	3530	13260	21740	17210	4780	3140	2970	2940	3180	4780	91,240
F-168-R	1984-85	334	43	2510	1100	657	880	488	797	95	18	17	17	6,956
Big Tujunga Dam	1985-86	18	593	503	1230	4100	3260	1210	358	90	387	24	19	11,792
118B-R	1984-85	+	857	425	745	411	+	1029	+	+	+	+	+	3,467
Pacoima Dam	1985-86	+	+	+	+	1967	2410	1668	317	359	362	+	+	7,083

* See Plate 5 for gaging station location.

+ - No measurable flow.

TABLE 5

SEPARATION OF SURFACE FLOW AT STATIONS F-57C-R AND F-252-R
(In Acre-Feet)

Period	Base Low Flow		Storm Runoff	Total Measured Outflow
	Rising Water[a/]	Waste Discharge		
Station F57C-R				
1971-72	3,602	8,219	35,049	46,870
1972-73	4,596	8,776	100,587	113,959
1973-74	2,694	6,366	79,818	88,878
1974-75	427	7,318	56,396	64,141
1975-76	261	6,741	32,723	39,725
1976-77	839	7,128	58,046	66,013
1977-78	1,331	7,449	357,883	366,663
1978-79	2,840[d/]	16,450[d/]	119,810	139,100
1979-80	5,500[d/]	16,500[d/]	[b/]	[b/]
1980-81	4,710	19,580	51,940	76,230
1981-82	1,280	18,180	80,000	99,460
1982-83	3,460[d/]	17,610	384,620	405,690
1983-84	3,000[d/]	17,780	49,090	69,870
1984-85	3,260	21,600	46,300	71,160
1985-86	3,880	48,370	102,840	155,090
29-year average				
1929-57	6,810	770	30,790	39,950
Station F252 R				
1971-72	2,050	0	2,513	4,563
1972-73	1,706	0	7,702	9,408
1973-74	1,772	0	5,613	7,385
1974-75	1,333	0	4,255	5,588
1975-76	2,170	0	2,380	4,550
1976-77	1,683	0	2,635	4,318
1977-78	1,168	0	23,571	24,739
1978-79	2,470[c/]	0	[b/]	[b/]
1979-80	5,150[c/]	0	7,752	12,902
1980-81	5,780	0	2,917	8,697
1981-82	3,710	0	5,367	9,077
1982-83	5,330[d/]	0	21,384	26,714
1983-84	4,000[d/]	0	b/	b/
1984-85	2,710	0	3,970	6,680
1985-86	2,470	0	6,270	8,740

a/ Includes rising water past rubber dam at Headworks Spreading Grounds, Verdugo Channel, and Los Angeles River Narrows.

b/ Data Not available.

c/ Verdugo Basin. Large increase in 1979-80 due to more accurate measurements.

d/ Estimated.

The base low flows were separated from the surface runoff by the use of the hydrographs of Station F-57C-R. Base flows consist of rising water and industrial waste plus reclaimed water. Separation of base flow from surface runoff is based on the following assumptions:

> Rising water equals base low flow minus the sum of industrial discharge water and reclaimed water. Industrial discharge waters are estimated from City of Los Angeles waste permits, Los Angeles-Glendale and Tillman reclamation plant discharges, and low flows in the Burbank-Western storm drain which include wastewater from the Burbank reclamation plant.
>
> When the City of Los Angeles diverts water at the Headworks spreading grounds, most of the rising water is diverted.
>
> When there is no diversion, a portion of the rising water may percolate upstream from Station F-57C-R.

Historically, the surface runoff obtained from the hydrographs of Station F-57C-R consisted primarily of storm runoff and Owens River water. The last releases of Owens River water into the Los Angeles River occurred in February 1971 due to the San Fernando earthquake. Releases in the future are expected to be minimal, but if they do occur, separation of surface runoff will be based on the following assumptions:

> Net storm runoff equals surface runoff minus Owens River water.
>
> If the Headworks diversion structure is used, all releases of Owens River waters are diverted to the Headworks spreading grounds. If the Headworks diversion structure does not divert water, all releases of Owens River waters are considered as passing Station F-57C-R.

Ground Water Recharge

Local precipitation can have a marked influence on the ground water supply and water in storage. However, there is a wide variation in the annual amount of runoff as a result of changes in both precipitation and retentive characteristics of the watershed.

Urban development during the past years in ULARA has resulted in much of the rainfall being collected and routed into paved channels, which discharge into the Los Angeles River, and subsequently being carried out of the basin.

To somewhat overcome the increased runoff due to urbanization, Pacoima and Hansen Dams, originally built for flood protection,

were utilized to regulate storm flows to recapture the flow in downstream spreading basins operated by LACDPW, as well as the City of Los Angeles. Operation of Hansen Dam for the purpose of spreading water for recharge has become increasingly more difficult due to the sand and gravel that has accumulated within the forebay of the dam.

LACDPW operates the Branford, Hansen, Lopez, and Pacoima spreading grounds. The City of Los Angeles, in turn, operates the Tujunga and Headworks spreading grounds. Plate 2 shows the locations of these spreading basins. The spreading grounds operated by LACDPW are utilized for spreading native water and imported water under contract. The spreading grounds operated by the City of Los Angeles are utilized to spread Owens River and native waters, ground water, and the discharge from the Reseda wells. Table 6 summarized the spreading operations for the 1985-86 water year.

Ground Water Table Elevations

During the 1985-86 water year, the Watermaster collected and processed data to determine prevailing ground water conditions in ULARA during the spring and fall of 1986. Plates 7 and 8 show these conditions. Change in ground water surface elevation from fall of 1985 to fall of 1986 as presented in Plate 9 reflects the effects of variations in spreading, ground water extractions, and replenishment from rainfall. Plate 10 provides a diagrammatic sketch of the direction travel time for ground water flow in the San Fernando and Verdugo Basins in 1980.

TABLE 6

1985-86
SPREADING OPERATIONS
(In Acre-Feet)

Month	Native Water Spread by Los Angeles County Flood Control District					Water Spread by City of Los Angeles			Total San Fernando Basin Spreading
	Spreading Basins					Tujunga Spreading Grounds		Headworks Spreading Grounds	
	Branford	Hansen	Lopez	Pacoima Native	Pacoima Owens River	Native Water	Owens River Water		
Oct.	16	266	0	18	0	0	0	0	300
Nov.	87	476	0	432	0	0	0	0	995
Dec.	3	694	0	76	0	0	0	0	773
Jan.	66	845	0	464	0	0	0	0	1,375
Feb.	32	5,452	435	2,006	0	0	0	0	7,925
Mar.	36	5,390	424	2,308	0	0	0	0	8,158
Apr.	26	2,180	224	1,400	0	0	1,433	0	5,263
May	0	1,100	151	0	0	0	0	0	1,251
June	0	1,310	253	0	0	0	0	0	1,563
July	0	475	248	0	0	0	0	0	723
Aug.	0	0	0	0	0	0	0	0	0
Sept.	24	0	0	0	0	0	0	0	24
Totals	290	18,188	1,735	6,704	0	0	1,433	0	28,350

Figures 1 and 2 depict water levels at key wells with their approximate locations indicated by numbers shown on Figure 2 map.

Water Reclamation

Water reclamation presently provides a source of water for irrigation, industrial and recreational uses, and ground water recharge which occurs in the unlined section of the Los Angeles River. Six wastewater reclamation plants are in operation in ULARA. A tabulation of operating water reclamation plants is shown on Table 7.

Water Quality

Water resources management must take into account water quality as well as water supply. The total dissolved solids (TDS) concentration in water is the quality indicator that is generally used. A comparison of the TDS content in the various water sources is shown in Figure 3. Representative mineral analyses of imported, surface, and ground waters for 1985-86 are contained in Table 8.

An Interagency Coordinating Committee has been formed to coordinate the implementation of the Groundwater Quality Management Plan - San Fernando Valley Basin - in order to deal with the organic contaminants TCE and PCE found in the groundwater. Table 9 shows the total number of wells for 1985-86 exceeding the California DOHS action levels for these contaminants.

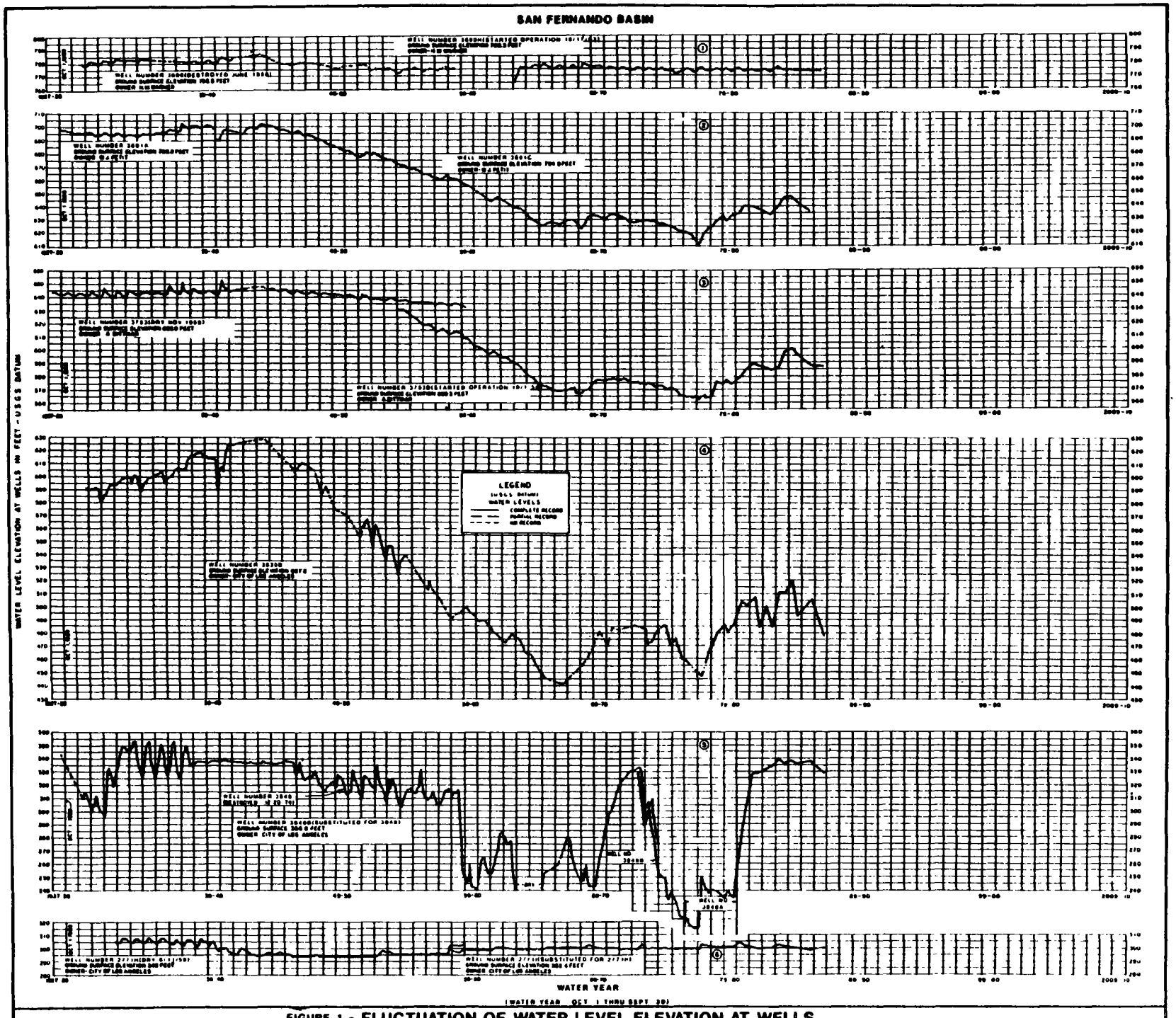

FIGURE 1 - FLUCTUATION OF WATER LEVEL ELEVATION AT WELLS IN THE SAN FERNANDO BASIN

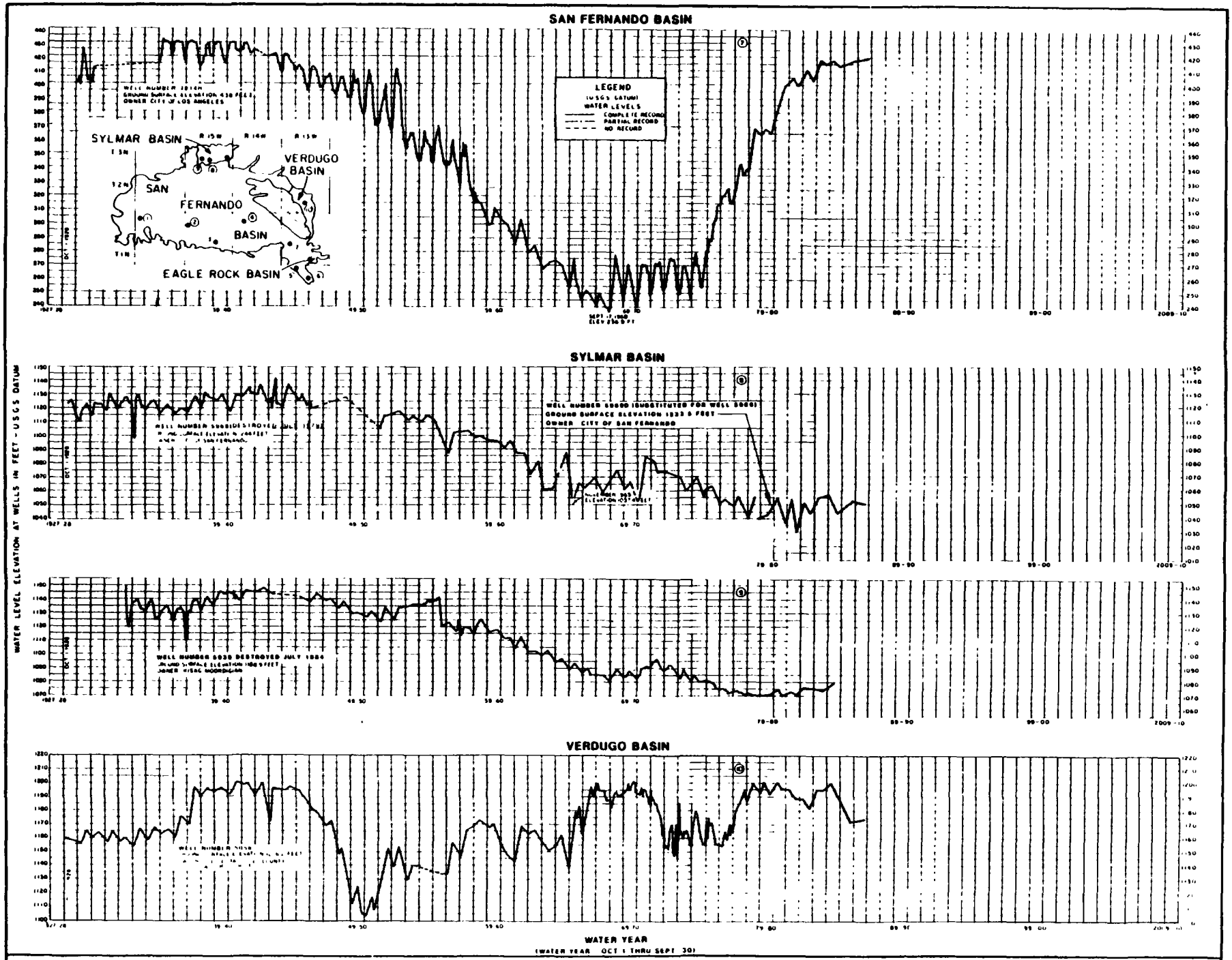

FIGURE 2 - **FLUCTUATION OF WATER LEVEL ELEVATION AT WELLS IN THE SAN FERNANDO, SYLMAR AND VERDUGO BASINS**

TABLE 7

WATER RECLAMATION PLANTS, 1985-86
(In Acre-Feet)

Plant	Treated	Used in ULARA	Discharged to Los Angeles River
San Fernando Basin			
City of Burbank	4,596	559	4,317
Los Angeles-Glendale	15,657	1,387[a/]	14,289
Donald C. Tillman	24,022	616[e/]	22,097
Indian Hills Mobile Homes[c/]	20	20[b/]	0
Rocketdyne (Santa Susana Field Laboratory)	37	37[b/]	0
The Independent Order of Foresters[d/]	18	18[b/]	0
Total	44,350	2,637	40,703

a/ Total water delivered (9 AF) to phosphate plant in Glendale includes 50 percent evaporation and the rest to Los Angeles River; 1371 AF delivered to Griffith Park by City of Los Angeles for irrigation and to Los Angeles-Glendale plant for wash down, cooling, and irrigation; 7 AF used by Cal/Trans for freeway landscape irrigation.

b/ Land irrigation.

c/ Water supply from nearby well.

d/ Water supply from pipeline from LADWP.

e/ Water used for in plant use.

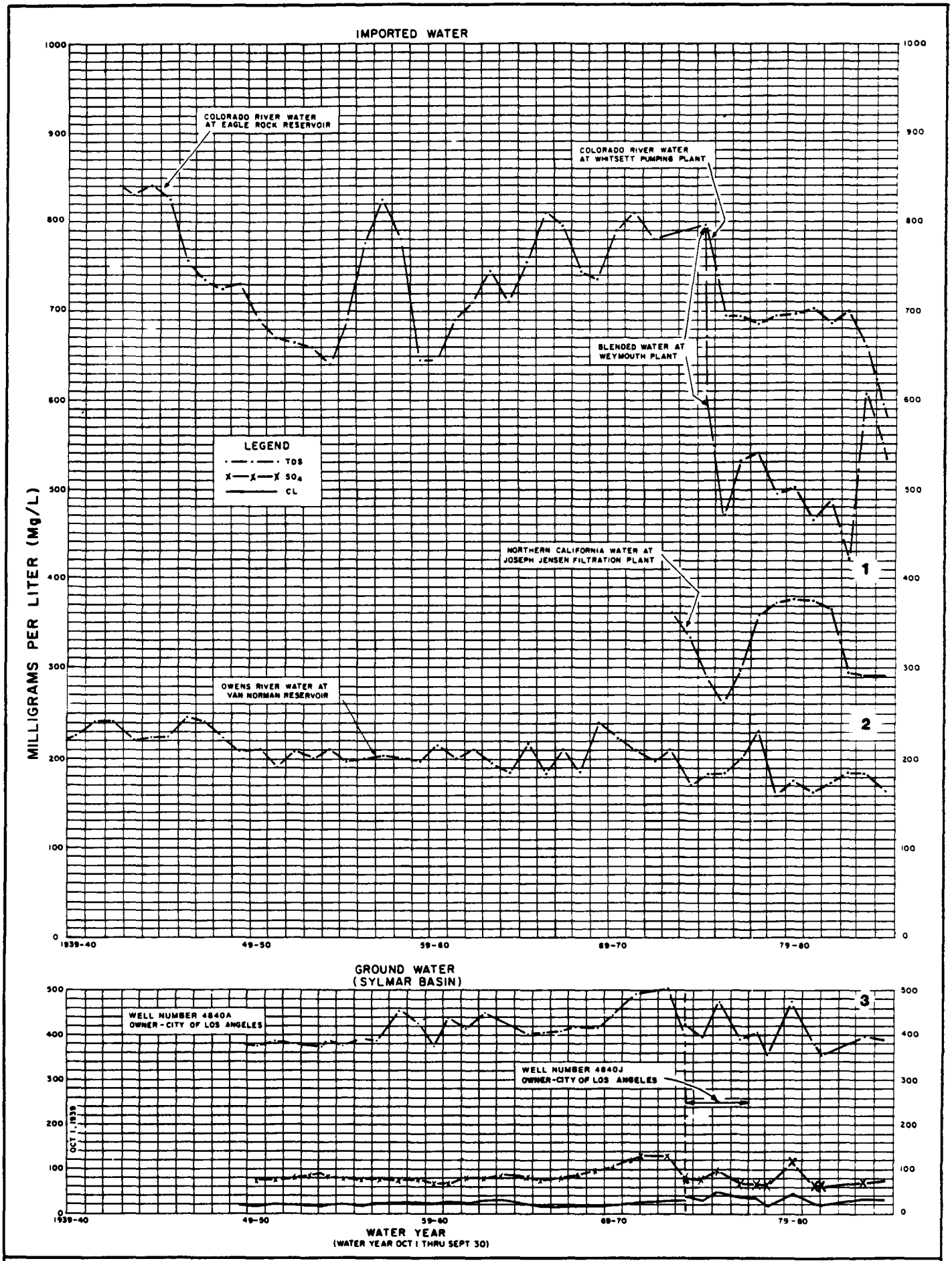

Figure 3— MINERAL CONSTITUENTS OF WATER SOURCES IN THE ULARA

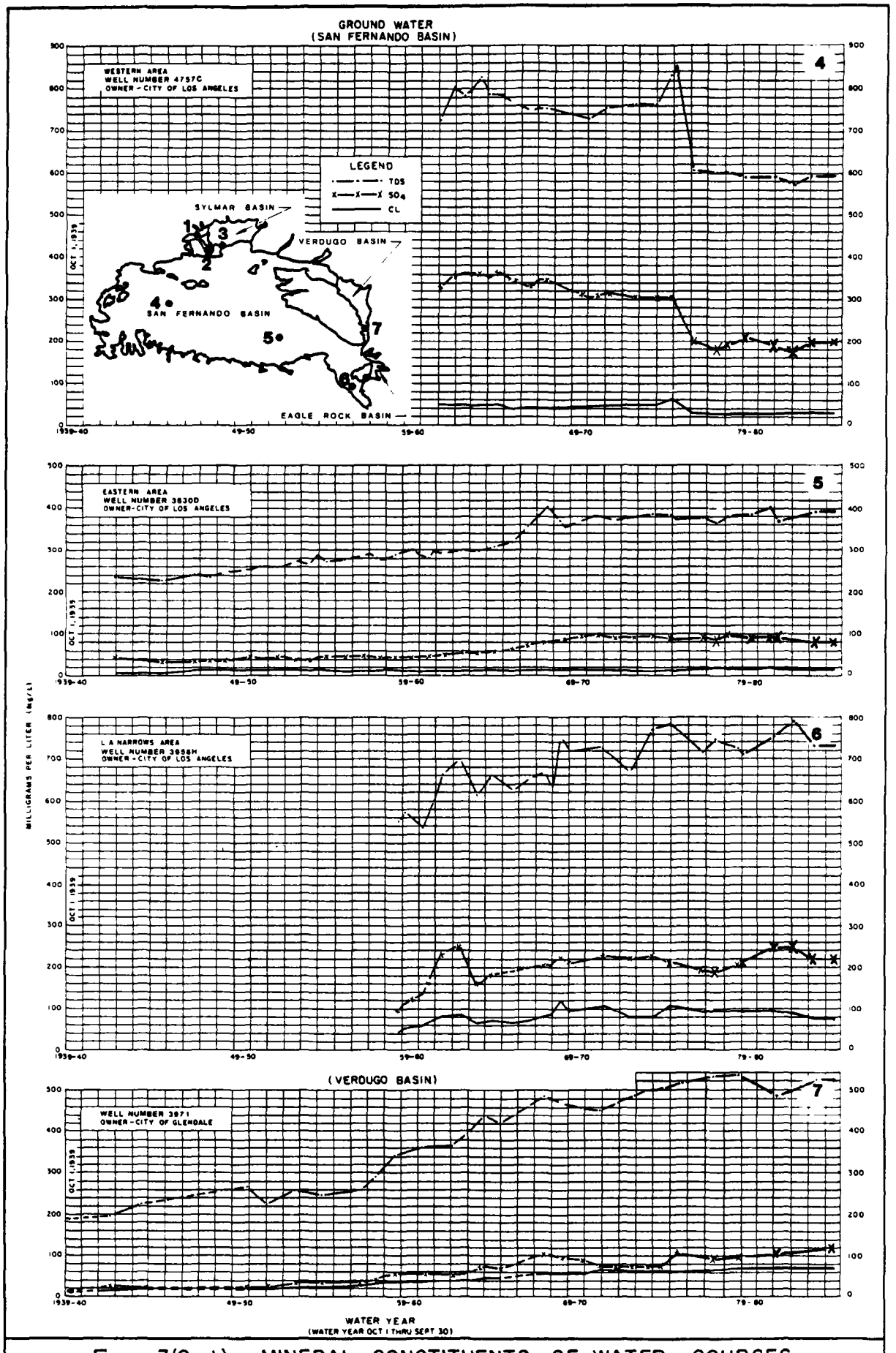

Figure 3(Cont.) — MINERAL CONSTITUENTS OF WATER SOURCES IN THE ULARA

TABLE 8

REPRESENTATIVE MINERAL ANALYSIS OF WATER

MINERAL CONSTITUENTS IN Milligrams per liter (mg/l)
Milliequivalents per liter (me/l)

