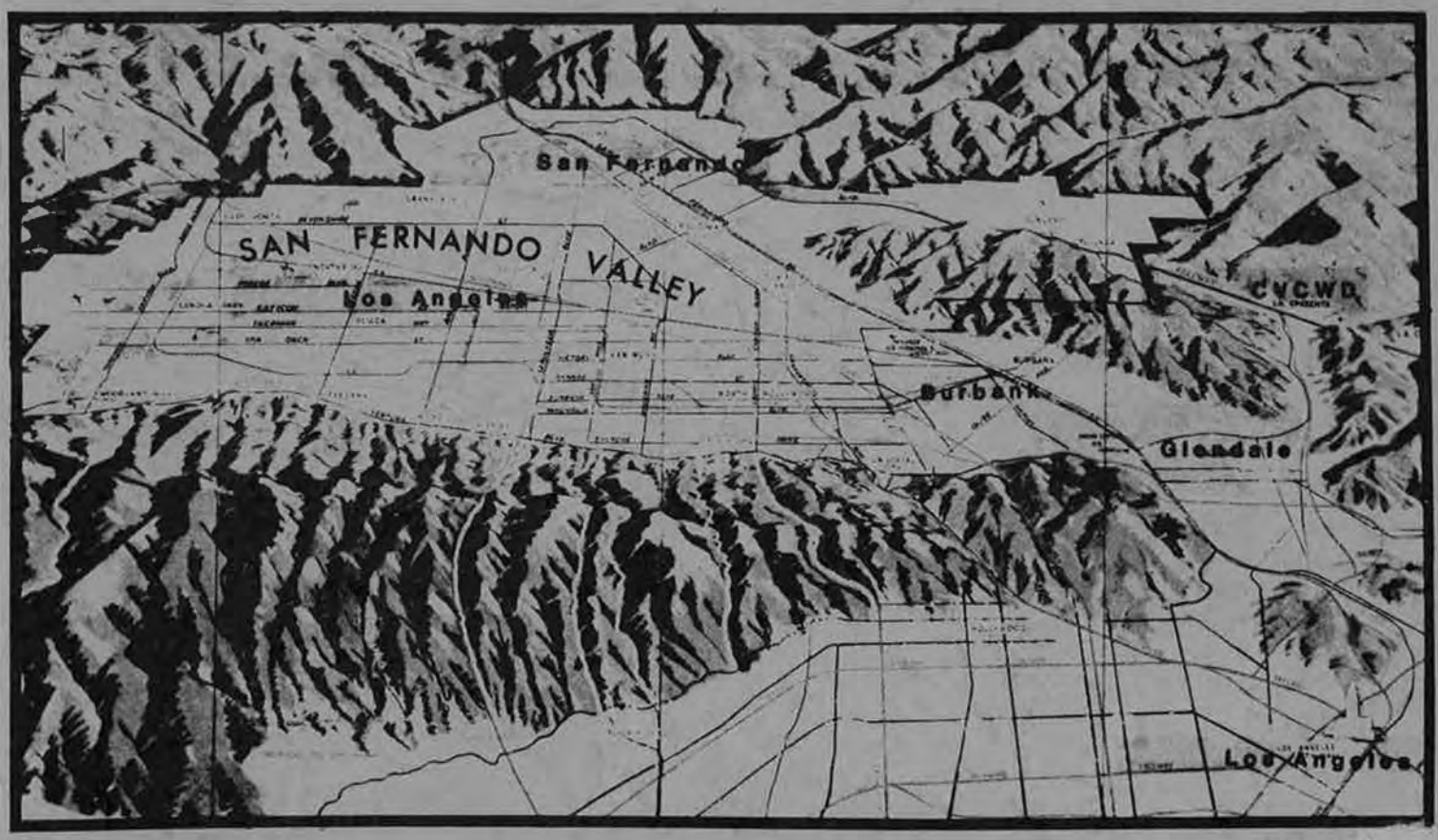
UPPER LOS ANGELES RIVER AREA WATERMASTER

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, 1988 - SEPTEMBER 30, 1989



MAY 1990

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WATERMASTER SERVICE
IN THE
UPPER LOS ANGELES RIVER AREA
LOS ANGELES COUNTY

OCTOBER 1, 1988 - SEPTEMBER 30, 1989

MAY 1990

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

FOREWORD

As Watermaster for the Upper Los Angeles River Area (ULARA), I am pleased to submit this report of the water supply 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. And on January 16, 1990 this case (City of Los Angeles vs. City of San Fernando et al - #650,079) was assigned to Judge Miriam Vogel.