Well Number or Source	Date Sampled	ECx10^6 at 25°C	pH	Ca	Mg	Na	K	Co_3	HCo_3	SO_4	Cl	NO_3	F	B	TDS Total Dissolved Solids mg/l	Total Hardness as $CaCO_3$ mg/l
Imported Water																
Blended State Project and Colorado River Water at Eagle Rock Reservoir	85-86	739	7.39	53 2.6	22 1.8	70 3.0	3.8 0.1	-- --	118 2.4	160 3.3	65 3.3	0.42 0.0	0.21 0.0	0.17 0.0	465	222
Owens River Water Upper Van Norman Reservoir Inlet	85-86	293	7.98	20 1.00	5.5 0.5	32 1.4	3.8 0.1	-- --	101 2.0	21 0.4	18 0.5	0.17 0.0	0.60 0.0	0.40 0.0	185	73
State Project Water at Joseph Jensen Filtration Plant (Influent)	85-86	497	-- --	32 1.60	15 1.79	55 2.39	3.0 0.08	0 0	109 1.78	-- --	69 1.94	0.85 0.06	0.19 0.00	0.30 1.00	313	142
Surface Water																
Los Angeles River at Sepulveda Blvd.	85-86	968	8.1	70 3.5	28 2.3	92 4.0	9.0 0.2	18 0.4	147 2.9	211 4.4	85 2.4	3.4 0.2	-- --	0.64 0.1	678	292
Los Angeles River at Colorado Blvd.	85-86	936	8.8	70 3.5	29 2.4	89 3.9	8.0 0.2	42 0.8	137 2.7	195 4.1	87 2.5	1.9 0.1	-- --	0.60 0.1	668	295
Burbank Western Wash at Los Angeles River	85-86	878	8.3	46 2.3	22 1.8	95 4.1	11 0.3	18 0.4	137 2.7	150 3.1	91 2.6	1.2 0.1	-- --	0.66 0.1	586	203
Burbank Reclamation Plant Discharge to Burbank-Western Wash	9-86	--	7.4	-- --	-- --	-- --	-- --	-- --	-- --	95 1.98	118 3.32	0.10 0.01	0.10 0.03	0.28 0.08	472	--
Los Angeles-Glendale Reclamation Plant Discharge to Los Angeles River	85-86	931	8.3	54 2.70	22 1.8	102 4.4	11 0.3	32 0.6	143 2.9	156 4.0	97 2.7	2.0 0.1	-- --	0.66 0.1	624	226
Groundwater																
(San Fernando Basin - Western Portion)																
4757C (Reseda No. 6)	10/13/83	944	7.80	115 5.75	31 2.54	43 1.87	2.1 0.05	-- --	301 4.94	200 4.17	33 0.93	2.6 0.19	0.31 0.02	0.24 0.07	595	416
(San Fernando Basin - Eastern Portion)																
(No. Hollywood No. 15)	05/27/86	548	7.8	61 3.05	21 1.72	26 1.11	2.3 0.06	-- --	-- --	40 0.83	22 0.62	8.9 0.25	0.30 0.02	0.23 0.06	240	190
3841G (Burbank No. 18)	03/20/86	475	8.0	45 2.25	8.3 0.68	56 2.4	-- --	-- --	200 3.28	35 0.73	38 1.07	10.0 0.28	0.24 0.14	-- --	320	150
3913H (Grandview No. 16)	09/10/85	515	7.80	52 2.6	12 1.00	39 1.70	3.2 0.08	0.87 0.03	218 3.57	48 1.00	20 0.56	2.6 0.19	9.57 0.03	-- --	310	180
(San Fernando Basin - L.A. Narrows)																
3498H (Pollock No. 6*)	11/18/86	1100	7.1	108 5.4	41 3.36	71 3.04	3.0 0.08	-- --	-- --	191 3.98	80 2.26	7.1 0.20	0.25 0.16	0.30 0.08	440	270
(Sylmar Basin)																
4840J (Mission No. 6**)	07/02/85	612	7.30	64 3.20	16 1.31	34 1.48	4.7 0.12	-- --	165 3.30	78 1.63	33 0.93	1.2 0.09	0.18 0.01	0.19 0.02	386	224
5959 (San Fernando No. 3)	02/13/85	850	7.60	100 5.0	17 1.39	30 1.30	3.1 0.08	-- --	-- --	65 1.35	32 0.90	21 1.75	0.31 0.02	-- --	400	319
(Verdugo Basin)																
3971 (Glorietta No. 3)	06/12/85	844	7.10	85 4.25	30 2.50	41 1.78	3.0 0.08	0.17 0.01	195 3.19	113 2.35	69 1.94	15 1.07	0.20 0.01	-- --	550	338
5069F (CVCWD No. 12***)	11/26/85	860	6.50	83.4 4.17	32.0 2.67	34.3 1.49	3.3 0.08	0.04 0.00	183 3.00	99.0 2.06	70.0 1.97	23.0 1.64	0.16 0.01	-- --	550	342

* Substituted for Pollock No. 6
** " " Mission No. 5
*** " " CVCWD No. 14

Imported Water

A. Owens River-Mono Basin water is sodium bicarbonate in character and is the highest quality water available to ULARA. Its TDS concentration averaged about 210 milligrams per liter (mg/1) for 30 years before 1969, the highest record being 320 mg/1 on April 1, 1946, and the lowest 150 mg/1 on September 17, 1941. Average TDS concentration for 1985-86 was 185 mg/1, which was 2 percent higher than the 165 mg/1 for 1984-85.

B. Colorado River water is predominantly sodium-calcium sulfate in character, changing to sodium sulfate after treatment to reduce total hardness. Samples taken at the Burbank turnout between 1941 and 1975 indicated a TDS concentration high of 875 mg/1 in August 1955 and a low of 625 mg/1 in April 1959. The average TDS over the 34-year period was approximately 740 mg/1. Tests conducted at Lake Matthews showed an average TDS of 522 mg/1 for 1985-86, a decrease of 10 percent from last year.

C. Northern California water (State Water Project water) is sodium bicarbonate-sulfate in character. It generally contains less TDS and is softer than local and Colorado River water. Since its arrival in Southern California in April 1972, the water had a high TDS concentration of 390 mg/1 and a low of 247 mg/1. Tests of Northern California water are taken at the Joseph Jensen Filtration Plant. Average TDS concentration during 1985-86 was 313 mg/1, an increase of 8 percent over last year.

D. Colorado River and Northern California water were first blended at the Weymouth Plant in May 1975. In the 1985-86 period, TDS had an average value of 367 mg/1 which was a 31 percent decrease from 1984-85. Blending rations vary at the Weymouth Plant and tests are taken from the effluent.

Surface Water

Surface runoff contains salts dissolved from rocks in the tributary areas. Surface water is sodium-calcium, sulfate-bicarbonate in character. In 1985-86, low flows in the Los Angeles River at Colorado Boulevard had an average TDS content of 668 mg/1 and a total hardness of 295 mg/1, an increase and decrease over last year of 6 and 23 percent, respectively.

Ground Water

Ground water in ULARA is moderately hard to very hard. The character of groundwater from the major water-bearing formations is of two general types, each reflecting the composition of the surface runoff in the area. In the western part of ULARA, it is calcium sulfate-bicarbonate in character, while in the eastern part, including Sylmar and Verdugo Basins, it is calcium bicarbonate. TDS increased in the western part of the San Fernando Basin by 4 percent from 1982-83 to 1983-84; increased by 2 percent in the eastern part over 1984-85; increased by 2 percent in the Sylmar Basin from 1982-83; and increased by 13 percent from 1981-82 to 1984-85 in the Verdugo Basin.

Groundwater is generally within the recommended limits of the United States Public Health Service Drinking Water Standards, except perhaps for wells in the western end of the San Fernando Basin having excess concentrations of sulfate and those in the lower part of the Verdugo Basin having abnormally high concentrations of nitrate.

Groundwater Quality Management Plan

During 1985-86, the Interagency Coordinating Committee (ICC) continued to implement the recommendations of the Groundwater Quality Management Plan - San Fernando Valley Basin (GWQMP) which are to protect the groundwater basin and to reduce concentrations of trichloroethylene (TCE) and tetrachloroethylene (PCE). There were seven active subcommittees operating during 1985-86 to implement the GWQMP recommendations. More than 20 state and local agencies are participating in the subcommittees. Several noteworthy accomplishments, described below, resulted from subcommittee activities.

Underground Tanks - The cities of Los Angeles and Glendale, and Los Angeles County have developed and are implementing guidelines to enforce ordinances to regulate underground storage tank construction and monitoring.

Private Sewage Disposal System -

The City of Los Angeles bureau of Sanitation is implementing the ordinance adopted in 1985, requiring the proper abandonment of Private Sewage Disposal Systems (PSDS) and connection to the public sewer system. A survey of the number of PSDSs that require abandonment was preformed. A total of 460 Notices to Connect to available sewers were issued to property owners.

As part of the above effort, the Bureau of Engineering is continuing work on 18 sewer construction projects in unsewered areas of the City. Once the sewer construction projects are completed, existing PSDSs can be abandoned, and commercial building waste-water discharges can be routed to the public sewer system.

Monitoring - Recent legislation, A.B. 3525 (1984), has required the State Water Resources Control Board (SWRCB) to conduct an evaluation of the impact of solid waste disposal sites upon air and water quality within the state. Under this program, a designated number of owners of disposal sites are required to prepare and submit Solid Waste Assessment Test (SWAT) Reports indicating the extent of their impact of these sites upon the groundwater and air. The City of Los Angeles as owner of the Sheldon-Arleta, Toyon, Lopez, and Branford landfills must submit SWAT Reports for these facilities to the Regional Water Quality Control Board in the 1987-89 period. DWP has assisted in the selection of the contractors to prepare these reports and has provided technical information. The DWP has provided water quality, Tujunga Spreading Grounds data, and water level information to assist the Los Angeles City Bureau of Sanitation in performing the SWAT.

Cities and agencies in the Upper Los Angeles River Area continued to monitor the volatile organic contamination in their production well fields. Table 9 shows the results of this monitoring and the scope of the contamination by summarizing the number of ULARA wells that are contaminated at various levels above the California State Department of Health Services action levels of 5 ppb for TCE and 4 ppb for PCE.

Water Treatment - The LADWP has proceeded with the development of the North Hollywood-Burbank Aeration Facility. The South Coast Air Quality Management District (AQMD) has approved the air quality permit application, and DWP is proceeding with the preconstruction phase of the project.

The DWP continues its research into the combined use of ultraviolet radiation and ozonization as possible alternative to other technologies for the removal of organic chemicals from groundwater sources. James M. Montgomery, Consulting Engineers, Inc., in cooperation with Dr. William Glaze of UCLA, is currently conducting this research under a cooperative agreement between DWP and the U.S. EPA.

The LADWP continues work on the well packer project in 14 North Hollywood wells. The purpose of this project is to seal off the contaminated upper aquifer zone from the lower zone and to pump clean water from the lower aquifer zone.

The well packer project involves: 1) the removal of the well pumps; b) photo-logging the well casings; c) re-installation of the well pumps; d) installation of the packer on the pump discharge column at the selected depth; and e) testing of the packer, both inflated and deflated, to determine the level of improvement in the quality of extracted water.

U.S. EPA Superfunding - As part of a program to remove the TCE and PCE from the ULARA groundwater basins, the LADWP filed an application with the U.S. EPA Superfund Program for the funding of a remedial investigation. Four sites, the North Hollywood, Crystal Springs, Pollock, and Verdugo areas, were officially designated as cleanup sites by the U.S. EPA and have been included on the National Priority List as the first step in the Superfund process. The next step in the process required a Remedial Investigation to determine the scope of the problem. In December 1985, DWP submitted a final application for funding of the Remedial Investigation to the U.S. EPA.

In order to expedite cleanup of a particularly important site, the U.S. EPA has approved a special DWP Fast Track Plan for the North Hollywood-Burbank site. This site will be administered separately from the other Superfund sites in the Upper Los Angeles River Area and will have the highest priority in the current program.

The U.S. EPA approved an advanced match of $300,000 in March 1986 for the North Hollywood-Burbank Aeration Facility.

Due to delays in U.S. EPA funding, the DWP Board of Commissioners authorized $2.5 million for a groundwater remediation program to proceed prior to the receipt of federal funds. The U.S. Congress authorized a $9 billion Superfund Program in October 1986. The U.S. EPA is seeking to obtain the necessary funding for the San Fernando Valley Groundwater Quality Remedial Programs.

Leaking Underground Tank Investigations - During 1985-86, underground tank leak investigations with the potential for impacting ground water were active at four sites. The investigative sites, Centralab, Lockheed, Riker Lab-3M, and Rockwell-Rocketdyne, are under the direction of the California Regional Water Quality Control Board. As part of the investigations, wells have been drilled and ground water has been extracted for the purpose of well development and testing. The following is the amount of water pumped by these non-parties during 1985-86:

Party	Amount of Water Pumped (Acre-Feet)
Centralab	0.18
Lockheed	0.61
Riker Labs	0.04
Rockwell	1.45
Total	2.28

The ULARA Administrative Committee approved on October 17, 1985 the extraction of ground water for testing and site investigations associated with potential ground water contamination. The above non-parties submitted estimates of anticipated pumping to the ULARA Watermaster and received approval. A stipulation allowing parties with no pumping rights to extract high-level TCE ground water for evaluation and cleanup is currently being drafted.

Other Activities - The DWP began construction of a new production well field in the Sun Valley area of the San Fernando Valley to provide a safe and adequate water supply to its customers. Rinaldi-Toluca Well Nos. 1 through 6 have been completed, and drilling of Rinaldi-Toluca Well Nos. 7 through 11 and construction of a collector line is scheduled for the upcoming year.

TABLE 9

1985-86
ULARA WELL FIELDS* -
WELLS EXCEEDING CALIFORNIA DOHS ACTION LEVELS
FOR TCE AND PCE

	Number of Wells											
	City of Los Angeles								Others			Total
	NH	CS	P	HW	E	W	V	Total	B	G	CVCWD	
TCE Levels (ppb)												
5-20	6	2**	1	0	3	1**	1	14	3**	2	0	19
20-100	11**	0	0	6**	1	3**	0	21	2**	2	0	25
100	4**	0	0	0	0	0	0	4	1	0	0	5
Total	21	2	1	6	4	4	1	39	6	4	0	49
PCE Levels (ppb)												
4-20	5**	0	2**	6**	0	1	0	14	2	3	4	23
20-100	0	0	0	0	0	0	0	0	2	0	0	2
100	0	0	0	0	0	0	0	0	2	0	0	2
Total	5	0	2	6	0	1	0	14	6	3	4	27

Well Fields:
NH - North Hollywood
CS - Crystal Springs
P - Pollock
HW - Headworks
E - Erwin
W - Whitnall
V - Verdugo
B - City of Burbank
G - City of Glendale
CVCWD - Crescenta Valley County Water District

*Values in table represent an average for the year.

**Since several wells in the well fields were not pumped during the year, a previous year's TCE annual average value was used for the unpumped wells in order to compile this table.

III. WATER USE AND DISPOSAL

Water delivered for use in ULARA is either imported water, local ground water, local surface diversions, reclaimed, or a mixture of local and imported water, depending on the area and water system operation. During the 1985-86 water year, the total amount delivered to water users in ULARA was 370,805 acre-feet. Of this total, 25,609 acre-feet was ground water, 342,559 acre-feet was imported, and 1,433 acre-feet was reclaimed water. Refer to Figure 5 for a monthly breakdown. The basin contains 542 wells, of which 132 are active and 410 are inactive, observation, test, capped, etc.

The original trial court adjudication of ground water rights in ULARA (no longer in effect) restricted all ground water extractions, effective October 1, 1968. On that date, extractions were restricted to approximately 104,000 acre-feet per water year. This amounted to a reduction of approximately 50,000 acre-feet below the previous six-year average. The State Supreme Court's opinion, as implemented on remand in the Final Judgment entered on January 26, 1979, provides a similar restriction in ground water pumping. Refer to the previous section entitled "History of Adjudication" for details of allowed pumping.

Sparkletts Drinking Water Corporation and Deep Rock Water Company are the only parties that extract water from the Eagle Rock Basin.

Figure 4 illustrates the annual ground water extractions and total water imported in ULARA, beginning with the 1944-45 water year. Note the change from 1968-69 through the present.

It can also be noted that for 10 years before pumping was restricted, imports exceeded extractions from 50,000 to 90,000 acre-feet per year and that, for the water years 1968-69 to 1985-86, the difference has increased to between 110,000 and 260,000 acre-feet.

Figure 5 provides an analysis of the monthly relationship between rainfall, ground water extractions, and imported supply. Data relates to all ULARA and not to any one specified ground water basin. The precipitation values were obtained from stations on the valley floor (Table 3).