This report describes the water rights in each basin, lists the allowable pumping for the water year 1989-90, and indicates the water in storage to the credit of each party as of October 1, 1989. 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 the 1986-87 Water Year, significant revisions were made to the ULARA Policies and Procedures. This document addresses and provides for test pumping and prolonged clean-up pumping by non-parties, who have no right to pump, but who are required to pump and treat contaminated groundwater under a Clean-up and Abatement Order of the Regional Water Quality Control Board. The Regional Board has included in all Clean-up and Abatement Orders for the ULARA, a provision requiring the discharger to follow the ULARA Policies and Procedures. Presently, several companies are involved in clean-up pumping and treatment or are drilling extraction wells and designing treatment facilities. These companies include Lockheed, Philips Components, 3M-Pharmaceutical, and Rockwell. Sections 2.5 to 2.7 of the Policies and Procedures were revised and approved on April 17, 1990.

Also addressed in the Policies and Procedures dated July 1987, is pumping for dewatering of construction projects. Arrangements have been made with the City of Los Angeles Department of Building and Safety to refer all such dewatering projects in ULARA to the Watermaster's office. If the water pumped for dewatering must be discharged to the storm drains, replacement water must be purchased. At present, over ten companies are dewatering and reporting to the Watermaster's office.

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* The purpose and function of the ULARA Policies and Procedures is to provide guidelines regarding decreed rights of parties set forth in the Final Judgment.

Under the Judgment, Disney (Defendant No. 105) operates under a separate stipulation (filed on May 11, 1961, and merged into the San Fernando Judgment, filed January 26, 1979) whereby groundwater extracted for cooling water is discharged into the channel of the Los Angeles River, just upstream from the Headworks Spreading Grounds. The original stipulation between Los Angeles and Disney anticipated that the water so discharged would be diverted by the then existing rubber dam into the Headworks Spreading Grounds and returned to the San Fernando Basin as groundwater storage. As the operation of the rubber dam was discontinued because of quality concerns by the California Department of Health Services, the water discharged by Disney is presently considered flowing to the ocean and being wasted. A number of meetings and letters between the Watermaster and parties have occurred in an attempt to resolve this matter. However, further work is required to deal with this situation. Los Angeles plans for future spreading went before the L.A. Regional Board and a pilot project to spread water from the L.A. River is presently in progress.

Under the Judgment, several rock companies were assigned rights to pump, with the understanding that their use of water for gravel washing was non-consumptive. As the gravel pits became more extensive, permanent ponds were produced, from which evaporation of perched water has occurred on a continuous basis. The Watermaster has received from the rock companies general proposed plans to take the pumped groundwater to a separate area for recharge. If done properly, such an approach would be acceptable. However, further review is required for final approval. As of February 15, 1990 an accounting of the water lost through evaporation is being required. Other Physical Solution pumpers such as Toluca Lake and Sportsman's Lodge are also under review by the Watermaster's office to see if there has been a change in their consumptive use of groundwater.

In dealing with the amount of stored groundwater, change in storage and the groundwater contours for the ULARA, a number of new monitoring wells will be required in the future. These test wells will provide more control on the water levels and underflow conditions, required by the Judgment.

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 Waterworks Engineer
and ULARA Watermaster
(Reg. C.E. No 12863)

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ULARA WATERMASTER REPORT

FOR WATER YEAR 1988-89

Report Prepared By:

Melvin L. Blevins.....Sr. Waterworks Engineer and ULARA Watermaster

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Michael L. Deas.....Hydrologic Engineering Assistant

Consultant

John F. Mann, Jr., Ph.D.....Consulting Geologist and Hydrologist

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 encompasses 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, surface runoff 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 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, et al., Defendants, signed March 14, 1968 by the Honorable Edmund M. Moor, Judge of the Superior Court. Numerous pretrial conferences 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 occurrence and movement of ground water and the surface and ground water hydrology of the area. In addition, investigations were made of the history of 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 Appeal, 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 Appeal. 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 the ULARA Watermaster, Post Office Box 111, Room 1455, 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 Watermaster 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.

On April 30, 1985, Judge Vernon G. Foster replaced Judge Hupp as Judge of Record for the San Fernando Judgment.

On January 16, 1990, Judge Miriam Vogel replaced Judge Foster as Judge of Record for the San Fernando Judgement. Judge Vogel retains the authority to oversee and implement the Judgment.

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
Sportsmen's 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 the overlying pumping of private parties. Los Angeles and San Fernando are each allowed to pump approximately 3,105 acre-feet per year. The private party Kisag Moordigian has sold and subdivided their property. The overlying rights to extract and use water on their lands are no longer maintained.

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

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 physical solution rights to extract water from Eagle Rock Basin.

Watermaster Service

In preparing the 1988-89 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, 1989, are:

City of Burbank
Fred Lantz (President)
Ross Burke (Alternate)

City of Glendale
Michael Hopkins (Vice-President)
Richard Segawa (Alternate)

City of Los Angeles
Dennis C. Williams
Donald G. McBride (Alternate)

City of San Fernando
Richard James
Michael Drake (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 1988-89 water year, the Administrative Committee met on April 27, 1989. The following items were discussed at the April 27 meeting.

1. Amount of Groundwater Stored in San Fernando Basin.
2. Status of Groundwater Quality Studies in the San Fernando Valley.
   a) North Hollywood/Burbank Aeration Tower Facility
   b) Well Packer Project
   c) Superfund Study - Status
   d) Underground Tank Leakage Problems
   e) San Fernando Groundwater Quality Study - ICC Committee
   f) AB 1803 - Programs on Water Quality Monitoring - Status
   g) SWAT Reports - Status
3. Verdugo Basin / Groundwater Conditions and Future Pumping Amounts.
4. Pumping by Non-Parties for a Special Need..
5. Overall Problems and Concerns of ULARA Watermaster.
6. Approval of the 1987-88 Watermaster Report.

Summary of 1988-89 Operating Conditions

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

Rainfall on the valley fill area was 55 percent of normal as compared to 113 percent of normal the year before. Surface runoff leaving the valley at Gage F-57C-R for 1988-89 was 136,843 acre-feet. The amount spread by the LACDPW in its spreading basins in 1988-89 was 5,713 acre-feet, a decrease from 23,161 acre-feet spread in 1987-88. Total precipitation falling on the San Fernando Valley and its tributary hill and mountain areas was estimated to be 319,769 acre-feet for the 1988-89 water year. Of this total, approximately 56,535 acre-feet flowed from the valley as storm runoff and rising ground water, leaving 263,234 acre-feet which was consumed or recharged within the area (82 percent of the total).

Ground water extractions decreased in the Sylmar, Verdugo, and Eagle Rock Basins and increased in the San Fernando Basin during 1988-89. Total ULARA extractions amounted to 142,559 acre-feet. Of this total, 117,649 acre-feet represents the 1988-89 extraction rights of parties in the San Fernando Basin (see Table 15, 1988-89) plus the safe yield values of Sylmar and Verdugo Basins and 2,799 acre-feet represents non-consumptive use pumping (see Table 13). Extractions used within ULARA increased by 53 acre-feet from last year.

For ULARA, gross imports decreased by 4,676 acre-feet, or 1 percent, while imports used within ULARA also decreased by 2 percent (6,691 acre-feet). Exports of Owens River water increased by 2,015 acre-feet, or 1 percent. The total amount delivered to water users within ULARA decreased by 3,455 acre-feet, or 1 percent.