Ground Water Extractions

Appendix A is the record of groundwater extractions for the 1985-86 water year, and Plate 6 shows the approximate location of the well fields which pumped this water. A total of 90,833 acre-feet was pumped from the San Fernando Basin compared to an allowable pumping of 103,523 acre-feet. Of this total, 99,651 acre-feet is extraction rights by parties in the San Fernando Basin (see 1984-85 Table 15), with its remaining 3,872 acre-feet

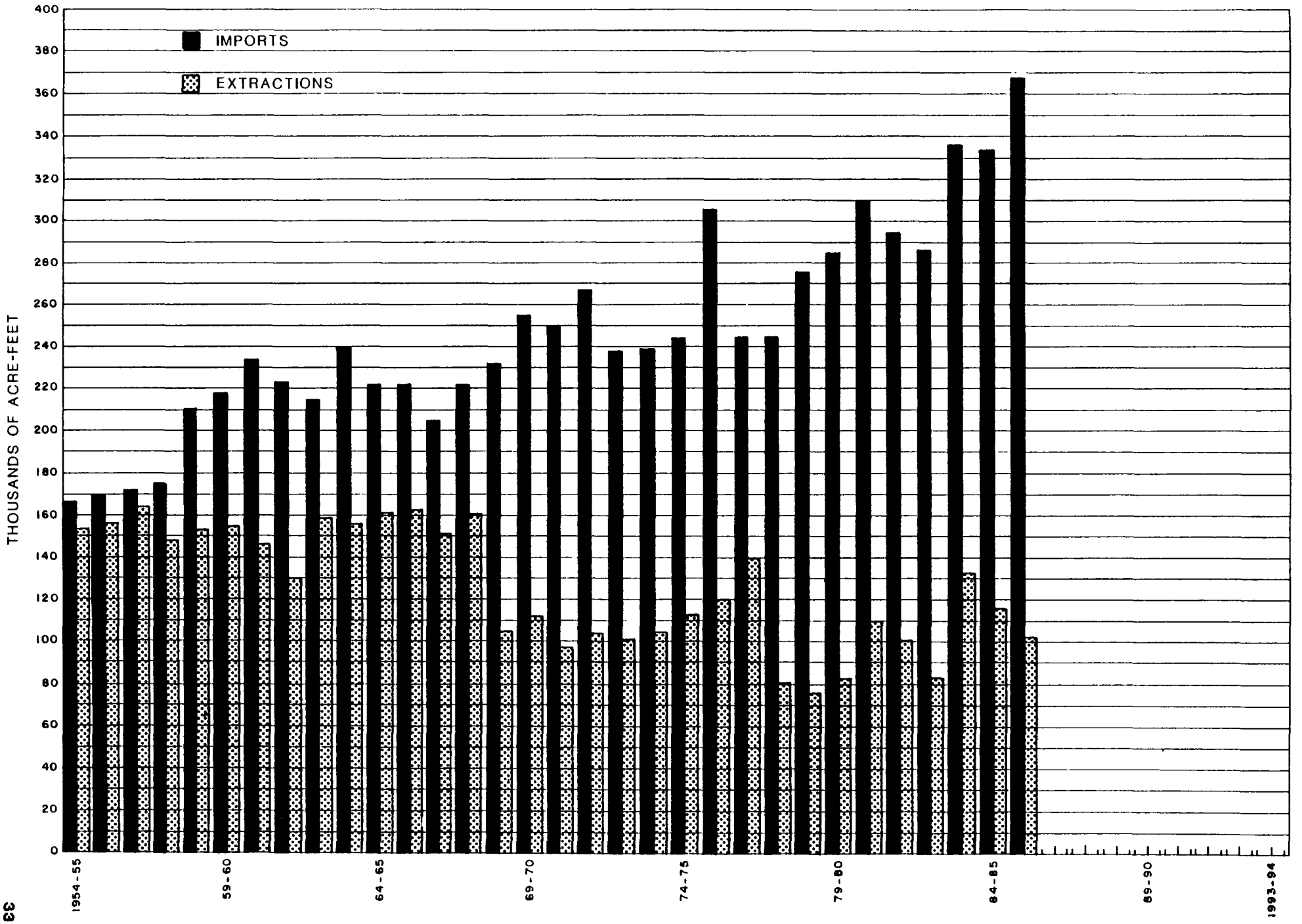

Figure 4 – GROUNDWATER EXTRACTIONS AND USE OF IMPORTED WATER IN UPPER LOS ANGELES RIVER AREA

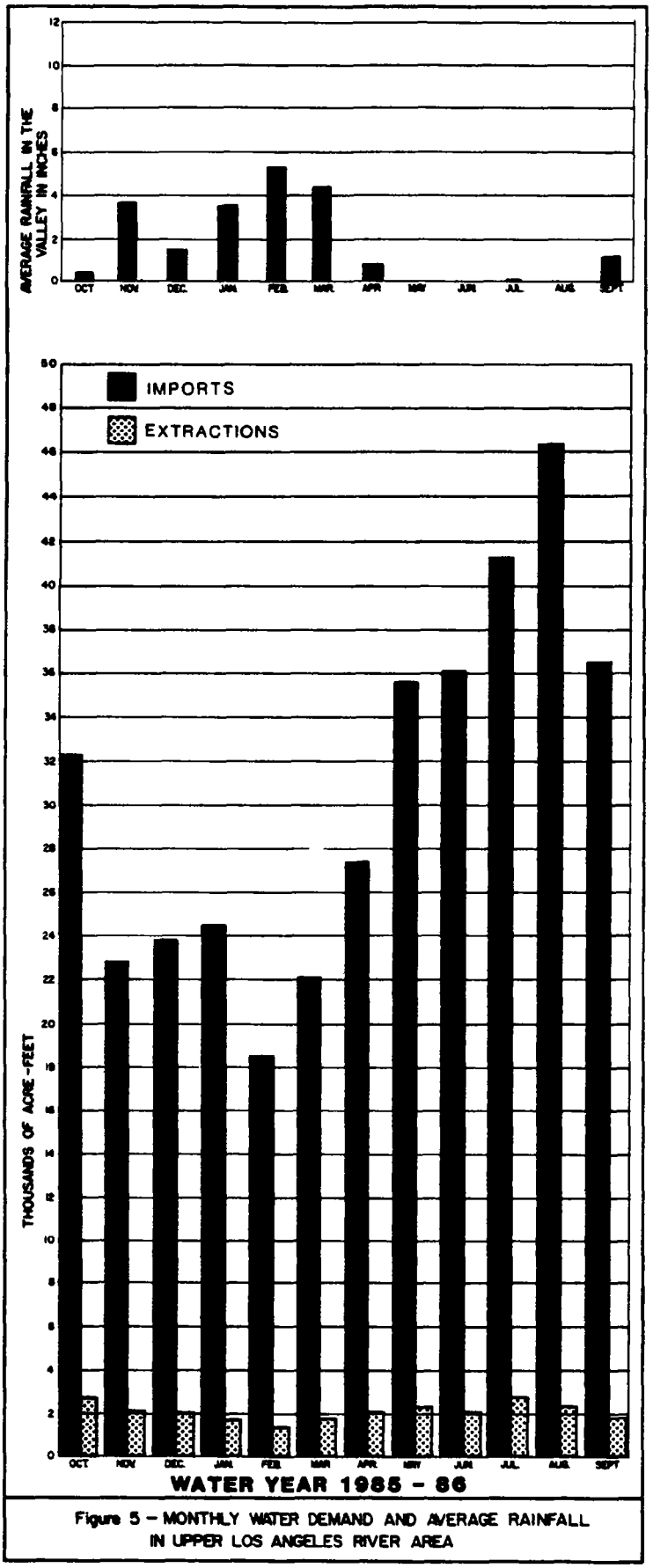

Figure 5 – MONTHLY WATER DEMAND AND AVERAGE RAINFALL IN UPPER LOS ANGELES RIVER AREA

being nonconsumptive use pumping (see Table 13). A total of 6,242 acre-feet was pumped from the Sylmar Basin and 5,493 acre-feet from the Verdugo Basin. The respective safe yield values for these three basins are 90,680, 6,210, and 7,150 acre-feet. Pumping in the Verdugo Basin is less than safe yield due to water quality problems. Construction of water blending facilities in the Verdugo Basin by the City of Glendale was completed in September 1981. This allows poorer quality Verdugo Basin ground water to be blended with MWD water and now enables Glendale to pump its prescriptive right in the Verdugo Basin.

Imports and Exports of Water

Residential, commercial, and industrial expansions in ULARA require the importation of additional water supplies to supplement that provided by the ground water basins.

The imported supplies to ULARA are from the City of Los Angeles' Owens-Mono Basin aqueduct and through the MWD distribution system, which consists of California and Colorado River Aqueduct waters.

Exports from ULARA, exclusive of sewage, are limited to the City of Los Angeles, which exports imported and ground water. Table 10 summarized the nontributary imports and exports from ULARA. Ground water imports and exports in and out of ULARA are listed in Table 12.

Physical Data by Basins

The Watermaster has collected and summarized data in Table 12 which show the water supply and disposal in each of the basins.

The information for Table 12 was submitted by the parties. In instances where estimates were made by the parties, such as water delivered to hill and mountain areas, sewage exported, etc., these were based upon methods consistent with previous estimates computed by SWRCB for the San Fernando Valley reference. The Watermaster also made computations of subsurface outflows based on similar computations made by SWRCB.

Pumping by private parties is summarized in Table 13.

San Fernando Basin Allowable Extractions

Table 14 lists San Fernando Basin extraction rights for the Cities of Burbank, Glendale, Los Angeles, and San Fernando for the water year 1986-87. Table 15 shows San Fernando Basin stored water as of October 1, 1985 and October 1, 1986. All rights are based on the City of Los Angeles vs. City of San Fernando, et al., judgment, dated January 26, 1979.

Sylmar Basin Allowable Extractions

Table 16 shows Sylmar Basin stored water as of October 1, 1985 and October 1, 1986. All rights are based on the March 22, 1984 stipulation between the City of San Fernando and the City of Los Angeles and filed with the Superior Court.

Facts Relevant to Ground Water Storage Capacity*

San Fernando Basin. The total ground water storage capacity of San Fernando Basin is approximately 3,200,000 acre-feet, with a regulatory storage capacity of 350,000 acre-feet required by the judgment. As of 1954-55, the temporary surplus in the basin had been exhausted by the overextraction of approximately 520,000 acre-feet.

Sylmar Basin. Sylmar Basin consists of confined aquifers with ground water storage space of approximately 310,000 acre-feet.

Verdugo Basin. The ground water storage capacity of Verdugo Basin is approximately 160,000 acre-feet.

Change in Ground Water Storage

San Fernando Basin. The change in storage for 1985-86 was -7,980 acre-feet, and the cumulative change in storage from 1954-55 through 1985-86 was -186,780 acre-feet. A comparison is made between the annual precipitation and the cumulative change in storage since the commencement of Watermaster activities for the San Fernando Basin. The average precipitation for the period 1968-69 through 1985-86 was 18.61 inches, compared to a long-term average of 16.48 inches of rainfall. During that time, the basin gained approximately 260,000 acre-feet of stored water. Of this total, 240,000 acre-feet was stored through spreading and in-lieu recharge activities. Thus, the natural change in storage due to an above normal rainfall period was 20,000 acre-feet. Refer to Table 11 for the annual precipitation and change in storage.

Sylmar Basin. The change in storage for 1985-86 was -120 acre-feet, and the cumulative change in storage from 1954-55 through 1985-86 was -23,300 acre-feet.

Verdugo Basin. The change in storage for 1985-86 was +130 acre-feet, and the cumulative change in storage from 1954-55 through 1985-86 was +19,620 acre-feet.

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* Information obtained from the City of Los Angeles vs. City of San Fernando, et al., Findings of Fact and Conclusions of Law dated January 26, 1979.

TABLE 10

ULARA - NONTRIBUTARY WATERS,
IMPORTS AND EXPORTS

(In Acre-Feet)

Source and Agency	1984-85	1985-86
Imports		
MWD water[a/]		
Burbank, City of	20,238	22,498
Crescenta Valley County Water District	2,777	2,662
Glendale, City of	22,992	20,672
Los Angeles, City of	10,163	9,971
La Canada Irrigation District	1,001	1,020
Las Virgenes Municipal Water District (nonparty)	15,811	15,227
San Fernando, City of	424	518
	73,406	72,568
Owens River water		
Los Angeles, City of	595,807[b/]	594,500[b/]
Total	669,213	667,068
Exports		
Owens River water		
Los Angeles, City of	-331,777	-324,509
Net Import	337,436	342,559

a/ Colorado River and Northern California waters combined.

b/ This value represents the summation of the gross amount of water delivered to and exported from ULARA. It does not include operational releases, reservoir evaporation, and water spread during the year.

TABLE 11

SAN FERNANDO BASIN
PRECIPITATION COMPARED TO
CHANGE IN STORAGE

Water Year	Valley Floor Precipitation (Inches)	Change in Storage (AF)	Cumulative Change in Storage (AF)
1968-69	29.00	+79240	+79240
1969-70	10.50	-9740	+69500
1970-71	15.57	+15340	+84840
1971-72	8.10	-17090	+67750
1972-73	20.65	+17020	+84770
1973-74	15.75	-21820	+62950
1974-75	14.74	-22580	+40370
1975-76	9.90	-30090	+10280
1976-77	14.19	-50490	-40210
1977-78	35.43	+136150	+95940
1978-79	21.76	+78080	+174020
1979-80	30.25	+99970	+273990
1980-81	11.04	-32560	+241430
1981-82	17.18	-530	+240900
1982-83	39.64	+121090	+361990
1983-84	9.97	-63180	+298810
1984-85	11.00	-31690	+267120
1985-86	20.27	-7950	+259140
18-yr. average	18.61		

Note

(1) 100-year mean precipitation = 16.48 inches.

(2) Stored water through spreading and in-lieu pumping = 239,830 AF.

(3) Natural change in storage = +259,140 AF - 239,830 AF = 19,310 AF.

TABLE 12

1985-86
SUMMARY OF WATER SUPPLY AND DISPOSAL
SAN FERNANDO BASIN
(In Acre-Feet)

Water Source and Use	City of Burbank	City of Glendale	City of Los Angeles	City of San Fernando	All Others	Total
Extractions						
Total quantity extracted	123	5,819	81,019	0	3,872	90,833
Used in valley fill	123	d/	4,063	d/	d/	d/
Imports						
MWD water	22,498	20,672	5,749	518	15,227	64,664
Owens River water	--	--	584,660 f/	--	--	584,660
Ground water from Sylmar Basin	--	--	3,075	2,881	0	5,956
Ground water from Verdugo Basin	--	1,842	--	--	--	1,842
Reclaimed water	559 g/	9 e/	1,994 c/	--	75 e/	2,637
Exports						
Ground water:						
to Verdugo Basin	--	0	0	--	0	0
out of ULARA	--	--	76,956	--	0	76,956
Owens River water:						
to Eagle Rock Basin	--	--	346	--	--	346
out of ULARA	--	--	324,509	--	0	324,509
MWD:						
to Verdugo Basin	--	3,217	0	--	--	3,217
Total net delivered water	23,180	25,125 a/	274,687	3,399	19,171	345,562
Water delivered to hill and mountain areas						
Ground water	d/	d/	0	0	0	d/
Owens River water	--	--	42,385	--	--	42,385
MWD water	d/	d/	2,639	0	15,227	d/
Verdugo Basin water	--	d/	--	--	--	d/
Water outflow						
Surface	--	--	--	--	--	155,090 b/
Subsurface	--	--	--	--	--	420
Sewers	12,536	18,679	72,655	1,955	--	105,825
Reclaimed	4,317	7,145	29,241	--	--	40,703

* See Table 13 for parties included.

a/ Total delivered water to the City of Glendale was 29,918 AF. Verdugo Basin metered sales times 105 percent equaled 4,793 AF. Therefore, the San Fernando Basin delivered water was 25,125 AF (29,918 AF minus 4,793 AF). Refer to Section 5.2.1.3 of Judgment.

b/ At Station F-57C-R where 29-year mean (1929-57) base low flow is 7,580 acre-feet.

c/ Used for irrigation at the Harding and Wilson Golf Courses, Crystal Springs picnic area, and freeway landscaping. Also used for wash down, cooling, and irrigation at the Los Angeles-Glendale plant and Tillman Water Reclamation Plant.

d/ These values are no longer calculated as per Judgment.

e/ Delivered to cooling towers of the phosphate plant in Glendale. Assumed 50 percent evaporation and 50 percent to Los Angeles River. Refer to Table 7 for all others.

f/ Includes Owens River water exported to Eagle Rock Basin and exported out of ULARA.

g/ This value is no longer estimated. Actual amount of reclaimed water is being metered by the City of Burbank.

Note: Colorado River and Northern California waters combined and listed as MWD water.

TABLE 12

1985-86
SUMMARY OF WATER SUPPLY AND DISPOSAL
SYLMAR BASIN
(In Acre-Feet)

Water Source and Use	City of Los Angeles	City of San Fernando	All Others	Total
Extractions				
Total quantity	3,075	3,166	1	6,242
Used in valley fill	0	285	1	286
Imports				
Owens River water	9,053	--	--	9,053
MWD water	--	518	--	518
Exports				
Groundwater: to San Fernando Basin	3,075	2,881	0	5,956
Water delivered to hill and mountain area				
Owens River	402	--	--	402
Water outflow				
Surface	--	--	--	5,000[i/]
Subsurface: to San Fernando Basin[h/]	--	--	--	--
Sewers	800	194	0	994

h/ Computation not possible, well destroyed.

i/ Surface outflow is not measured. Calculated average surface outflow by Mr. Laverty - SF Exhibit 57.

TABLE 12

1985-86
SUMMARY OF WATER SUPPLY AND DISPOSAL
VERDUGO BASIN
(In Acre-Feet)

Water Source and Use	Crescenta Valley County Water District	City of Glendale	La Canada Irrigation District	City of Los Angeles	Total
Extractions					
Total quantity	2,075	3,418	0	0	5,493
Used in valley fill	2,019	1/	0	0	1/
Imports					
MWD water	2,662	3,217	1,020	0	6,899
Owens River water	--	--	--	787	787
Groundwater from:					
San Fernando Basin	--	--	--	--	--
Reclaimed water	--	--	--	--	--
Exports					
Groundwater to:					
San Fernando Basin	--	1,842	--	--	1,842
Water delivered to hill and mountain areas					
MWD water	72	1/	0	0	1/
Owens River water	--	--	--	103	103
Groundwater from:					
Verdugo Basin	56	1/	--	0	1/
San Fernando Basin	--	0	--	0	0
Water outflow					
Surface	--	--	--	--	8,740 j/
Subsurface:					
to Monk Hill Basin	--	--	--	--	300 k/
to San Fernando Basin	--	--	--	--	70
Sewage	1,395	2,184	0	120	3,699

j/ Information obtained from Station F-252C-R

k/ Based on 29-year average (1929-57)

1/ These values are no longer required

TABLE 12

1985-86
SUMMARY OF WATER SUPPLY AND DISPOSAL
EAGLE ROCK BASIN
(In Acre-Feet)

Water Source and Use	City of Los Angeles	Deep Rock[o/] Water Company	Sparkletts Drinking[o/] Water Corporation	Total
Extractions				
Total quantity	0	12	172	184
Used in valley fill	0	0	0	0
Imports				
Owens River water	346	--	--	346
MWD water	4,222	--	--	4,222
Groundwater	0	0	0	0
Exports				
Groundwater	0	12	172	184
Water delivered to hill and mountain areas				
MWD water	2,483	--	--	2,483
Owens River water	346	--	--	346
Water outflow				
Surface[m/]	--	--	--	--
Subsurface[n/]	--	--	--	--
Sewers	1,910	0	0	1,910

m/ Information not available

n/ Estimated in Supplement No. 2 to Report of Referee for dry years 1960-61. Currently, data not available for direct evaluation.

o/ Deep Rock Water Company and Sparkletts Drinking Water Corporation under a stipulated agreement with the City of Los Angeles; extract limited to 500 AF/year, and export given amount.

TABLE 13

1985-86
PUMPING BY NONCONSUMPTIVE USE, PHYSICAL SOLUTION,
AND PARTIES WITHOUT RIGHTS
SAN FERNANDO BASIN

(In Acre-Feet)

I.	Nonconsumptive Use Parties	
1.	Conrock Co.	1,710
2.	Livingston-Graham, Inc.	5
3.	Sears, Roebuck and Company	30
4.	Sportsmen's Lodge, Inc.	1
5.	Toluca Lake Property Owners Assn.	9
6.	Walt Disney Productions	1,429
7.	Total	3,184
II.	Physical Solution Parties	
1.	Environmentals Inc.	29
2.	Forest Lawn Cemetery Assn.	400
3.	Sportsmen's Lodge, Inc.	1
4.	Toluca Lake Property Owners Assn.	30
5.	Valhalla Memorial Park	226
6.	Total	686
III.	Parties Without Rights	
1.	Harper, Cecelia De Mille	1
2.	Mena, John and Barbara	1
3.	Total	2
IV.	Total Pumping by Private Parties	3,872

Note: Sportsmen's Lodge and Toluca Lake pumping is part nonconsumptive and part physical solution.

TABLE 14

1986-87
SAN FERNANDO BASIN EXTRACTION RIGHTS
(In Acre-Feet)

Item	Cities of		
	Burbank (1)	Glendale (2)	Los Angeles (3)
1. Delivered water 1985-86	23,180	25,125	274,687
2. Import delivered 1985-86	--	--	--
3. Delivered to hill & mountain 1985-86	--	--	45,024
4. Delivered to valley fill 1985-86	--	--	229,663
5. Percent recharge	20%	20%	20.8%
6. Return water extraction right 1986-87	4,636	5,025	47,770
7. Native safe yield	0	0	43,660
8. Total extraction right 1986-87	4,636	5,025	91,430

Items 1, 2 & 3 = Table 12
Item 4 = Item 1 minus Item 3
Item 5 = Article 5.2.1.3, page 17 of Judgment
Item 6, cols. (1) & (2) = Item 1 x Item 5
col. (3) = Item 4 x Item 5
Item 7 = Article 4.2.4, page 11 of Judgment
Item 8 = Item 6 + Item 7
-- = Data not required

TABLE 15

STORED WATER
SAN FERNANDO BASIN
(In Acre-Feet)

	Cities of		
	Burbank (1)	Glendale (2)	Los Angeles (3)
1984-85			
1. Stored water as of Oct. 1, 1984	22,659	19,143	181,229
2. Delivered water 1983-84	24,927	25,941	222,549
3. Return water extraction right 1984-85	4,985	5,188	46,290
4. Native safe yield	0	0	43,660
5. Total extraction right for 1984-85	4,985	5,188	46,290
6. Extractions for year	2,863	3,086	95,654
7. Physical solution extractions	(261)**	(438)**	29
8. Spread water	0	0	5,573
9. Stored water as of Oct. 1, 1985	24,781	21,245	180,370
1985-86			
10. Delivered water 1984-85	23,641	25,742	221,705
11. Return water extraction right 1985-86	4,728	5,148	46,115
12. Native safe yield	0	0	43,660
13. Total extraction right for 1985-86	4,728	5,148	89,775
14. Extractions for year	123	5,819	81,019
15. Physical solution extractions	(226)**	(429)**	31
16. Spread water	0	0	1,433
17. Stored water as of Oct. 1, 1986*	29,386	20,574	189,873

Items 3 & 11 = Items 2 & 10 x percent recharge
Items 5 & 13 = Items 3 + 4 & 11 + 12, respectively
Item 9 = Items 1 + 5 - 6 - 7 + 8
** Items 7 & 15 = All subtracted from Los Angeles
col. (1) = Valhalla pumping
col. (2) = Forest Lawn & Environmentals Inc. pumping
col. (3) = Toluca Lake & Sportsmens Lodge pumping. Only consumptive use portion charged to Los Angeles.
Item 17 = Items 9 + 13 - 14 - 15 + 16
* = Does not include return flow occurring during water year 1985-86.

TABLE 16

STORED WATER AND
1984-85 EXTRACTION RIGHTS
SYLMAR BASIN
(In Acre-Feet)

	Cities of San Fernando	Cities of Los Angeles	Others
1984-85			
1. Stored water as of Oct. 1, 1984	(11) c/	(40) c/	--
2. Native safe yield	3,105	3,105	b/
3. Total extraction right 1984-85	3,105 a/	3,105 a/	b/
4. Extractions for year	3,102	3,130	29
5. Stored water as of Oct. 1, 1985	(11) c/	(40) c/	--
1985-86			
6. Stored water as of Oct. 1, 1985	(11)	(40)	--
7. Native safe yield	3,105	3,105	--
8. Total extraction right 1985-86	3,094 a/	3,065 a/	b/
9. Extractions for year	3,166	3,075	(18) c/
10. Stored water as of Oct. 1, 1986	(73) c/	(10) c/	--
1986-87			
11. Stored water as of Oct. 1, 1986	(73) c/	(10) c/	--
12. Native safe yield	3,105	3,105 d/	--
13. Total extraction right 1986-87	3,032	3,095	b/

a/ Effective Oct. 1, 1984, the safe yield of the Sylmar Basin is 6,210 acre-feet. The safe yield less pumping by others is equally shared by Los Angeles and San Fernando. The extraction right also takes into account deficit stored water.

b/ Entitled to reasonable overlying landowner pumping amount.

c/ Parenthesis indicate deficit stored water.

d/ An audit performed on San Fernando's pumping records discovered over-pumping of 980 AF during a two year period. The watermaster was informed by City of San Fernando and has agreed to reduce San Fernando's extraction rights by 327 AF/yr. for a three year period beginning 1987-88.