Sewage export was estimated at 180,000 acre-feet in 1988-89, an increase of 1 percent. Total reclaimed water used in ULARA (cooling towers, irrigation, etc.) increased 3,183 acre-feet. The large increase is due to the inclusion of the Las Virgenes Municipal Water Districts Reclamation Plant which was not included in past reports. The total water reclaimed increased from 76,207 acre-feet to 78,898 acre-feet, an increase of almost 4 percent. Most of the reclaimed water is discharged to the Los Angeles River.

A total of 5,713 acre-feet of native water was spread during 1988-89 (no Owens River water spread).This represents a decrease of 17,448 acre-feet from last year, of native water spread.

Ground water storage in the San Fernando, Sylmar, and Verdugo Basins decreased by an estimated 30,550 acre-feet , 2,532 acre-feet and 749 acre-feet respectively during 1988-89, as compared with 1987-88.

Summary of Allowable Pumping for 1989-90

Table 2 gives a summary of allowable pumping for the Cities of Los Angeles, Burbank, Glendale, and San Fernando, and Crescenta Valley County Water District. Stored water is also shown as a credit for these parties as of October 1, 1989.

TABLE 1

UPPER LOS ANGELES RIVER AREA
SUMMARY OF OPERATING CONDITIONS
1987-88 AND 1988-89

Item	Water Year 1987-88	1988-89	
1. Active pumpers	19	23	(e)
2. Inactive pumpers (within valley fill)	2	2	
3. Valley rainfall, in inches	18.62	9.12	
4. Spreading operations, in acre-feet(a)			
a. LACDPW	23,161	5,713	
b. Los Angeles, City of	0	0	
5. Extractions, in acre-feet	120,100	142,559	
a. Used in ULARA	17,252	17,305	
6. Gross imports, in acre-feet			
a. MWD water	85,114	89,578	
b. Owens River water(b)	574,664	565,524	
Total	659,778	655,102	
7. Exports in acre-feet			
a. Owens River water	288,722	290,737	
b. Groundwater by Los Angeles	102,643	125,010	
Total	391,365	415,747	
8. Imports used in ULARA, in acre-feet	371,056	364,365	
9. Reclaimed water, in acre-feet	76,207	78,898	
a. Used in ULARA	3,444	6,627	
10. Total delivered water used in ULARA in acre-feet	391,752	388,297	
11. Sewer export, in acre-feet (c)	177,808	180,000	(d)

(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 ULARA. It does not include operational releases, reservoir evaporation, and water spread during the year. A portion of the water (7a) is passed though ULARA and is considered an export.

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

(d) Estimated.

(e) Includes 3M-Pharmaceutical, Philips Component, and pumpers from Appendix A.

TABLE 2

SUMMARY OF ALLOWABLE PUMPING FOR ENSUING YEAR 1989-90

(In Acre-Feet)

	Extractions			Stored Water Credit(a)
	Native	Import Credit	Total	
San Fernando Basin				
Los Angeles	43,660	48,624	92,284	150,287
Burbank	--	4,773	4,773	42,027
Glendale	--	5,434	5,434	27,007
Sylmar Basin				
Los Angeles	--	--	2,904	(201) (b)
San Fernando	--	--	3,338	566
Verdugo Basin				
Crescenta	--	--	3,294	--
Glendale	--	--	3,856	--

(a) As of October 1, 1989.

(b) Parentheses indicate stored water deficit.

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 1988-89 water year experienced below average rainfall. The valley floor received 9.12 inches of rain, whereas the mountains received approximately 13.21 inches. The weighted average of both valley and mountain areas was 11.64 inches, a decrease of 9.72 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, dated July 1962.

In the safe yield evaluation, precipitation on the valley was 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 was 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)

LACDPW Number	Name	100-Year Mean	1987-88 Precipitation	1988-89 Precipitation	1988-89 Percent of 100-Year Mean
11D	Upper Franklin Canyon Reservoir	18.50	17.69	10.42	56
13C(b)	Hollywood-Blix	16.63	20.28	9.05	54
14C(b)	Roscoe-Merrill	14.98	20.08	5.35	36
15A(b)	Van Nuys	15.30	14.40	7.43	49
17	Sepulveda Canyon-Mulholland Highway	19.82	25.40	11.50	58
21B(b)	Woodland Hills	14.60	18.04	8.64	59
23B-E(b)	Chatsworth Reservoir	15.19	18.88	7.41	49
25C(b)	Northridge-LADWP	15.16	18.07	8.85	58
33A-E	Pacoima Dam	19.64	21.60	13.17	67
47D	Clear Creek-City School	33.01	31.50	23.60	71
53D	Colby's Ranch	29.04	26.30	15.50	53
54C	Loomis Ranch-Alder Creek	18.62	17.55	12.39	67
210B	Brand Park	18.13	18.40	10.60	58
251C(b)	La Crescenta	23.31	21.79	15.36	66
259D	Chatsworth-Twin Lakes	18.70	20.00	7.80	42
293B(b)	Los Angeles Reservoir	17.32	19.03	12.22	71
1190	Pacoima Canyon-North Park Ranger Station	23.06	28.98	13.61	59

Weighted average for valley stations - 9.12 inches (1988-89)
Weighted average for mountain stations - 13.21 inches (1988-89)

(a) Data furnished by Los Angeles County Department of Public Works (LACDPW)

(b) Valley Stations

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

Table 4 summarizes the monthly runoff for these gaging stations and compares the 1987-88 water year with the 1988-89 year. The larger runoff in 1987-88 reflects higher rainfall than 1988-89 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 which includes 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. Runoff below this point flows to the Lopez and Pacoima spreading grounds and 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 1988-89 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 ground water, and industrial and reclaimed wastewater discharges. The Watermaster utilized the procedures outlined in the Report of Referee (Volume II, Appendix O) 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(a)
(In Acre-Feet)

Station	Water Year	Month												Total
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	
F-57C-R	1987-88(b)	28570	14479	12002	16963	21194	7415	17078	8152	7854	7456	7699	7342	156,204
Los Angeles River	1988-89(b)	7249	10448	37277	10165	13577	10505	6992	7032	6488	8133	8982	9995	136,843
F-252-R	1987-88	2340	1950	3330	1580	1830	364	878	313	462	300	418	275	14,040
Verdugo	1988-89	189	786	2092	307	1484	512	179	200	85	102	124	388	6,448
E-285-R	1987-88	2710	1330	1180	1500	1560	765	1520	655	553	761	716	804	14,054
Burbank Storm Drain	1988-89	714	969	1590	712	1218	942	542	488	502	383	515	494	9,069
F-300-R	1987-88	21755	8986	13963	12682	18861	5817	13070	4353	4577	4932	5119	4805	118,920
L.A. River Tujunga Ave.	1988-89	4896	5444	15635	5805	9884	6642	4380	4292	4338	4590	4411	4642	74,959
F-168-R	1987-88	169	657	357	821	617	1700	1167.5	614	29.4	30.7	19.8	100	6,282
Big Tujunga Dam	1988-89	206	117	155	157	288	2187	415	354	51	113	34	0	4,077
118B-R	1987-88	+	0	47.6	1436	0	1094	+	808	+	+	+	3.4	3,389
Pacoima Dam	1988-89	0	0	36	152	1063	580	181	0	0	0	0	0	2,012

(a) See Plate 5 for gaging station location.

(b) Station F-57C-R is estimated.

+ 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 Groundwater(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	16,450	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	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
1986-87	110	64,125	19,060	83,295
1987-88	210	81,920	74,074	156,204 (d)
1988-89	288	80,020	56,535	136,843 (d)
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	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	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
1986-87	2,100 (d)	0	1,690 (d)	3,790 (d)
1987-88	3,548	0	10,493	14,041
1988-89	1,995	0	4,453	6,448

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

(b) Data not available.

(c) Verdugo Basin. Large increase in 1979-80 is probably due to a change in the method of measurement

(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 ground water and industrial waste plus reclaimed water. Separation of base flow from surface runoff is based on the following assumptions:

Rising ground 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. However, the operation of the diversion structure (rubber dam) was discontinued in 1982 because of quality concerns by the State Department of Health Services.