Item 3 = Items 2 - 1
Item 5 = Items 3 - 4 - others divided by 2
Item 8 = Items 7 - 6
Item 10 = Items 8 - 9 - others divided by 2
Item 13 = Items 12 - 11

APPENDIX A

GROUNDWATER EXTRACTIONS

1985-1986 WATER YEAR

GROUND WATER EXTRACTIONS

(Acre-Feet)

Owners		Extractions												
Well No.	Designation	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Total
						San Fernando Basin								
City of Burbank														
3841C	6A	26.86	3.12	5.99	14.14	8.13	2.96	4.75	6.27	4.71	5.53	0.00	0.00	82.46
3841G	18	19.72	0.00	0.00	0.00	4.59	3.98	2.63	3.45	2.61	3.10	0.00	0.00	40.08
Party Total		46.58	3.12	5.99	14.14	12.72	6.94	7.38	9.72	7.32	8.63	0.00	0.00	122.54
Conrock Co.														
4916A	2	11.83	103.53	148.34	106.37	84.57	144.11	167.98	138.11	167.85	163.27	175.89	157.73	1569.58
4916	3	105.32	0.00	0.07	0.26	10.08	0.00	0.00	4.92	16.64	1.75	1.55	0.31	140.90
Party Total		117.15	103.53	148.41	106.63	94.65	144.11	167.98	143.03	184.49	165.02	177.44	158.04	1710.48
Environmentals Inc.														
3934A	MOSOA	0.00	0.00	0.00	5.33	2.47	4.21	4.18	4.29	4.01	0.00	2.13	2.30	28.92
Forest Lawn Cemetery Assn.														
3947A	2	15.36	4.97	5.35	7.07	1.51	5.66	14.33	14.34	14.87	0.74	0.00	0.00	84.20
3947B	3	25.13	7.69	8.45	11.41	2.20	8.87	22.52	28.84	22.95	9.60	0.00	2.60	150.26
3947C	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.67	17.53	16.22	20.82	78.24
3958K	7	12.33	3.29	3.96	1.40	0.00	0.00	9.10	14.45	11.69	10.48	11.64	8.98	87.32
Party Total		52.82	15.95	17.76	19.88	3.71	14.53	45.95	57.63	73.18	38.35	27.86	32.40	400.02
City of Glendale														
3924N	SIPT 1	29.65	31.83	24.64	26.50	22.80	25.06	23.92	28.46	34.26	39.86	53.60	38.75	379.33
3924R	SIPT 2	0.50	0.99	0.27	0.28	0.00	0.13	0.67	1.42	2.56	1.44	1.39	0.50	10.15
GVENT	GVENT	428.74	376.87	348.02	439.17	404.49	347.72	411.86	427.82	382.40	883.26	616.87	362.14	5429.36
Party Total		458.89	409.69	372.93	465.95	427.29	372.91	436.45	457.70	419.22	924.56	671.86	401.39	5818.84
Harper, Cecelia DeMille														
4940A	North	0.10[E]	0.10[E]	0.10[E]	0.10[E]	0.10[E]	0.10[E]	0.10[E]	0.10[E]	0.10[E]	0.10[E]	0.10[E]	0.10[E]	1.20
Livingston-Graham, Inc.														
4916B	SnVal	0.26	0.20	0.21	0.18	0.20	0.42	0.45	0.54	0.67	0.69	0.85	0.68	5.35
City of Los Angeles														
3914L	CS-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.21	32.92	33.24
3914M	CS-46	330.08	300.83	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.09	0.00	631.25
CS Total		330.08	300.83	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.11	0.30	32.92	664.49

E - Estimated

1985-1986 WATER YEAR

GROUND WATER EXTRACTIONS

(Acre-Feet)

Well No.	Owners Designation	Extractions Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Total
						San Fernando Basin (Cont'd)								
3831H	E-1	153.90	142.58	142.91	28.58	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	468.59
3821I	E-2A	104.27	95.98	96.21	29.52	5.76	0.00	123.44	155.63	143.44	140.96	124.66	111.73	1131.60
3831G	E-3	128.63	118.73	121.79	33.84	0.67	0.00	119.51	161.25	159.16	149.22	156.50	136.02	1285.32
3921F	E-4	138.25	123.00	122.68	32.48	37.17	139.49	128.86	128.19	114.44	117.77	116.69	103.86	1302.88
3831F	E-5	268.34	215.15	0.00	19.42	1.10	0.00	225.78	145.55	0.00	0.00	0.00	0.00	875.34
3821H	E-6	195.36	185.45	189.03	157.71	184.27	194.72	148.10	205.05	198.44	93.66	0.00	0.00	1751.79
E Total		988.75	880.89	672.62	301.55	229.59	334.21	745.69	795.67	615.48	501.61	397.85	351.61	6815.52
3894BB	H-25	93.71	411.32	230.95	29.71	11.46	0.00	0.00	419.45	410.93	409.78	419.08	124.82	2561.21
3893L	H-26	0.00	0.00	0.00	0.09	0.00	0.00	315.34	0.00	0.00	0.00	0.00	0.00	315.43
3893K	H-27	216.37	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	216.44
3893M	H-28	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
3893N	H-29	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
3893P	H-30	244.17	35.54	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	279.85
H Total		554.25	446.86	230.95	30.23	11.46	0.00	315.34	419.45	410.93	409.78	419.08	124.82	3373.15
3800	NH-2	285.91	199.34	0.00	0.00	0.00	0.00	0.00	107.67	284.97	302.73	302.00	296.58	1779.20
3780A	NH-4	38.57	108.47	125.51	118.21	100.12	0.00	0.00	75.87	125.21	144.97	144.56	32.67	1014.16
3770	NH-7	46.03	129.25	146.10	137.97	113.59	33.91	0.00	79.16	129.43	157.42	155.33	35.06	1163.25
3810	NH-11	230.05	14.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	244.95
3810B	NH-14A	247.82	59.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	246.42	250.41	75.92	880.53
3790B	NH-15	31.54	69.81	0.00	0.00	0.00	0.00	0.00	43.53	119.56	121.37	121.12	121.19	628.12
3820D	NH-16	281.64	280.31	293.41	296.70	261.16	298.30	57.53	151.42	284.07	282.21	289.60	126.08	2902.43
3820C	NH-17	0.00	0.00	0.00	0.00	45.04	40.82	0.00	100.96	188.52	180.83	186.69	180.49	923.35
3820B	NH-18	339.81	334.30	347.78	92.47	54.84	354.50	68.25	179.48	286.04	0.00	0.00	0.00	2057.47
3830D	NH-19	373.90	24.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	398.21
3830C	NH-20	463.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	463.66
3790C	NH-22	280.32	222.32	263.71	260.40	198.97	0.00	0.00	118.11	275.71	280.88	280.99	276.75	2458.16
3790D	NH-23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	153.40	215.47	211.94	25.16	605.97
3790F	NH-25	274.96	221.83	255.47	241.32	165.29	0.00	0.00	119.70	26.29	0.00	59.76	63.82	1428.44
3790E	NH-26	266.16	203.84	0.00	135.40	232.03	0.00	0.00	103.24	261.25	193.41	0.00	0.00	1395.33
3820F	NH-27	219.24	214.88	164.44	58.56	14.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	671.95
3800D	NH-30	240.45	198.60	222.73	201.91	148.21	36.82	0.00	55.51	55.74	0.00	0.00	0.00	1159.97

1985-1986 WATER YEAR

GROUND WATER EXTRACTIONS

(Acre-Feet)

Well No.	Owners Designation	Extractions Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Total
						San Fernano Basin (Cont'd)								
3770C	NH-32	331.15	265.20	301.54	291.03	291.03	280.49	0.00	0.00	16.48	0.00	0.00	0.00	1485.89
3780C	NH-33	65.06	184.14	208.08	192.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	649.87
3790G	NH-34	247.04	198.85	234.25	230.01	199.54	276.01	63.98	130.97	241.99	243.09	243.02	250.94	2559.69
3830N	NH-35	199.22	186.66	0.00	0.00	6.18	0.00	0.00	110.86	207.97	206.77	213.43	208.82	1339.91
3790H	NH-36	411.21	336.62	377.94	369.72	314.14	276.54	56.89	129.27	240.13	263.25	261.37	255.40	3292.48
3790J	NH-37	400.74	336.14	375.12	372.75	309.44	321.05	60.22	203.63	386.04	399.27	398.56	391.05	3954.01
3810M	NH-38	466.19	29.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	495.71
3810N	NH-39	459.42	419.56	0.00	33.91	31.22	0.00	0.00	115.04	459.69	466.44	481.36	283.52	2750.16
3810Q	NH-41	20.43	7.46	261.57	102.69	48.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	440.54
3810R	NH-42	410.26	396.56	418.48	427.83	373.28	0.00	0.00	199.59	417.11	412.88	418.94	401.84	3876.77
3790K	NH-43A	465.25	389.99	434.42	428.33	364.79	472.32	93.73	223.42	424.27	455.90	462.49	453.42	4668.33
3790L	NH-44	337.74	265.84	469.54	463.18	398.58	428.15	93.83	218.76	389.19	403.84	404.78	406.71	4280.14
3790M	NH-45	-	-	-	-	-	361.09	90.36	222.04	408.34	463.34	462.74	278.93	2286.84
NH Total		7433.77	5298.66	4900.09	4454.98	3660.13	2899.51	584.79	2704.71	5364.92	5440.49	5349.09	4164.35	52255.49
3904J	CS-52(#1)	5.28	3.17	3.28	2.39	2.69	2.25	1.52	3.44	1.29	2.82	0.41	1.08	29.62
3904J	CS-52(#2)	4.82	2.89	2.96	2.11	2.48	2.00	1.42	3.12	1.17	2.59	0.39	0.99	26.94
CS Total		10.10	6.06	6.24	4.50	5.17	4.25	2.94	6.56	2.46	5.41	0.80	2.07	56.56
3959E	P-4	59.44	91.83	0.00	28.24	157.94	172.41	171.60	175.97	168.27	171.72	169.31	166.55	1533.28
3958H	P-6	0.00	0.00	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.95	36.27
3958J	P-7	42.93	53.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.03
P Total		102.37	144.93	0.00	28.56	157.94	172.41	171.60	175.97	168.27	171.72	169.31	202.50	1665.58
3863H	V-1	99.63	93.23	97.71	27.41	0.00	0.00	89.92	121.97	116.46	117.43	111.89	104.41	980.06
3853F	V-2	114.53	110.88	114.10	114.53	102.94	94.38	0.00	0.00	0.00	0.00	0.00	0.00	651.36
3863J	V-4	115.63	97.13	95.16	83.75	7.64	41.00	107.16	144.08	128.90	125.34	116.05	107.87	1169.71
3863L	V-11	299.63	294.61	301.24	90.06	280.21	244.77	303.35	307.37	287.51	304.87	303.84	178.61	3196.07
3853G	V-13	36.43	38.06	37.56	38.91	34.53	38.36	36.52	36.13	35.49	35.70	35.38	33.36	436.43
3854F	V-22	46.24	41.76	43.69	46.00	40.82	44.86	44.93	48.49	49.38	50.14	47.93	45.09	549.33
V Total		712.09	675.67	689.46	400.66	466.14	463.37	581.88	658.04	617.74	633.48	615.09	469.34	6982.96

1985-1986 WATER YEAR

GROUND WATER EXTRACTIONS

(Acre-Feet)

Well No.	Owners Designation	Extractions Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Total
						San Fernando Basin (Cont'd)								
3820E	W-1	240.61	0.00	0.00	0.11	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	240.79
3821B	W-2	0.00	0.00	0.00	0.09	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.18
3821C	W-3	0.00	0.00	0.00	31.20	9.25	0.00	79.68	0.00	0.00	275.48	291.09	225.48	912.18
3821D	W-4	314.03	284.02	262.03	77.48	32.69	0.00	245.48	287.12	366.03	407.26	408.82	379.23	3064.19
3821E	W-5	0.00	0.00	0.00	0.00	18.85	199.31	186.96	193.64	188.84	195.59	193.85	133.31	1310.35
3831J	W-6A	249.36	239.51	243.62	106.45	0.60	126.36	170.09	164.90	212.08	219.47	215.04	206.77	2154.25
3832K	W-7	155.12	144.26	143.32	60.81	0.16	100.23	142.93	119.63	99.70	63.91	122.91	116.76	1269.74
3832M	W-9	72.11	77.20	71.28	30.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	250.82
3842E	W-10	0.00	0.00	0.00	3.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.17
W Total		1031.23	744.99	720.25	309.54	61.55	425.90	825.30	765.29	866.65	1161.71	1231.71	1061.55	9205.67
City of Los Angeles														
Total		11162.64	8498.89	7219.61	5530.02	4591.98	4299.65	3227.54	5525.69	8046.70	8324.31	8183.23	6409.16	81019.42
Mena, John & Barbara														
4973J	4973J	0.08[E]	0.08[E]	0.08[E]	0.08[E]	0.08[E]	0.08[E]	0.08[E]	0.08[E]	0.08[E]	0.08[E]	0.08[E]	0.08[E]	0.96
Sears Roebuck & Co.														
3945	3945	2.21	2.02	1.65	1.68	1.52	1.60[E]	0.90[E]	0.73	6.92	4.73	4.93	0.92	29.81
Sportmen's Lodge, Inc.														
3785A	1	0.15	0.17	0.15	0.16	0.17	0.15	0.13	0.27	0.15	0.14	0.15	0.04	1.83
Toluca Lake Property Owners Assn.														
3845F	3845F	10.50	0.11	0.00	0.00	0.00	0.30	5.66	4.47	4.04	7.87	2.62	2.96	38.53
Valhalla Memorial Park														
3840K	4	24.60	2.43	2.29	3.00	2.94	2.70	13.41	35.20	35.35	35.91	41.26	26.83	225.92
Walt Disney Productions														
3874E	East	135.38	96.42	97.89	88.02	0.00	0.00	75.42	0.00	0.00	0.00	0.00	0.00	493.13
3874F	West	18.89	0.00	0.00	30.55	92.90	99.41	59.68	105.05	120.36	155.81	143.97	109.06	935.68
Party Total		154.27	96.42	97.89	118.57	92.90	99.41	135.10	105.05	120.36	155.81	143.97	109.06	1428.81
Basin Total		12030.25	9132.71	7867.07	6265.72	5230.73	4947.11	4045.31	6344.50	8902.59	9666.20	9256.48	7143.96	90832.63

1985-1986 WATER YEAR

GROUND WATER EXTRACTIONS

(Acre-Feet)

Owners		Extractions												
Well No.	Designation	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Total
Sylmar Basin														
City of Los Angeles														
Plant	Mission	388.69	365.82	218.16	0.00	0.00	0.00	88.06	406.71	404.04	413.52	401.21	388.66	3074.87
Meurer Engineering Co.														
5998	3	0.80	0.01[E]	0.01[E]	0.01[E]	0.01[E]	0.01[E]	0.01[E]	0.01[E]	0.01[E]	0.01[E]	0.01[E]	0.01[E]	0.91
City of San Fernando														
5969D	2A	200.59	186.83	178.27	193.36	163.75	204.49	192.60	213.57	123.12	100.32	0.00	59.83	1816.73
5959	3	85.98	64.05	72.23	76.31	69.33	61.75	77.73	114.34	109.87	56.31	61.89	55.32	905.11
5969	4	23.96	14.95	14.87	11.69	12.29	10.96	19.09	21.42	29.52	4.69	7.94	13.70	185.08
5968	7A	29.94	20.36	19.99	18.70	6.82	18.46	27.82	34.37	49.95	7.09	8.32	17.34	259.16
Party Total		340.47	286.19	285.36	300.06	252.19	295.66	317.24	383.70	312.46	168.41	78.15	146.19	3166.08
Basin Total		729.96	652.02	503.53	300.07	252.20	295.67	405.31	790.42	716.51	581.94	479.37	534.86	6241.86
Verdugo Basin														
Crescenta Valley County														
5058B	1	5.23	0.00	0.01	0.00	0.00	0.00	1.16	9.05	12.92	12.89	28.42	1.64	71.32
5058H	5	2.86	0.00	0.02	0.00	0.02	0.00	0.12	4.32	0.00	0.00	0.00	1.65	8.99
5058	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.54
5047B	7	0.01	0.00	0.01	0.00	0.01	0.00	0.36	0.69	3.05	9.20	13.11	4.56	31.00
5069J	8	27.87	17.86	18.76	43.02	39.63	44.10	43.12	42.85	42.84	43.94	43.04	39.45	446.48
5047D	9	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	2.85	4.72	11.56	5.61	24.77
5058D	10	83.78	66.50	60.51	42.70	19.68	31.29	52.10	60.90	82.99	88.67	80.41	15.92	685.45
5058J	12	8.26	5.16	4.17	4.47	1.19	3.79	5.84	9.45	13.96	17.90	31.21	79.46	184.86
5069F	14	47.65	51.86	53.10	48.59	42.80	47.13	39.85	47.36	46.89	47.55	46.72	43.33	562.83
	Pick	5.11	4.90	5.09	5.10	4.65	5.07	4.84	4.98	4.77	4.84	4.97	4.89	59.21
Party Total		180.77	146.28	141.69	143.88	107.99	131.38	147.39	179.60	210.27	229.71	259.44	197.05	2075.45
City of Glendale														
3961-3971	GL3-4	0.00	0.00	0.00	104.90	44.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	149.09
3970	GL-6	149.05	150.32	123.59	0.00	110.48	121.35	143.08	140.78	122.76	123.68	123.68	119.69	1428.46
	MM-1	154.62	189.23	229.68	152.65	154.89	212.93	165.60	119.38	109.32	124.42	116.36	111.16	1840.44
Party Total		303.67	339.55	353.27	257.55	309.56	334.28	308.68	260.16	232.08	248.10	240.24	230.85	3417.99
Basin Total		484.44	485.83	494.96	401.43	417.55	465.66	456.07	439.76	442.35	477.81	499.68	427.90	5493.44

1985-1986 WATER YEAR

GROUND WATER EXTRACTIONS

(Acre-Feet)

Owners		Extractions												
Well No.	Designation	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Total
						Eagle Rock Basin								
Deep Rock Water Co.														
	3	1.51	1.52	1.82	2.18	0.20	1.48	2.56	0.20	0.19	0.19	0.00	0.00	11.85
Sparkletts Drinking Water														
3987A	1	6.94	5.62	6.41	5.57	6.02	2.17	3.10	5.79	3.90	3.59	3.68	3.51	56.30
3987B	2	6.50	5.10	5.72	6.52	5.58	4.72	3.77	7.40	5.24	4.77	4.65	4.36	64.33
3987F	3	2.00	1.89	1.24	1.77	1.29	6.59	5.92	2.56	5.96	7.78	7.41	7.28	51.69
Party Total		15.44	12.61	13.37	13.86	12.89	13.48	12.79	15.75	15.10	16.14	15.74	15.15	172.32
Basin Total		16.95	14.13	15.19	16.04	13.09	14.96	15.35	15.95	15.29	16.33	15.74	15.15	184.17
ULARA Total		13261.60	10284.69	8880.75	6983.26	5913.57	5723.40	4922.04	7590.63	10076.74	10742.28	10251.27	8121.87	102752.10

APPENDIX B

KEY GAGING STATIONS SURFACE RUNOFF

GAGING STATION SUMMARY

LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT
HYDRAULIC DIVISION

Station Location and Description LOS ANGELES RIVER ABOVE ARROYO SECO for Water-Year 1985 1986

Station No. F57C-R

Drainage Area 511 Square Miles C. H. ELDEEB Observer

Gage Read EVERY 15 MINUTES

Rating Table No. 69 I

DAY	OCTOBER			NOVEMBER			DECEMBER			JANUARY			FEBRUARY			MARCH		
	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge
1	e		60.	e		77.2	0.81		66.7	0.81		66.7	1.31		300.	0.91		85.0
2				e		78.9	1.69		818.	0.81		66.7	0.86		78.9	0.91		85.0
3				e		78.9	1.16		177.	0.80		65.0	0.86		75.4	0.91		85.0
4				0.88		78.9	0.89		80.7	1.14		164.	0.91		83.9	0.94		92.6
5				0.89		80.7	0.89		80.7	1.75		914.	0.85		73.7	0.94		92.6
6				0.89		80.7	0.89		80.7	0.82		68.5	0.85		73.7	0.95		95.2
7				0.90		82.4	0.88		78.9	0.79		63.5	0.86		78.9	0.96		97.8
8				0.89		80.7	0.88		78.9	0.78		62.0	1.14		162.	2.36		1940
9				0.98		104.	0.88		78.9	0.78		62.0	0.86		78.9	1.24		233.
10				0.98		104.	0.93		90.6	0.79		63.5	0.86		78.9	2.34		2030.
11				2.50		2400	1.28		271.	0.80		65.0	0.81		72.	1.10		139.
12				1.17		183.	0.85		73.7	0.80		650	0.65		72.	1.36		366.
13				0.77		60.5	0.86		75.4	0.80		650	2.55		2520	1.88		1130.
14				0.77		60.5	0.64		72.0	0.81		66.7	3.24		4350	1.24		237
15				0.78		62.0	0.82		68.5	0.81		66.7	3.43		4920	2.35		2060
16				0.78		62.0	0.80		65.0	0.81		66.7	1.52		599	3.21		4250
17				0.79		63.5	0.78		62.0	0.81		66.7	1.3-		342	1.37		387
18				0.78		62.0	0.76		59.0	0.82		68.5	1.19		196.	1.09		135.
19				0.76		59.0	0.76		59.0	0.82		68.5	2.35		1850.	0.99		105.
20			60.	0.76		59.0	0.77		60.5	0.83		70.2	1.22		219	0.95		95.2
21			300	0.77		60.5	0.77		60.5	0.83		70.2	1.12		150.	0.94		92.6
22			70	0.78		62.0	0.77		60.5	0.84		72.0	1.12		153.	0.93		90.1
23				0.78		62.0	0.78		62.0	0.85		737	0.92		87.5	0.92		87.5
24				1.61		698	0.78		62.0	0.86		75.4	0.91		85.0	0.92		87.5
25				2.75		3010	0.78		62.0	0.85		73.7	1.15		168.	0.93		90.1
26				1.17		184.	0.79		63.5	0.85		73.7	0.92		87.5	0.93		90.1
27				0.81		66.7	0.79		63.5	0.85		73.7	0.91		85.	0.94		92.6
28				0.79		63.5	0.79		63.5	0.85		73.7	0.91		85.	0.94		92.6
29				2.21		1760.	0.81		66.7	1.38		380				0.98		103.
30				0.98		103.	0.81		66.7	3.18		5110.				0.95		95.2
31	e		70				0.81		66.7	2.69		2840				0.93		90.1

DAY	APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER			DAY
	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	
1	0.91		85.0	0.94		92.6	0.92		87.5	e		90.	e		90.	e		94.7	1
2	0.97		100.	0.94		92.6	0.92		87.5										2
3	0.94		92.6	0.93		90.1	0.94		92.6										3
4	0.94		92.6	0.92		87.5	0.94		92.6										4
5	1.12		149.	0.91		85.0	0.93		90.1										5
6	1.98		1320	0.92		87.5	0.95		95.2										6
7	1.47		497.	0.94		92.6	0.93		90.1										7
8	0.94		92.6	0.94		92.6	0.93		90.1										8
9	0.89		80.7	0.96		97.8	0.93		90.1										9
10	0.89		80.7	0.94		92.6	0.94		92.6										10
11	0.87		77.2	0.92		87.5	0.93		90.1										11
12	0.88		78.9	0.92		87.5	0.94		92.6										12
13	0.88		78.9	0.94		92.6	0.96		97.8										13
14	0.90		82.4	0.93		90.1	0.94		92.6										14
15	0.90		82.4	0.95		95.2	0.91		85.0										15
16	0.88		78.9	0.95		95.2	0.91		85.0										16
17	0.88		78.9	0.94		92.6	0.94		92.6										17
18	0.91		85.0	0.92		87.5	0.94		92.6										18
19	0.91		85.0	0.91		85.0	0.93		90.1										19
20	0.91		85.0	0.93		90.1	0.94		92.6										20
21	0.91		85.0	0.90		82.4	0.94		92.6										21
22	0.91		85.0	0.92		87.5	0.93		90.1									94.7	22
23	0.92		87.5	0.92		87.5	0.92		87.5							e		96.5	23
24	0.92		87.5	0.93		90.1	0.92		87.5							e		1140.	24
25	0.93		90.1	0.92		87.5	0.93		90.1							1.58		650.	25
26	0.94		92.6	0.91		85.0	0.91		85.0							0.90		82.4	26
27	0.92		87.5	0.92		87.5	0.89		80.7							0.91		84.2	27
28	0.92		87.5	0.94		92.6	0.93		90.1							0.90		82.4	28
29	0.94		92.6	0.94		92.6	0.94		92.6							0.90		82.4	29
30	0.94		92.6	0.95		95.2	0.94		92.6							0.90		82.4	30
31				0.94		92.6				e		90	e		90.				31

REMARKS

1. Total CFS
2. Average Daily Flow in CFS
3. Total Monthly Flow in A.F.
4. Maximum Average Daily Flow in CFS
5. Minimum Average Daily Flow in CFS

													YEARLY TOTALS
1	2200.	9987.6	3194.8	11181.	17125.3	14751.8	4290.7	2794.7	2708.2	2790.	2790.	4383.7	78,197.8
2	71.	333.	103.	361.	612.	476.	143.	90.2	90.3	90.	90.	146.	214.2
3	4360.	19810.	6340.	22180.	33970.	29260.	8510.	5540.	5370.	5530.	5530.	8690.	155,090.
4	300.	3010.	818.	5110.	4920.	4250.	1320.	97.8	97.8	90.	90.	1140.	5,110.
5	60.	59.	59.	62.	72.	85.	77.2	82.4	80.7	90.	90.	82.4	59.

Maximum stage 8.58 feet at 1430 on JAN. 31, 86 Discharge 25,400 Second-feet.

Minimum stage INC. feet at on Discharge Second-feet.

GAGING STATION SUMMARY

LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT
HYDRAULIC DIVISION

Station Location and Description PACOIMA CREEK FLUME BELOW PACOIMA DAM for Water-Year 19 85 19 86

Station No. F 118 FP

Drainage Area 28.2 Square Miles (SAR/SUA (Observer) Gage Read CONTINUOUSLY Rating Table No. 44 I

Day	Oct Gage Height	Oct Adj.	Oct Discharge	Nov Gage Height	Nov Adj.	Nov Discharge	Dec Gage Height	Dec Adj.	Dec Discharge	Jan Gage Height	Jan Adj.	Jan Discharge	Feb Gage Height	Feb Adj.	Feb Discharge	Mar Gage Height	Mar Adj.	Mar Discharge
1			+			+			+			+			+	0.83	+.07	71
2															+	0.83	+.07	71
3															+	0.83	+.07	71
4													⊢⊣		62.5	0.83	+.07	71
5													1.12	.03	90.0	0.83	+.07	71
6													1.14	.03	91	⊢⊣		44.2
7													⊢⊣	-	56.1			+
8															+			
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19															+			
20													⊢⊣		55.5			
21													⊢⊣		55.5			
22													0.97	+.07	82			
23													0.96	+.07	83			+
24													0.95	+.07	82	⊢⊣		72.9
25													0.96	+.07	83	1.21	+.08	109
26													0.95	+.07	82	1.21	+.08	109
27													0.90	+.07	77.6	1.22	+.08	110
28													0.87	+.07	74.8	1.21	+.08	107
29																1.17	+.08	105
30						+										1.13	+.08	101
31			+						+			+				1.12	+.08	100
1			+			+			+			+			991.7			1515.1
2			+			+			+			+			35.4			39.2
3			+			+			+			+			1967			2410
4			+			+			+			+			91			110
5			+			+			+			+			+			+

Day	Apr Gage Height	Apr Adj.	Apr Discharge	May Gage Height	May Adj.	May Discharge	June Gage Height	June Adj.	June Discharge	July Gage Height	July Adj.	July Discharge	Aug Gage Height	Aug Adj.	Aug Discharge	Sept Gage Height	Sept Adj.	Sept Discharge
1	1.12	+.07	99			+		d	+	0.91	+.08	27.2			+			+
2	1.11	+.07	98				⊢⊣		20.1	0.95	+.08	28						
3	⊢⊣		51.1				⊢⊣		33.2	⊢⊣		17.4						
4			0.2				⊢⊣		14.7			0.2						
5			0.2						0.2			0.2						
6			0.2						0.2			0.2						
7			0.2						0.2			0.2						
8	⊢⊣		57.6						0.2			0.2						
9	1.01	+.06	87.1						0.2			0.2						
10	0.99	+.06	85.2						0.2			0.2						
11	0.97	+.06	83.3						0.2			0.2						
12	0.96	+.06	82.4						0.2			0.2						
13	0.96	+.06	82.4						0.2			0.2						
14	0.96	+.06	82.4						0.2	⊢⊣		21.2						
15	⊢⊣		31.5						0.2	.32	+.14	32.8						
16			+				⊢⊣	d	15.9	.31	+.14	32						
17							0.26	+.07	24	⊢⊣		19.8						
18							0.29	+.07	24.8			0.2						
19							0.3	+.07	25.6			0.2						
20									0.2			0.2						
21									0.2			0.2						
22									0.2			0.2						
23									0.2			0.2						
24									0.2			0.2						
25									0.2			0.2						
26						+			0.2			0.1						
27				⊢⊣		29.0			0.2			0.1						
28				⊢⊣		56.6			0.2			0.1						
29				⊢⊣		52.1			0.2			0.1						
30			+	⊢⊣		21.5	⊢⊣		18.5			0.1						+
31						+						0.1			+			
1			840.8			160			181			182.6			+			+
2			28.0			5.2			6.0			5.9						
3			1668			317			359			362			+			+
4			99			52.9			33.2			32.8						
5			+			+			0.2			0.1						

REMARKS

1. Total CFS
2. Average Daily Flow in CFS
3. Total Monthly Flow in A.F.
4. Maximum Average Daily Flow in CFS
5. Minimum Average Daily Flow in CFS

YEARLY TOTALS	
1	3571
2	9.8
3	7083
4	110
5	0

Maximum stage 2.45 feet at 0749 on 5-27-86 Discharge 245 Second-feet.
Minimum stage feet at TIMES on Discharge DRY Second-feet.

GAGING STA. . SUMMARY

LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT
HYDRAULIC DIVISION

Station Location and Description: BIG TUJUNGA CREEK BELOW BIG TUJUNGA DAM — for Water-Year 19 85 19 86 — Station No. F 168 R

Drainage Area: 82.7 — Square Miles — (CARUSUA — Observer) — Gage Read: EVERY 15 MINUTES — Rating Table No.: 78 I

DAY	OCTOBER			NOVEMBER			DECEMBER			JANUARY			FEBRUARY			MARCH			DAY	APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER			DAY
	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge		Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	
1			0.3			0.3			20.0			5.0			135.0			23.2	1			39.0			2.1			11.8			0.3			0.3			0.3	1
2			0.3			0.3			20.0			5.0			95.9			23.2	2			46.0			3.0			9.8			0.3			0.3			0.3	2
3			0.3			0.3			20.0			5.0			46.2			23.8	3			27.6			3.2			4.0			0.3			0.4			0.2	3
4			0.3			0.3			20.0			5.0			18.7			23.8	4			16.4			3.3			0.5			0.3			0.4			0.2	4
5			0.3			0.3			20.0			5.0			14.9			23.8	5			16.8			3.5			0.4			0.2			0.4			0.3	5
6			0.3			0.3			13.1			5.0			14.8			23.2	6			17.2			3.7			0.3			0.3			0.4			0.3	6
7			0.3			0.3			8.6			5.0			14.8			23.2	7			17.2			3.8			0.3			0.3			0.4			0.3	7
8			0.3			0.3			8.6			5.2			14.8			23.8	8			17.2			4.0			0.3			16.4			0.4			0.3	8
9			0.3			0.3			8.6			10.1			14.6			32.0	9			30.0			5.0			0.3			27.4			0.4			0.3	9
10			0.3			0.3			8.6			8.3			14.8			19.5	10			41.2			6.9			0.3			27.4			0.4			0.3	10
11			0.3			2.6			8.6			8.3			42.0			51.0	11			38.2			6.9			0.3			22.6			0.4			0.3	11
12			0.3			0.5			8.6			8.0			45.9			46.7	12			24.1			6.9			0.3			20.4			0.4			0.3	12
13			0.3			0.3			8.6			8.0			17.8			18.2	13			16.8			6.9			0.4			20.4			0.4			0.3	13
14			0.3			0.3			8.6			7.0			23.2			69.9	14			16.8			6.9			0.6			15.8			0.4			0.3	14
15			0.3			0.3			8.6			8.0			351.0			43.1	15			16.7			6.9			1.0			16.8			0.4			0.3	15
16			0.3			0.3			6.2			7.7			277.0			96.5	16			17.2			6.9			1.0			9.4			0.4			0.3	16
17			0.3			0.3			1.1			7.4			177.0			125.0	17			16.8			6.9			1.0			8.0			0.4			0.3	17
18			0.3			0.3			0.9			7.2			87.8			103.0	18			16.8			6.9			1.0			4.9			0.4			0.3	18
19			0.3			0.3			0.8			7.2			74.9			101.0	19			16.8			6.9			1.0			1.4			0.4			0.3	19
20			0.3			3.9			2.1			7.2			99.9			97.3	20			16.8			6.9			1.0			1.1			0.4			0.3	20
21			0.3			5.0			4.3			7.2			94.8			72.1	21			16.8			6.9			1.0			1.0			0.4			0.3	21
22			0.3			5.0			4.3			6.9			55.0			91.2	22			16.8			6.6			1.0			0.9			0.4			0.3	22
23			0.3			5.0			4.3			4.5			29.7			82.8	23			16.8			6.6			1.0			0.9			0.4			0.3	23
24			0.3			7.2			4.3			4.7			104.0			57.0	24			16.8			6.6			1.0			0.8			0.4			0.3	24
25			0.3			40.5			4.7			4.7			119.0			49.2	25			16.9			6.6			1.0			0.8			0.4			0.4	25
26			0.3			62.0			4.9			4.7			2.3			66.6	26			16.8			6.4			1.0			0.6			0.4			0.4	26
27			0.3			57.5			4.9			4.7			2.3			70.2	27			16.8			6.6			1.0			0.6			0.4			0.4	27
28			0.3			54.0			5.0			4.7			2.3			33.9	28			16.8			6.6			1.0			0.6			0.3			0.4	28
29			0.3			32.2			5.0			5.0						16.8	29			8.1			6.6			1.0			0.5			0.3			0.4	29
30			0.3			19.6			5.0			102.0						16.8	30			2.0			6.6			1.0			0.5			0.3			0.4	30
31			0.3						5.0			264.0						16.8	31						6.6						0.5			0.3				31
1	9.3			300.1			253.8			618.7			2057.3			1699.9			1	610.2			160.9			45.6			19.5.8			12.2			9.6			1	5947
2	0.3			10.			7.2			20.			23.8			53.1			2	20.3			5.8			1.5			6.3			0.4			0.3			2	16.4
3	18.4			593.			253.			1230.			4100.			3260			3	1210			358			90.9			387			24.2			19			3	11,772
4	0.3			63.			20.			264.			351.			125			4	96			6.9			11.8			27.4			0.5			0.4			4	351
5	0.3			0.3			0.8			4.5			14.7			16.8			5	2			2.1			0.3			0.3			0.3			0.3			5	0.3

Maximum stage 9.83 feet at 1600 on 1-30-86 Discharge 475 Second-feet.
Minimum stage feet at [illegible] on Discharge DRY Second-feet.

REMARKS

1 - Total Flow in C.F.S.
2 - Average Daily Flow in C.F.S.
3 - Total Monthly Flow in A.F.
4 - Maximum Average Daily Flow in C.F.S.
5 - Minimum Average Daily Flow in C.F.S.

YEARLY TOTALS

57

GAGING STATIO[illegible] [illegible]MARY

LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT
HYDRAULIC DIVISION

Station Location and Description [illegible]ERDUGO WASH
[illegible] ESTELLE AVE.

for Water-Year 19 85 - 19 86

Station No. F [illegible]2 R

Drainage Area 26.8 Square Miles (EL DEEB (Observer)

Gage Read EACH 15 MINUTES

Rating Table No 47-I

Day	October Gage Height	Adj.	Discharge	November Gage Height	Adj.	Discharge	December Gage Height	Adj.	Discharge	January Gage Height	Adj.	Discharge	February Gage Height	Adj.	Discharge	March Gage Height	Adj.	Discharge	Day
1	0.21		3.9	0.16		1.8	d		1.2	0.17		2.0	0.31		15.7	0.22		5.0	1
2	0.21		3.9	[illegible]		1.8	|		1.5	0.17		2.0	0.21		3.9	0.22		5.0	2
3	0.21		3.9	0.17		2.0	|		1.2	0.18		2.3	0.20		2.8	0.21		3.9	3
4	0.17		2.5	0.17		2.0	d		1.5	0.34		23.2	0.18		2.3	0.22		5.0	4
5	0.21		3.9	0.17		[illegible]	0.17		2.0	0.51		83.1	0.17		2.0	0.22		5.0	5
6	0.22		5.0	0.18		2.3	0.17		2.0	0.20		2.8	0.18		2.3	0.22		5.0	6
7	0.21		3.9	0.16		1.8	0.17		2.0	0.19		2.5	0.18		2.3	0.22		5.0	7
8	0.17		2.5	0.17		2.0	0.17		2.0	0.19		2.5	0.21		3.9	0.63		165.	8
9	0.22		5.0	0.17		2.0	0.17		2.0	0.19		2.5	0.20		2.8	0.28		11.8	9
10	0.19		2.5	0.36		27.5	0.17		2.0	0.19		2.5	0.20		2.8	0.44		54.0	10
11	0.17		2.5	d		218.	0.17		2.0	0.19		2.5	0.20		2.8	0.26		9.5	11
12	0.17		2.5	|		3.9	0.17		2.0	0.18		2.3	0.19		2.5	0.22		5.0	12
13	0.18		2.3	|		2.3	0.18		2.3	0.18		2.3	0.63		165.	0.58		127.	13
14	0.18		2.3	|		2.0	0.17		2.0	0.19		2.5	0.72		247.	0.33		22.0	14
15	0.19		2.5	|		1.8	0.17		2.0	0.19		2.5	0.70		228.	0.61		147.	15
16	0.17		2.5	|		1.8	0.17		2.0	0.20		2.8	0.40		38.	d		318.	16
17	0.19		2.5	|		1.5	0.17		2.0	0.20		2.8	0.27		10.6	|		18.8	17
18	0.19		2.5	|		1.8	0.17		2.0	0.20		2.8	0.24		7.3	|		2.8	18
19	0.19		2.5	|		1.5	0.16		1.8	0.21		3.9	0.63		164.	|		2.8	19
20	0.19		2.5	|		1.5	0.16		1.8	0.21		3.9	0.26		9.5	|		2.8	20
21	b		8.4	|		1.8	0.16		1.8	0.21		3.9	0.23		6.2	|		2.8	21
22	|		7.3	|		1.8	0.17		2.0	0.21		3.9	0.22		5.0	|		2.8	22
23	|		2.5	|		1.5	0.17		2.0	0.21		3.9	0.22		5.0	|		3.9	23
24	|		2.3	|		57.5	0.17		2.0	0.21		3.9	0.23		6.2	|		3.9	24
25	|		2.5	|		139.	0.17		2.0	0.22		5.0	0.23		6.2	|		3.9	25
26	|		2.5	|		3.9	0.17		2.0	0.22		5.0	0.24		7.3	|		3.9	26
27	|		2.5	|		2.5	0.17		2.0	0.22		5.0	0.23		6.2	|		5.0	27
28	b		2.0	|		2.5	0.17		2.0	0.22		5.0	0.22		5.0	|		5.0	28
29	0.16		1.8	|		73.5	0.18		2.3	0.48		68.1	X		X	|		3.9	29
30	0.16		1.8	d		1.2	0.18		2.3	0.90		437.	X		X	|		5.0	30
31	0.16		1.8	X		X	0.17		2.0	0.61		152.	X		X	d		5.0	31
1	97.			566.5			59.7			847.5			962.6			965.5			1
2	3.1			18.9			1.9			27.3			34.4			31.1			2
3	132.			1120.			118.			1680.			1910.			1920.			3
4	8.4			218.			2.3			437.			247.			318.			4
5	1.8			1.2			1.2			2.0			2.0			2.8			5

Day	April Gage Height	Adj.	Discharge	May Gage Height	Adj.	Discharge	June Gage Height	Adj.	Discharge	July Gage Height	Adj.	Discharge	August Gage Height	Adj.	Discharge	September Gage Height	Adj.	Discharge	Day	Yearly Totals
1	d		3.9	0.21		3.9	0.21		3.9	0.21		3.9	0.21		3.9	0.20		2.8	1	
2	|		2.8	0.21		3.9	0.22		5.0	0.21		3.9	0.20		2.8	0.19		2.8	2	
3	|		3.9	0.20		2.8	0.22		5.0	0.21		3.9	0.20		2.8	0.20		2.8	3	
4	|		2.8	0.20		2.8	0.22		5.0	0.22		5.0	0.20		2.8	0.19		2.5	4	
5	|		6.2	0.20		2.8	0.23		6.2	0.22		5.0	0.21		3.9	0.17		2.5	5	
6	|		42.0	0.20		2.8	0.22		5.0	0.21		3.9	0.21		3.9	0.17		2.5	6	
7	|		10.6	0.20		2.8	0.22		5.0	0.21		3.9	0.21		3.9	0.21		3.9	7	
8	|		2.8	0.20		2.8	0.22		5.0	0.21		3.9	0.20		2.8	0.18		2.3	8	
9	|		3.9	0.20		2.8	0.23		6.2	0.21		3.9	0.20		2.8	0.19		2.5	9	
10	|		3.9	0.20		2.8	0.22		5.0	0.22		5.0	0.20		2.8	0.19		2.5	10	
11	|		2.8	0.20		2.8	0.23		6.2	0.26		9.5	0.20		2.8	0.19		2.5	11	
12	|		2.8	0.20		2.8	0.23		6.2	0.24		7.3	0.21		3.9	0.19		2.5	12	
13	|		2.8	0.20		2.8	0.22		5.0	0.25		8.4	0.21		3.9	0.21		3.9	13	
14	|		2.5	0.21		3.9	0.22		5.0	0.24		7.3	0.20		2.8	0.20		2.8	14	
15	|		2.5	0.20		2.8	0.22		5.0	0.25		8.4	0.21		3.9	0.19		2.5	15	
16	|		2.8	0.20		2.8	0.23		6.2	0.25		8.4	0.20		2.8	0.19		2.5	16	
17	|		2.5	0.20		2.8	0.22		5.0	0.24		7.3	0.20		2.8	0.19		2.5	17	
18	|		2.5	0.21		3.9	0.22		5.0	0.23		6.2	0.19		2.5	0.19		2.5	18	
19	|		2.8	0.21		3.9	0.22		5.0	0.23		6.2	0.18		2.3	0.19		2.5	19	
20	|		2.8	0.21		3.9	0.23		6.2	0.24		7.3	0.21		3.9	0.20		2.8	20	
21	|		3.9	0.21		3.9	0.22		5.0	0.23		6.2	0.21		3.9	0.19		2.5	21	
22	|		3.9	0.21		3.9	0.23		6.2	0.23		6.2	0.21		3.9	0.21		3.9	22	
23	|		3.9	0.22		5.0	0.22		5.0	0.23		6.2	0.21		3.9	b		238.	23	
24	|		2.8	0.21		3.9	0.22		5.0	0.19		2.5	0.21		3.9	|		131.	24	
25	|		2.8	0.22		5.0	0.21		3.9	0.20		2.8	0.20		2.8	|		11.	25	
26	|		3.9	0.21		3.9	0.21		3.9	0.20		2.8	0.20		2.8	|		2.8	26	
27	|		5.0	0.21		3.9	0.21		3.9	0.19		2.5	0.20		2.8	|		2.3	27	
28	|		5.0	0.22		5.0	0.21		3.9	0.20		2.8	0.20		2.8	|		2.5	28	
29	|		3.9	0.23		6.2	0.21		3.9	0.19		2.5	0.19		2.5	|		2.5	29	
30	d		5.0	0.21		3.9	0.21		3.9	0.20		2.8	0.19		2.5	b		2.5	30	
31	X		X	0.21		3.9	X		X	0.20		2.8	0.18		2.3	X		X	31	
1	149.7			111.1			150.7			158.7			98.1			238.6			1	4405.7
2	5.0			3.6			5.			5.1			3.2			8.			2	12.1
3	297.			220.			299.			315.			195.			473.			3	8740.
4	42.			6.2			6.2			9.5			3.9			131.			4	437.
5	2.5			2.8			3.9			2.5			2.3			2.3			5	1.2

REMARKS

1. Total CFS
2. Average Daily Flow in CFS
3. Total Monthly Flow in A.F.
4. Maximum Average Daily Flow in CFS
5. Minimum Average Daily Flow in CFS

Maximum stage 1.62 feet at 1315 on 3-8-86 Discharge 1620. Second-feet.
Minimum stage INC feet at on Discharge Second-feet.