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 are thence out of the basin.

To offset partially the increased runoff due to urbanization, Pacoima and Hansen Dams, originally built for flood protection, are utilized to regulate storm flows and allow recapture of 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 continues to be a problem because of the sediment that has accumulated upstream of the dam.

LACDPW operates the Branford, Hansen, Lopez, and Pacoima spreading grounds. The City of Los Angeles, 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 agreements. The Tujunga spreading grounds, operated by the City of Los Angeles, is utilized to spread Owens River and native waters. The Headworks spreading grounds are not operational due to the Department of Health Services' (DOHS) concern regarding the spreading of Los Angeles River water. Table 6 summarizes the spreading operations for the 1988-89 water year.

Ground Water Table Elevations

During the 1988-89 water year, the Watermaster collected and processed data to determine prevailing ground water conditions during the spring and fall of 1989. Plates 7 and 8 show ground water contours for these two seasons. Change in water surface elevation from the fall of 1988 to the fall of 1989 are shown on Plate 9. The drop in water levels in the North Hollywood area is related to the increase in pumping in the North Hollywood wells and the start-up of the newly installed Rinaldi-Toluca production wells. The fall in water levels northeast of the Verdugo Fault and southerly of the Hansen Spreading Grounds is related to the decrease of spreading in 1988-89 (3,844 acre-feet Table 6) as compared with 1987-88 (17,252 acre-feet). On Plate 10 is a diagrammatic sketch of flow directions and estimated ground water velocities in the San Fernando Basin. On Figures 1 and 2 are shown fluctuations of water levels in wells whose locations are shown in the inset map on Figure 2.

Water Reclamation

Water reclamation presently provides a source of water for irrigation, industrial and recreational uses, and ground water recharge in the unlined section of the Los Angeles River. Six wastewater reclamation plants are in operation in ULARA. Las Virgenes Municipal Water District (LVMWD) operates a water reclamation facility outside the ULARA Basin but releases water into the ULARA Basin. A tabulation of operating water reclamation plants is shown on Table 7. Their locations are shown on Plate 2.

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 are contained in Table 8.

TABLE 6

1988-89
SPREADING OPERATIONS
(In Acre-Feet)

Month	Native Water Spread by Los Angeles County Department of Public Works					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.	4	134	0	0	0	0	0	0	138
Nov.	45	125	0	36	0	0	0	0	206
Dec.	67	548	1	427	0	0	0	0	1043
Jan.	18	386	46	55	0	0	0	0	505
Feb.	56	700	87	559	0	0	0	0	1402
Mar.	36	1,326	113	229	0	0	0	0	1704
Apr.	4	375	61	0	0	0	0	0	440
May	3	246	0	0	0	0	0	0	249
June	1	4	0	0	0	0	0	0	5
July	0	0	0	0	0	0	0	0	0
Aug.	1	0	0	0	0	0	0	0	1
Sept.	20	0	0	0	0	0	0	0	20
Totals	255	3,844	308	1,306	0	0	0	0	5,713