GAGING STATION SUMMARY

LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT
HYDRAULIC DIVISION

Station Location and Description: BURBANK - WESTERN STORM DRAIN
RIVERSIDE DRIVE
for Water-Year 19 85 19 86
Station No. E 285-R
Drainage Area: 25 Square Miles: 0.04 Observer: EL DEEB Gage Read: EVERY 15 MINUTES Rating Table No.: 59 I

DAY	OCTOBER			NOVEMBER			DECEMBER			JANUARY			FEBRUARY			MARCH			DAY	APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER			DAY
	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge		Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	
1	0.09		6.7	0.09		6.7	b		9.1	0.09		6.7	b		17.1	b		5.6	1	0.15		14.6	0.07		5.0	d		5.6	0.03		2.8	0.06		4.5	b		3.4	1
2	0.10		7.9	0.09		6.7			17.1	0.10		7.9			10.6			5.0	2	0.12		10.6	0.07		5.0			5.6	0.04		3.4	0.06		4.5				2
3	0.09		6.7	0.08		5.6			10.6	0.09		6.7			7.9			5.0	3	0.12		10.6	0.07		5.0			5.6	0.04		3.4	0.06		4.5				3
4	0.10		7.9	0.10		7.9	b		7.9	0.20		20.9			7.9			5.6	4	0.11		9.1	0.08		5.6			5.6	0.04		3.4	0.06		4.5				4
5	0.08		5.6	0.08		5.6	0.09		6.7	0.16		16.0			6.7	b		5.6	5	0.31		49.0	0.08		5.6			5.6	0.08		5.6	0.06		4.5				5
6	0.10		7.9	0.08		5.6	0.09		6.7	0.08		5.6			6.7	0.09		6.7	6	b		116.	0.07		5.0			5.6	0.06		4.5	0.06		4.5				6
7	0.12		10.6	0.09		6.7	0.09		6.7	0.08		5.6			5.6	0.09		6.7	7			7.9	0.09		6.7	d		5.6	0.07		5.0	0.06		4.5				7
8	0.11		9.1	0.08		5.6	0.09		6.7	0.08		5.6			6.7	0.43		92.6	8			7.9	0.08		5.6	e		6.7	0.07		5.0	0.06		4.5			3.4	8
9	0.11		9.1	0.08		5.6	0.09		6.7	0.08		5.6			5.6	0.14		13.1	9			7.9	0.10		7.9			6.7	0.07		5.0	0.06		4.5	b		5.0	9
10	0.10		7.9	0.26		34.0	0.11		9.7	0.09		6.7			5.6	0.51		129.	10			7.9	0.10		7.9			6.7	0.07		5.0	0.04		3.4	0.07		5.0	10
11	0.09		6.7	b		108.	0.09		6.7	0.09		6.7	b		5.6	0.16		15.7	11			7.9	0.10		7.9	e		5.6	0.09		6.7	0.05		3.9	0.07		5.0	11
12	0.09		6.7	b		11.9	0.09		6.7	0.10		7.9	0.09		6.7	0.11		9.1	12			7.9	0.11		9.1	0.07		5.0	0.09		6.7	0.05		3.9	0.07		5.0	12
13	0.09		6.7	b		7.9	0.09		6.7	0.12		10.6	0.48		114.	b		103.	13			7.9	0.09		6.7	0.07		5.0	0.07		5.0	0.04		3.4	0.07		5.0	13
14	0.09		6.7	0.08		5.6	0.09		6.7	0.13		11.9	0.68		232.			14.6	14			7.9	0.09		6.7	0.07		5.0	0.06		4.5	0.05		3.9	0.07		5.0	14
15	0.10		7.9	0.08		5.6	0.09		6.7	0.14		13.1	0.62		197.			13.6	15			7.9	0.11		9.1	0.07		5.0	0.07		5.0	b		3.9	0.07		5.0	15
16	0.10		7.9	0.08		5.6	0.08		5.6	0.15		14.6	0.38		72.			21.4	16			7.9	0.10		7.9	0.07		5.0	0.08		5.6			3.4	0.05		3.9	16
17	0.13		11.9	0.08		5.6	0.08		5.6	0.14		13.1	0.24		30.3			17.1	17			7.9	0.09		6.7	0.06		4.5	0.07		5.0			3.4	0.04		3.4	17
18	0.14		13.1	0.08		5.6	0.08		5.6	0.12		10.6	0.17		17.1	b		13.1	18			9.1	0.08		5.6	0.06		4.5	0.10		7.9				0.06		4.5	18
19	0.14		13.1	0.09		6.7	0.08		5.6	0.14		13.1	b		78.9	0.10		7.9	19			7.9	0.09		6.7	0.07		5.0	0.12		10.6				0.07		5.0	19
20	0.12		10.6	0.08		5.6	0.09		6.7	0.11		9.1			11.9	0.10		7.9	20			7.9	0.10		7.9	0.07		5.0	0.11		9.1				0.07		5.0	20
21	b		47.7	0.08		5.6	0.08		5.6	0.11		9.1			9.1	0.09		6.7	21			7.9	0.08		5.6	0.06		4.5	0.12		10.6				0.08		5.6	21
22			11.9	0.08		5.6	0.08		5.6	0.11		9.1			6.7	0.09		6.7	22			7.9	0.10		7.9	0.07		5.0	0.10		7.9				0.08		5.6	22
23			9.1	0.09		6.7	0.08		5.6	0.11		9.1			6.7	0.10		7.9	23			9.1	0.09		6.7	0.07		5.0	0.10		7.9				0.03		2.8	23
24			9.1	0.33		55.2	0.08		5.6	0.12		10.6			5.6	0.09		6.7	24			7.9	0.09		6.7	0.07		5.0	0.06		4.5				b		135.	24
25			7.9	0.43		93.9	0.08		5.6	0.11		9.1			5.6	0.10		7.9	25			7.9	0.08		5.6	0.08		5.6	0.06		4.5						35.1	25
26			7.9	0.10		7.9	0.08		5.6	0.11		9.1			5.6	0.09		6.7	26			7.9	0.07		5.0	0.06		4.5	0.06		4.5						13.1	26
27			7.9	0.10		7.9	0.08		5.6	0.11		9.1			5.6	0.09		6.7	27			7.9	0.08		5.6	0.07		5.0	0.06		4.5						10.6	27
28	b		9.1	0.10		7.9	0.08		5.6	0.09		6.7	b		5.6	0.08		5.6	28			7.9	0.08		5.6	0.05		3.9	0.06		4.5						7.9	28
29	0.10		7.9	b		138.	0.08		5.6	0.29		42.3				0.08		5.6	29	b		7.9	d		5.6	0.03		2.8	0.06		4.5						6.7	29
30	0.09		6.7	b		13.1	0.08		5.6	b		372.				0.08		5.6	30	0.09		6.7	d		5.6	0.03		2.8	0.06		4.5				b		5.6	30
31	0.09		6.7				0.08		5.6	b		159.				0.10		7.9	31				d		5.0				0.06		4.5	b		3.4				31
1	302.6			599.9			212.1			843.2			896.4			886.7			1	100.7			198.5			153.			171.6			117.3			312.			1
2	9.8			20.			6.8			27.2			32.			28.6			2	13.4			6.4			5.1			5.5			3.8			10.4			2
3	600.			1190.			421.			1670.			1780.			1760.			3	795.			394.			303.			340.			233.			619.			3
4	47.7			138.			17.1			372.			232.			214.			4	116.			9.1			6.7			10.6			4.5			135.			4
5	5.6			5.6			5.6			5.6			5.6			5.0			5	6.7			5.0			2.8			2.8			3.4			2.8			5

REMARKS

1 — Total CFS
2 — Average Daily Flow in CFS
3 — Total Monthly Flow in A.F.
4 — Maximum Average Daily Flow in CFS
5 — Minimum Average Daily Flow in CFS

YEARLY TOTALS

1	5094.	1
2	14.	2
3	10,100.	3
4	372.	4
5	2.8	5

Maximum stage 2.71 feet at 1400 on JAN.31 Discharge 3070 Second-feet.
Minimum stage INC. feet at on Discharge Second-feet.

GAGING STATION SUMMARY

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
HYDRAULIC DIVISION

Station Location and Description: LOS ANGELES RIVER at TUJUNGA AVE.

for Water-Year 19 85 - 19 86

Station No. F 300 R

Drainage Area: 401 Square Miles | Observer: C.H. ELDEEB | Gage Read: EVERY 15 MIN. | Rating Table No: 621

DAY	OCTOBER			NOVEMBER			DECEMBER			JANUARY			FEBRUARY			MARCH			DAY
	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	
1	1.27		28.3	1.58		41.0	1.54		39.2	1.54		39.0	d		253.	1.77		49.9	1
2	1.28		28.7	1.56		40.1	3.55		526.	1.49		37.0			64.5	1.78		50.4	2
3	1.31		29.7	1.58		40.7	2.24		78.5	1.50		37.6			49.9	1.75		48.9	3
4	1.33		30.6	1.57		40.5	1.57		40.5	3.20		199.			45.9	1.78		50.4	4
5	1.32		30.2	1.53		38.6	1.45		35.3	3.54		517.			40.5	1.72		47.4	5
6	2.30		82.8	1.67		44.8	1.41		33.7	1.57		40.5			37.4	1.71		47.0	6
7	1.34		31.1	1.69		46.0	1.33		30.6	1.49		37.0			36.2	1.70		46.2	7
8	1.32		30.2	1.68		45.4	1.23		26.7	1.42		34.1			46.9	3.97		1130	8
9	1.53		38.7	2.75		122.	1.21		26.2	1.42		34.1			49.1	3.45		397.	9
10	1.39		32.9	3.01		162.	2.76		147.	1.40		33.3			53.6	4.13		138.0	10
11	1.40		33.2	3.82		908.	2.15		72.4	1.47		36.2			46.1	3.16		189.	11
12	1.40		33.3	2.43		92.1	1.40		33.3	1.44		34.9	d		37.8	3.40		342	12
13	1.36		31.6	1.68		45.3	1.46		35.6	1.46		35.9	4.40		1820	3.46		417	13
14	1.35		31.3	1.57		40.5	1.42		34.1	1.50		37.5	5.04		3060	3.28		239.	14
15	1.37		32.0	1.02		20.0	1.41		33.9	1.53		38.9	4.16		2350	3.99		1160	15
16	1.48		36.5	1.56		40.1	1.46		35.8	1.54		39.3	3.31		257.	b		2370	16
17	1.48		36.7	1.51		37.9	1.36		31.8	1.47		36.2	3.02		159.			45.7	17
18	1.46		35.9	1.48		36.4	1.47		36.2	1.45		35.3	2.72		119.			44.1	18
19	1.49		37.0	1.24		27.2	1.50		37.4	1.43		34.5	3.91		1030			46.9	19
20	1.51		37.9	1.44		34.9	1.52		38.4	1.42		34.0	3.16		187.			48.4	20
21	3.20		201.	1.50		37.5	1.43		34.5	1.40		33.3	2.86		135.			49.4	21
22	1.82		52.4	1.60		42.0	1.45		35.3	1.38		32.6	2.74		121.			49.9	22
23	1.52		38.3	1.50		37.6	1.49		37.0	1.47		36.0	2.00		62.7			50.4	23
24	1.51		37.8	3.60		600.	1.47		36.3	1.50		37.5	1.82		52.5			50.9	24
25	1.53		38.5	4.31		1660.	1.46		35.9	1.44		34.9	3.13		181.			50.4	25
26	1.55		39.7	2.18		74.2	1.46		35.8	1.44		34.9	1.95		59.8			47.4	26
27	1.58		40.8	1.59		41.4	1.50		37.4	1.42		34.1	1.85		54.1			45.0	27
28	1.46		35.9	1.55		39.5	1.50		37.4	1.42		34.1	1.80		51.4			43.2	28
29	1.51		37.7	3.95		1100.	1.63		43.0	3.34		287.						45.9	29
30	1.59		41.5	1.97		61.1	1.49		37.0	4.93		2790.						47.9	30
31	1.60		42.0				1.47		36.1	4.48		1960.				b		47.9	31
1	1314.2			5596.8			1778.3			6685.7			10963.			8676.6			1
2	42.4			187.			57.4			216.			392.			280.			2
3	2610.			11100.			3530.			13260.			21740.			17210.			3
4	201.			1660.			526.			2790.			3060.			2370.			4
5	28.3			20.			26.2			32.6			36.2			43.2			5

DAY	APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER			DAY
	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	
1	b		47.9	1.91		57.3	1.67		45.0	1.65		44.1	1.79		51.0	1.77		49.7	1
2			56.4	1.87		55.2	1.71		47.0	1.60		42.0	1.74		48.6	1.78		50.4	2
3			48.4	1.79		50.7	1.67		44.9	1.74		48.6	1.72		47.4	1.73		48.0	3
4			49.9	1.73		48.1	1.80		51.5	1.68		45.3	1.75		48.9	1.83		52.9	4
5			50.4	1.77		49.8	1.82		52.5	1.73		47.7	1.76		49.4	1.76		49.6	5
6			66.4	1.85		54.2	1.82		52.7	1.72		47.4	1.81		51.7	1.77		49.9	6
7			313.	1.85		54.1	1.83		53.0	1.74		48.4	1.91		57.6	1.80		51.3	7
8			44.1	1.93		58.8	1.74		48.4	1.70		46.2	1.79		51.1	1.78		50.4	8
9			47.9	1.87		55.1	1.79		50.9	1.72		47.4	1.76		49.4	1.84		53.6	9
10			19.4	1.78		50.2	1.82		52.6	1.71		46.4	1.87		55.5	1.76		49.5	10
11			50.4	1.69		45.9	1.79		50.3	1.70		46.4	1.80		51.3	1.82		52.5	11
12			50.8	1.75		49.0	1.84		53.7	1.82		52.4	1.96		60.3	1.82		52.5	12
13			51.4	1.82		52.4	1.87		55.4	1.82		52.7	1.97		60.7	1.83		53.0	13
14			51.9	1.83		53.3	1.80		51.4	1.71		46.9	1.73		47.7	1.81		51.9	14
15			51.9	1.89		56.3	1.71		46.7	1.69		46.0	1.78		50.4	1.86		54.9	15
16			51.9	1.84		53.4	1.70		46.4	1.60		41.9	1.82		52.5	1.77		50.1	16
17			52.5	1.79		50.9	1.82		52.5	1.63		43.0	1.79		50.7	1.82		52.3	17
18			52.5	1.72		47.4	1.80		51.4	1.75		48.9	1.79		50.9	1.87		55.1	18
19			52.5	1.75		48.8	1.79		50.9	1.74		48.4	1.82		52.5	2.01		63.1	19
20			52.5	1.78		50.4	1.81		51.9	1.68		45.5	1.93		58.9	1.97		60.9	20
21			52.5	1.78		50.3	1.78		50.4	1.72		47.4	1.81		51.9	1.93		58.9	21
22			52.5	1.81		51.9	1.77		49.9	1.71		46.9	1.80		51.6	1.89		56.3	22
23			52.5	1.79		50.7	1.80		51.4	1.95		59.7	1.77		49.9	1.86		54.6	23
24			51.9	1.76		49.4	1.80		51.4	1.75		49.1	1.77		49.9	3.70		739.	24
25			52.5	1.67		45.0	1.81		51.9	1.73		47.9	1.83		53.1	3.17		191.	25
26			52.5	b		47.0	1.55		39.8	1.71		46.9	1.83		53.1	1.89		56.3	26
27	b		50.9			49.9	1.70		46.4	1.69		46.1	1.82		52.5	1.82		52.3	27
28	1.84		53.7			49.9	1.77		50.0	1.72		47.4	1.77		49.8	1.78		50.2	28
29	1.89		56.4			49.4	1.78		50.4	1.74		48.4	1.76		49.4	1.76		49.4	29
30	1.88		55.8	b		49.9	1.70		46.2	1.90		56.8	1.73		47.7	1.79		50.4	30
31				1.77		49.8				1.79		50.7	1.76		49.6				31
1	2409.9			1584.5			1497.5			1482.9			1605.			2410.2			1
2	80.3			51.1			49.9			47.8			51.8			80.3			2
3	4780.			3140.			2970.			2940.			3180.			4730.			3
4	664.			58.8			55.4			59.7			60.7			739.			4
5	44.1			45.			39.8			41.9			47.4			48.			5

Maximum stage 9.21 feet at 1400 on 1-31-86 Discharge 16,700 Second-feet.
Minimum stage INC. feet at on Discharge Second-feet.

REMARKS:

1 - Total CFS
2 - Average Daily Flow in CFS
3 - Total Monthly Flow in A.F.
4 - Maximum Average Daily Flow in CFS
5 - Minimum Average Daily Flow in CFS

YEARLY TOTALS	
1	46,004.6
2	126.
3	91,240.
4	3060.
5	20.

APPENDIX C

WELLS DRILLED AND DESTROYED

WELLS DESTROYED 1985-86

Party	LACDPW Well No.	Owner No.	Purpose
W. Collins	3762	252	Irrigation
Cal-Mat	4916B	--	Water Quality

WELLS DRILLED 1985-86

Party	LACDPW Well No.	Owner No.	Purpose
LADWP	4909E	RT-1	Production
"	4898A	RT-2	"
"	4898B	RT-3	"
"	4898C	RT-4	"
"	4898D	RT-5	"
"	4898E	RT-6	"
Cal-Mat	4915B	LADWP Valley Steam Plant	Monitoring
Cal-Mat	4916E	--	"

WELLS DRILLED 1985-86 FOR LEAKY UNDERGROUND TANK INVESTIGATIONS

Centralab - have drilled 15 wells for site evaluation, testing, and monitoring.

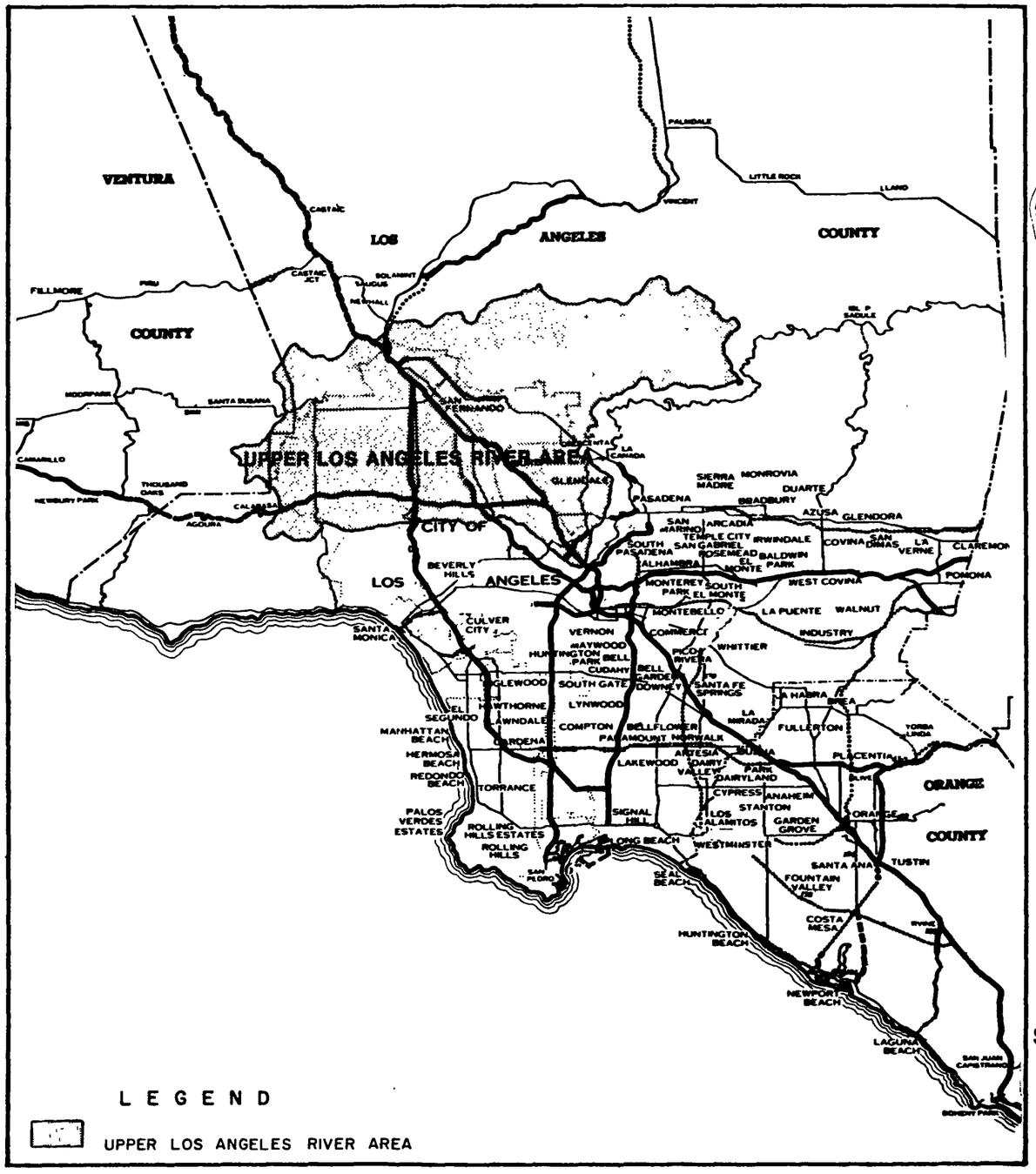
Lockheed - have drilled 12 wells for site evaluation, testing, and monitoring.

Riker Labs - have drilled 21 wells for site evaluation, testing, and monitoring.

Rocketdyne - have drilled approximately 78 wells of which 11 have potential to become extraction wells and the remaining 67 for site evaluation, testing, and monitoring.

APPENDIX D

PLATES

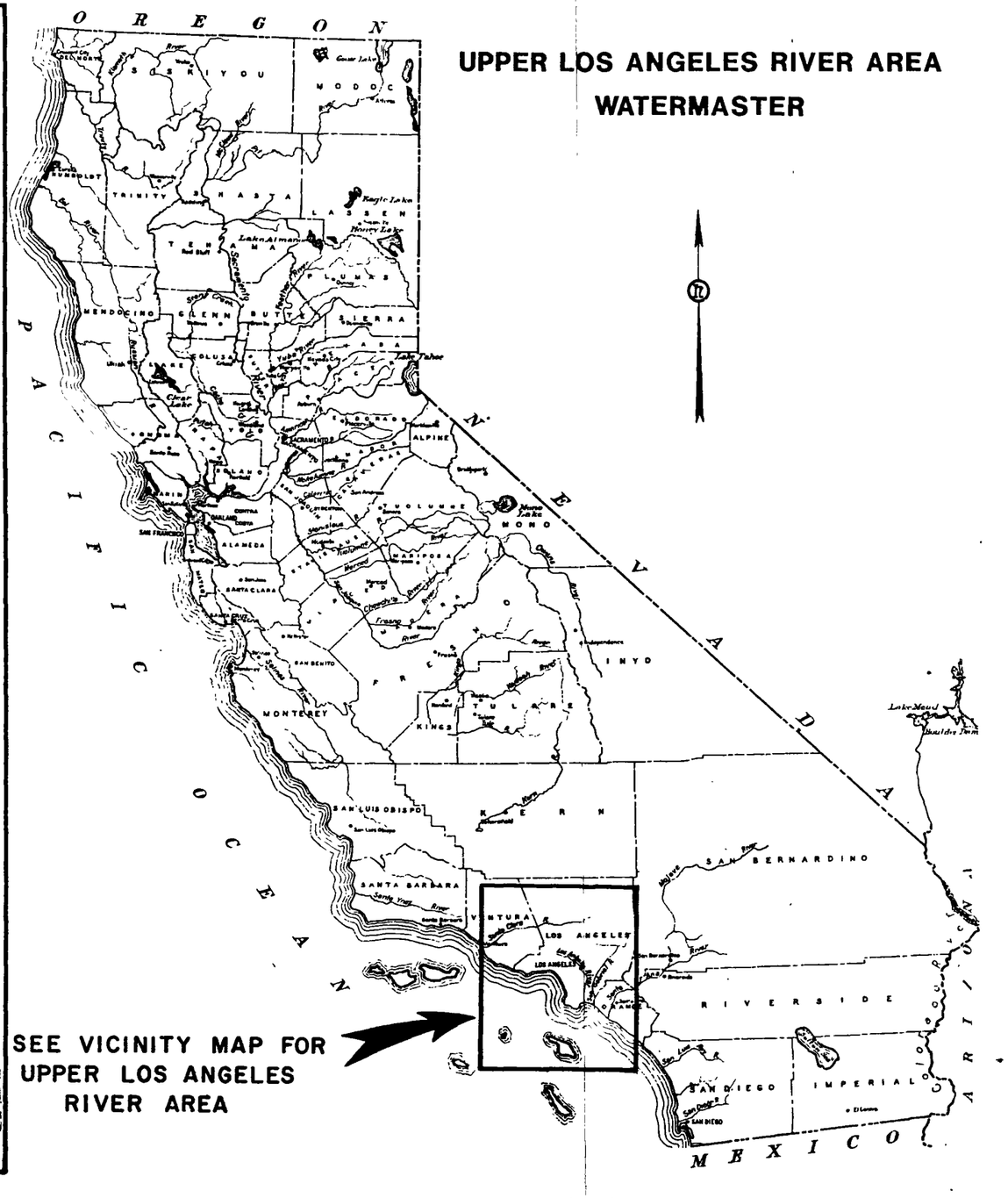


VICINITY MAP

SCALE

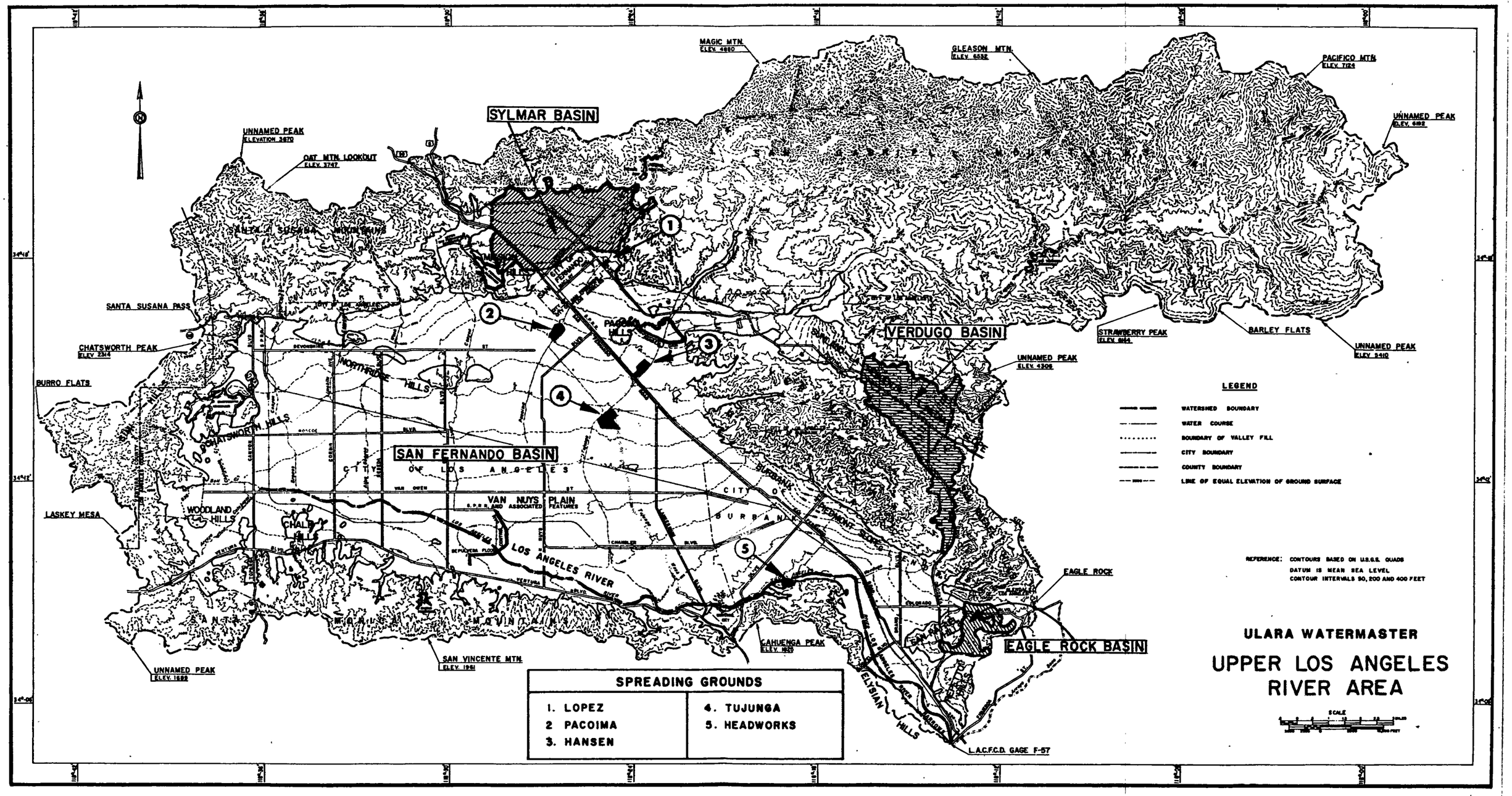
0 5 10 15 Miles

UPPER LOS ANGELES RIVER AREA WATERMASTER



SEE VICINITY MAP FOR UPPER LOS ANGELES RIVER AREA

LOCATION MAP



SPREADING GROUNDS	
1. LOPEZ	4. TUJUNGA
2 PACOIMA	5. HEADWORKS
3. HANSEN	

ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

PLATE 3

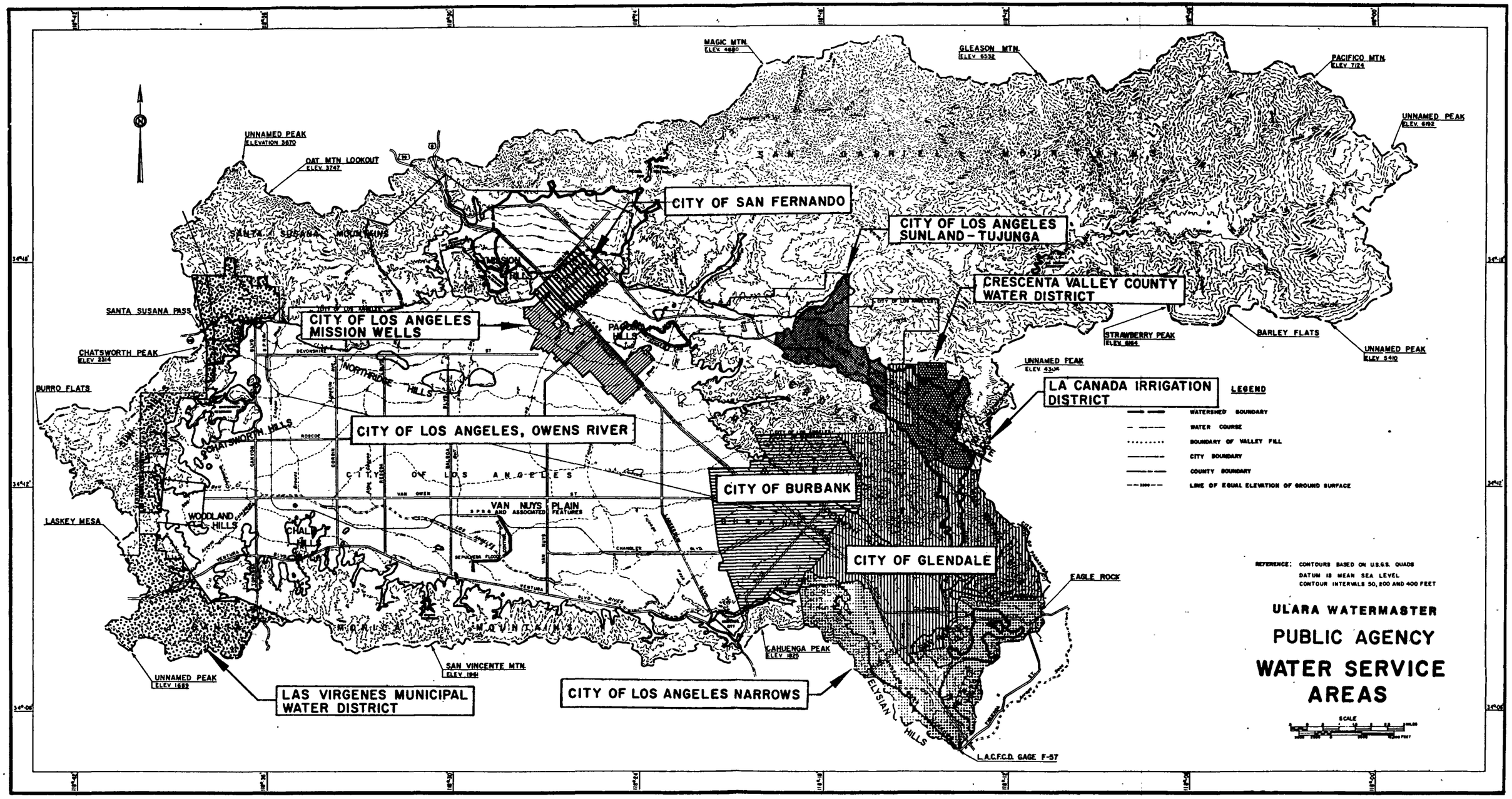
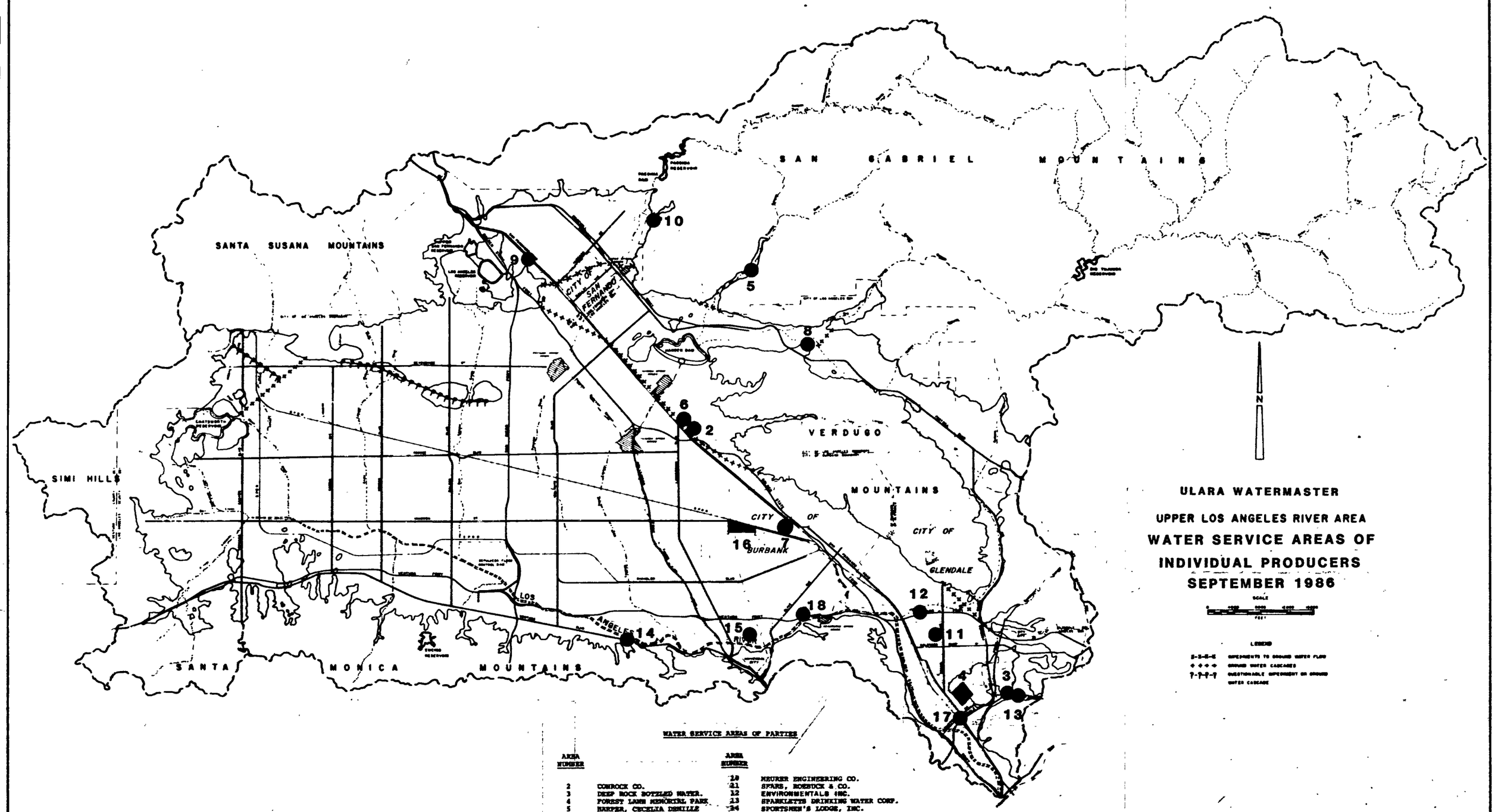

MAGIC MTN.
ELEV. 4880
GLEASON MTN.
ELEV. 5532
PACIFICO MTN.
ELEV. 7124
UNNAMED PEAK
ELEV. 6892
UNNAMED PEAK
ELEVATION 3670
OAT MTN LOOKOUT
ELEV. 3747
CITY OF SAN FERNANDO
CITY OF LOS ANGELES
SUNLAND - TUJUNGA
CRESCENTA VALLEY COUNTY
WATER DISTRICT
SANTA SUSANA MOUNTAINS
SANTA SUSANA PASS
CITY OF LOS ANGELES
MISSION WELLS
STRAWBERRY PEAK
ELEV. 6864
BARLEY FLATS
UNNAMED PEAK
ELEV. 5410
CHATSWORTH PEAK
ELEV. 2344
UNNAMED PEAK
ELEV. 4334
LA CANADA IRRIGATION
DISTRICT
BURRO FLATS
CHATSWORTH HILLS
NORTHRIDGE HILLS
NORTH HILLS
CITY OF LOS ANGELES, OWENS RIVER
CITY OF BURBANK
CITY OF LOS ANGELES
VAN NUYS PLAIN
SPRD AND ASSOCIATED FEATURES
WOODLAND HILLS
LASKEY MESA
CHALK HILL
CITY OF GLENDALE
EAGLE ROCK
SANTA MONICA MOUNTAINS
SAN VINCENTE MTN.
ELEV. 1991
CAHUENGA PEAK
ELEV. 1820
UNNAMED PEAK
ELEV. 1682
LAS VIRGENES MUNICIPAL
WATER DISTRICT
CITY OF LOS ANGELES NARROWS
ELYSIAN HILLS
L.A.C.F.C.D. GAGE F-57
LEGEND
WATERSHED BOUNDARY
WATER COURSE
BOUNDARY OF VALLEY FILL
CITY BOUNDARY
COUNTY BOUNDARY
LINE OF EQUAL ELEVATION OF GROUND SURFACE
REFERENCE: CONTOURS BASED ON U.S.G.S. QUADS
DATUM IS MEAN SEA LEVEL
CONTOUR INTERVALS 50, 200 AND 400 FEET
ULARA WATERMASTER
PUBLIC AGENCY
WATER SERVICE
AREAS
SCALE

PLATE 4



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

WATER SERVICE AREAS OF INDIVIDUAL PRODUCERS SEPTEMBER 1986

SCALE

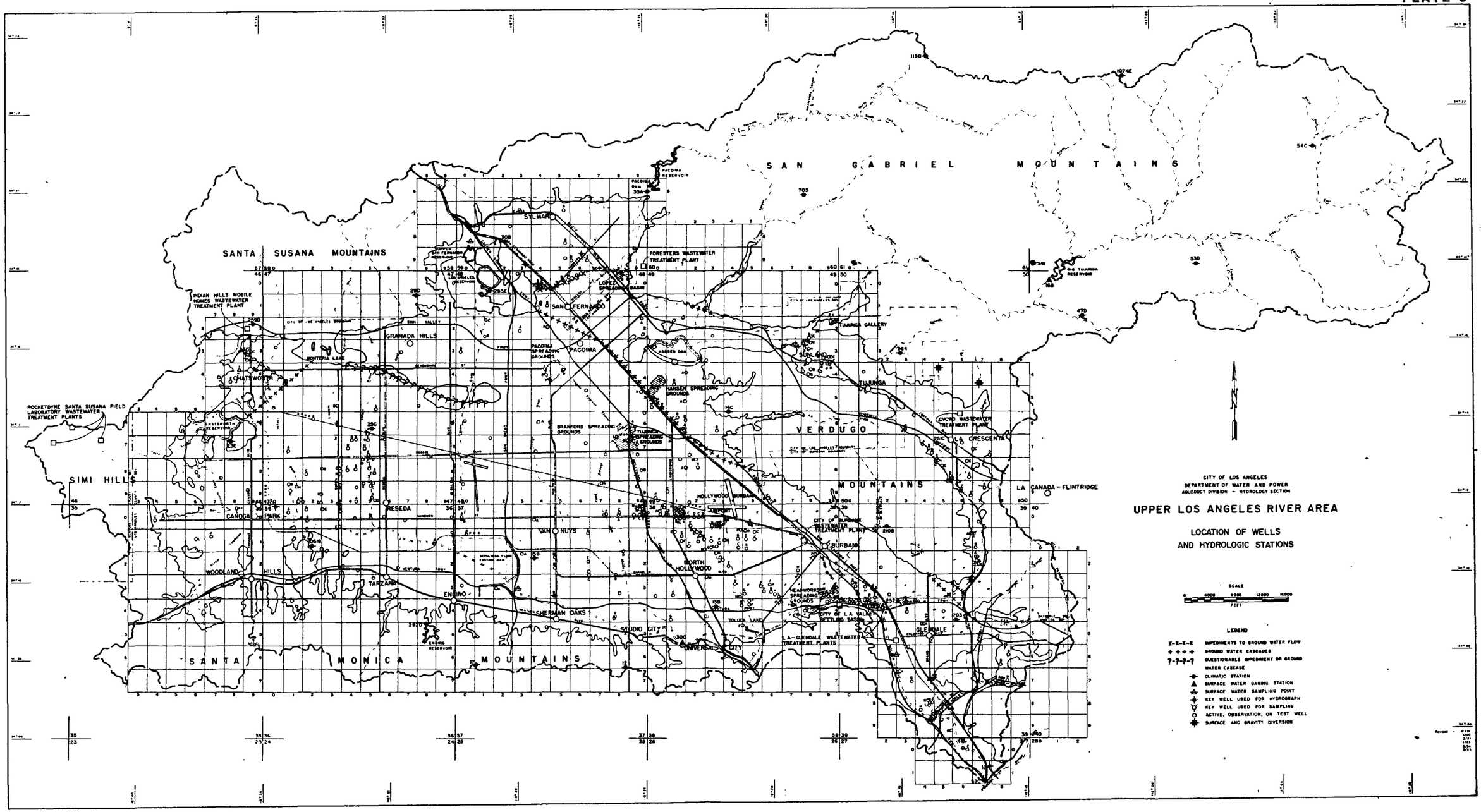
LEGEND

- 2-2-2-2 GROUNDWATER TO GROUND WATER FLOW
- + + + + GROUND WATER CASCADES
- ?-?-?-? QUESTIONABLE GROUNDWATER ON GROUND WATER CASCADE

WATER SERVICE AREAS OF PARTIES

AREA NUMBER		AREA NUMBER	
2	CONROCK CO.	10	MEURER ENGINEERING CO.
3	DEEP ROCK BOTTLED WATER.	11	SEARS, ROEBUCK & CO.
4	FOREST LAWN MEMORIAL PARK	12	ENVIRONMENTALS INC.
5	HARPER, CECELIA DEMILLE	13	SPARKLETTS DRINKING WATER CORP.
6	LIVINGSTON-GRAHAM, INC.	14	SPORTSMEN'S LODGE, INC.
7	LOCKHEED AIRCRAFT CORP.	15	TOLUCA LAKE PROPERTY OWNERS ASSN.
8	MESA, JOHN & BARBARA	16	VALHALLA MEMORIAL PARK
9	MOORDIGIAN, KISAG	17	VAN DE KAMP'S DUTCH BAKERS, INC.
		18	WALT DISNEY PRODUCTIONS

PLATE 5



CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER
AQUEDUCT DIVISION - HYDROLOGY SECTION

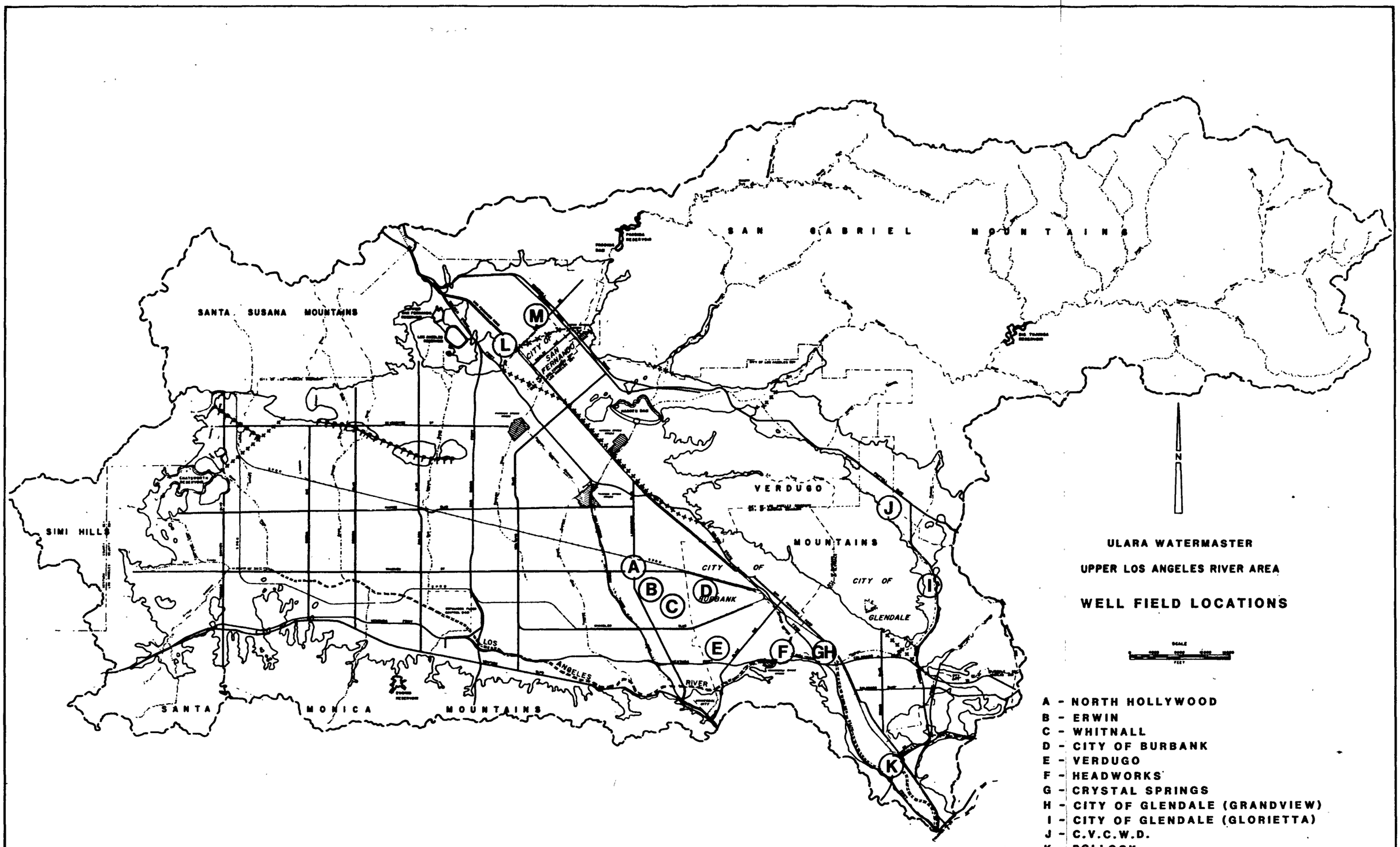
UPPER LOS ANGELES RIVER AREA

LOCATION OF WELLS AND HYDROLOGIC STATIONS

SCALE
0 4000 8000 12000 16000
FEET

LEGEND

- X-X-X-X IMPEDIMENTS TO GROUND WATER FLOW
- + + + + GROUND WATER CASCADES
- ?-?-?-? QUESTIONABLE IMPEDIMENT OR GROUND WATER CASCADE
- CLIMATIC STATION
- SURFACE WATER GAGING STATION
- SURFACE WATER SAMPLING POINT
- KEY WELL USED FOR HYDROGRAPH
- KEY WELL USED FOR SAMPLING
- ACTIVE, OBSERVATION, OR TEST WELL
- SURFACE AND GRAVITY DIVERSION



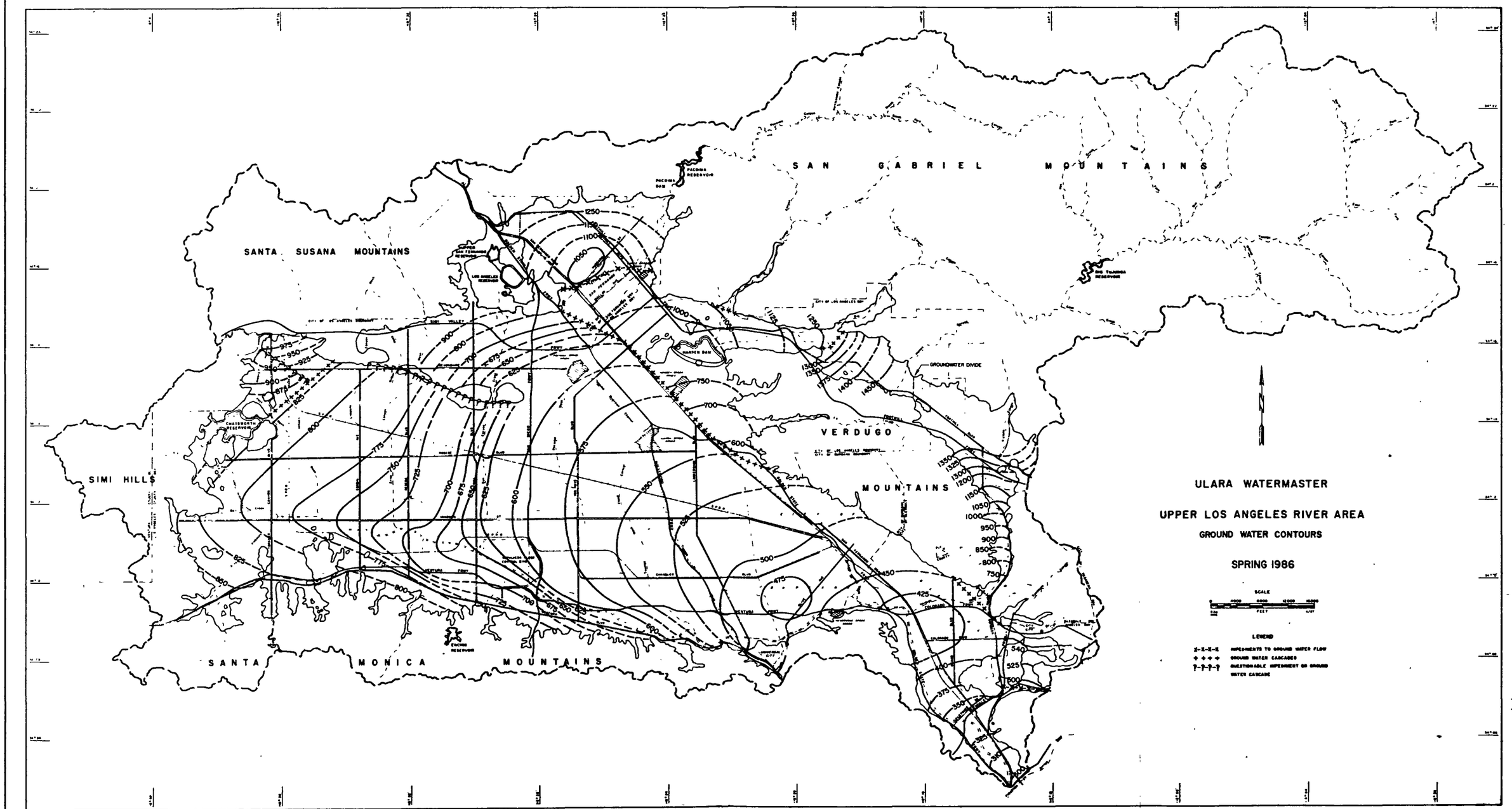
ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

WELL FIELD LOCATIONS

A - NORTH HOLLYWOOD
B - ERWIN
C - WHITNALL
D - CITY OF BURBANK
E - VERDUGO
F - HEADWORKS
G - CRYSTAL SPRINGS
H - CITY OF GLENDALE (GRANDVIEW)
I - CITY OF GLENDALE (GLORIETTA)
J - C.V.C.W.D.
K - POLLOCK
L - MISSION
M - CITY OF SAN FERNANDO

PLATE 7



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

GROUND WATER CONTOURS

SPRING 1986

SCALE

0 4000 8000 12000 16000

FEET

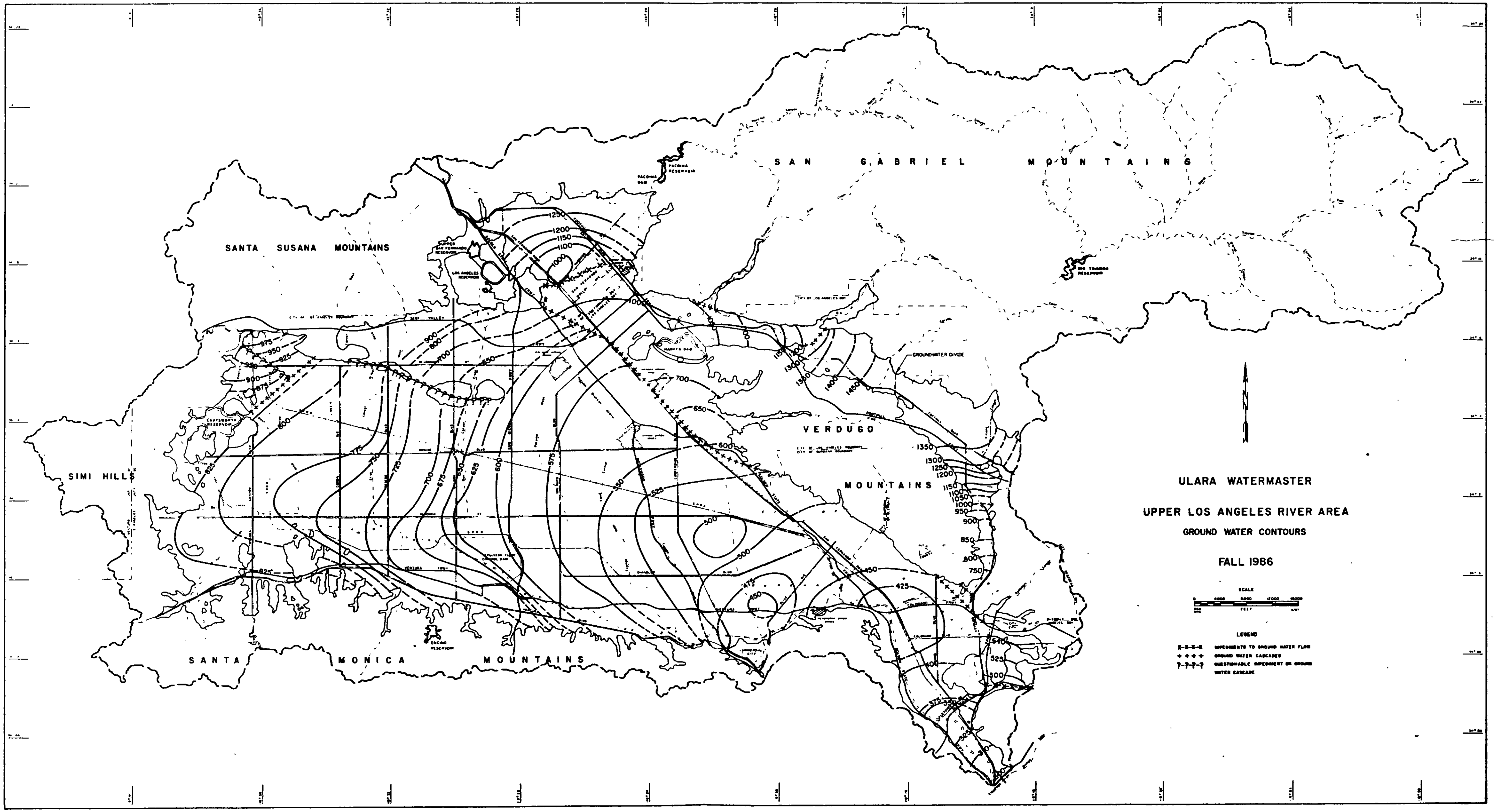
LEGEND

X-X-X-X IMPEDIMENTS TO GROUND WATER FLOW

+ + + + GROUND WATER CASCADES

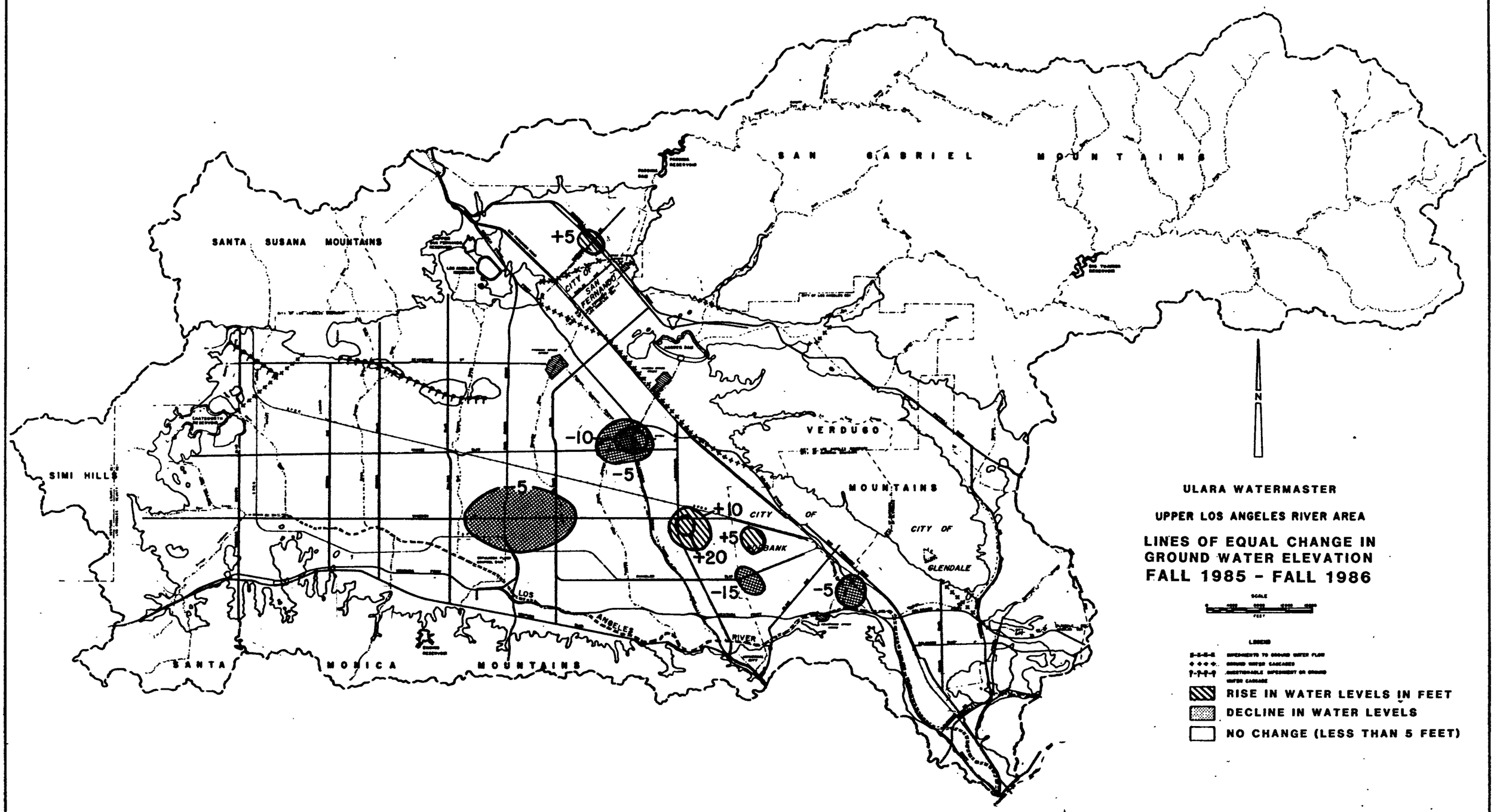
?-?-?-? QUESTIONABLE IMPEDIMENT OR GROUND WATER CASCADE

PLATE 8



SAN GABRIEL MOUNTAINS
SANTA SUSANA MOUNTAINS
SIMI HILLS
SANTA MONICA MOUNTAINS
VERDUGO MOUNTAINS
ULARA WATERMASTER
UPPER LOS ANGELES RIVER AREA
GROUND WATER CONTOURS
FALL 1986
SCALE
FEET
LEGEND
GROUNDWATER DIVIDE

PLATE 9



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

LINES OF EQUAL CHANGE IN GROUND WATER ELEVATION FALL 1985 - FALL 1986

SCALE

LEGEND

RISE IN WATER LEVELS IN FEET

DECLINE IN WATER LEVELS

NO CHANGE (LESS THAN 5 FEET)

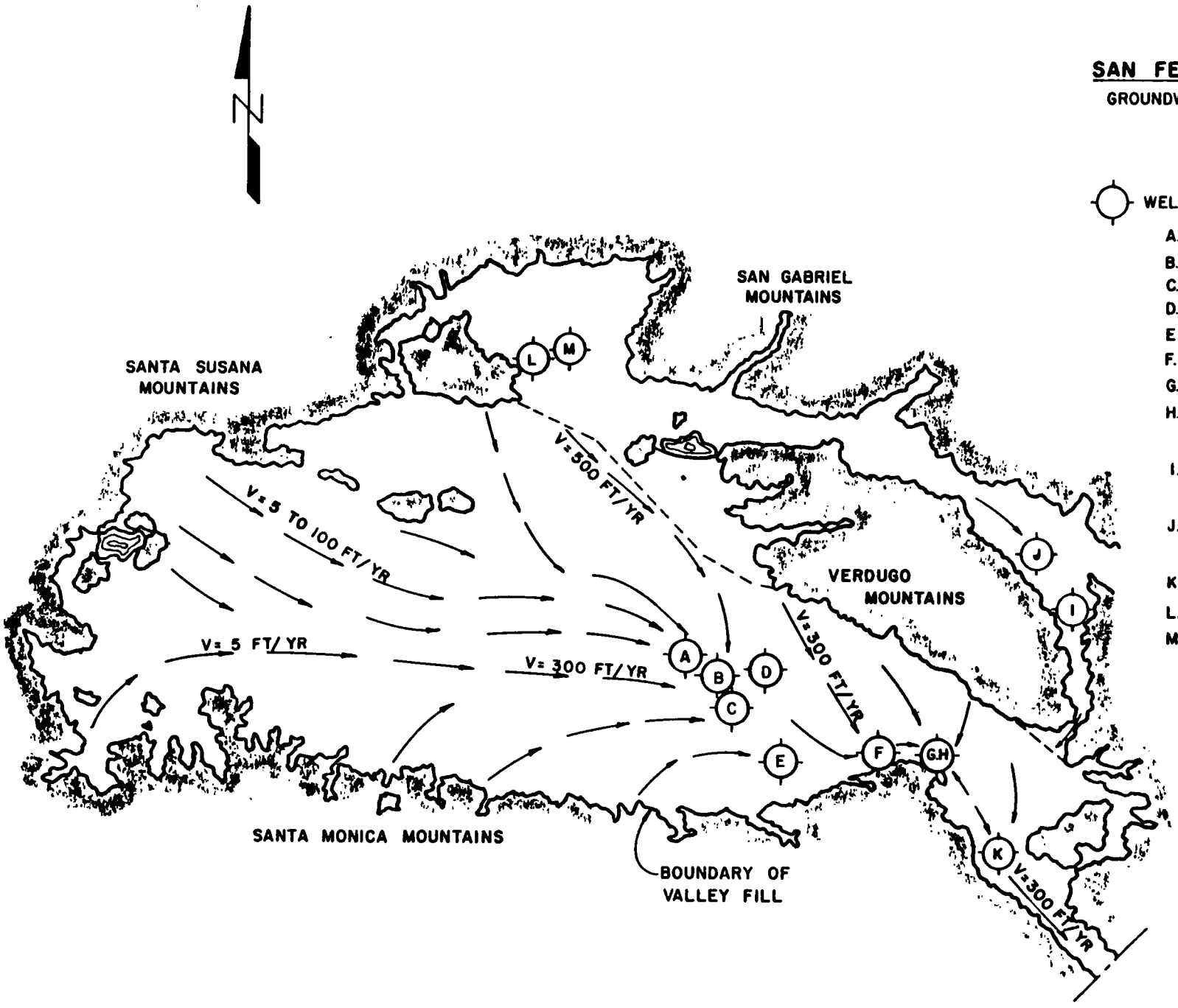

N
SAN FERNANDO BASIN
GROUNDWATER FLOW 1980
LEGEND
WELL FIELDS
A. NORTH HOLLYWOOD
B. ERWIN
C. WHITNALL
D. CITY OF BURBANK
E. VERDUGO
F. HEADWORKS
G. CRYSTAL SPRINGS
H. CITY OF GLENDALE (GRANDVIEW)
I. CITY OF GLENDALE (GLORIETTA)
J. CRESCENTA VALLEY COUNTY WATER DISTRICT
K. POLLOCK
L. MISSION
M. CITY OF SAN FERNANDO
SAN GABRIEL MOUNTAINS
SANTA SUSANA MOUNTAINS
VERDUGO MOUNTAINS
SANTA MONICA MOUNTAINS
V= 5 TO 100 FT/YR
V= 500 FT/YR
V= 5 FT/YR
V= 300 FT/YR
V= 300 FT/YR
V= 300 FT/YR
BOUNDARY OF VALLEY FILL

PLATE 10