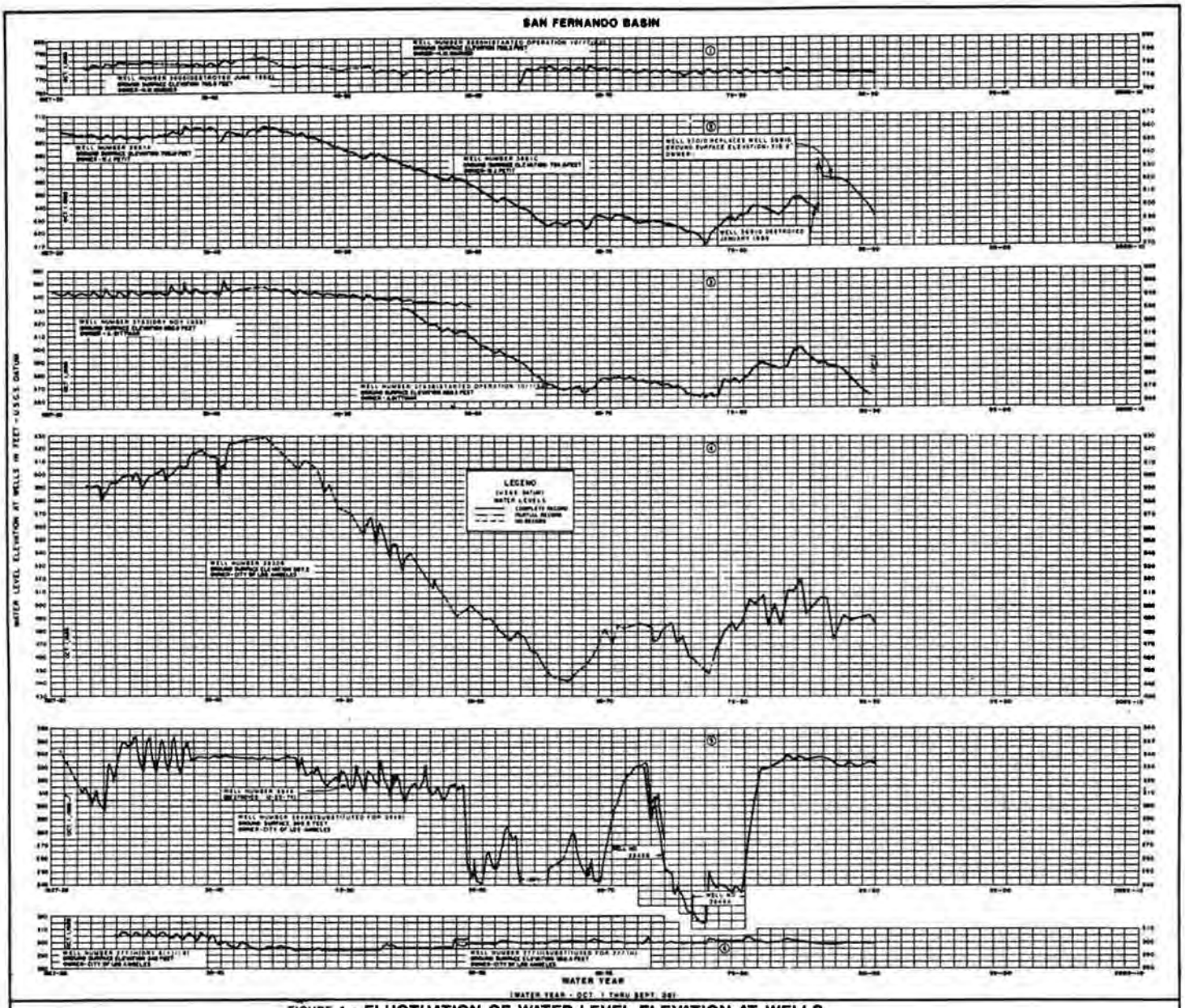


FIGURE 1 - FLUCTUATION OF WATER LEVEL ELEVATION AT WELLS IN THE SAN FERNANDO BASIN

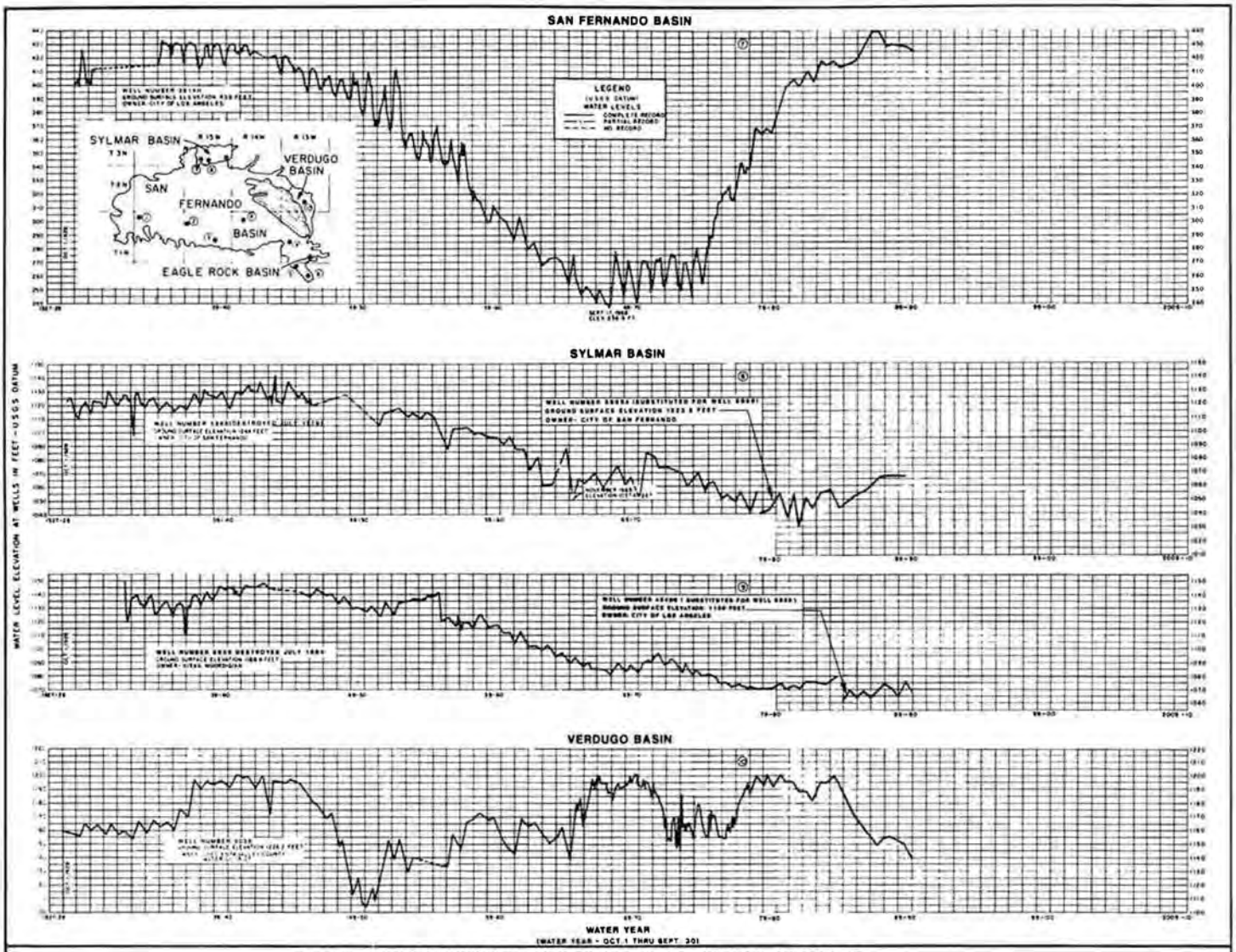


FIGURE 2 - **FLUCTUATION OF WATER LEVEL ELEVATION AT WELLS IN THE SAN FERNANDO, SYLMAR AND VERDUGO BASINS**

TABLE 7

WATER RECLAMATION PLANTS, 1988-89
(In Acre-Feet)

Plant	Treated	Used in ULARA	Discharged to Los Angeles River
San Fernando Basin			
City of Burbank	5,066	927 (a)	4,591
Los Angeles-Glendale	20,599	2,317 (b)	19,096
Donald C. Tillman	49,498	615 (c)	47,414
Indian Hills Mobile Homes(d)	20	20 (e)	0
Rocketdyne (Santa Susana Field Laboratory)	44	44	0
The Independent Order of Foresters(f)	19	19 (e)	0
Las Virgenes Municipal Water District(g)	3,652	2,685	0
Total	78,898	6,627	71,101

(a) Total water delivered (905 AF) to the power plant in Burbank for cooling water includes 50 percent evaporation and the rest is discharged to the Burbank western channel at the power plant; 22 AF used by Cal/Trans for freeway landscape irrigation.

(b) Total water delivered (498 AF) to the phosphate plant in Glendale for cooling water includes 50 percent evaporation and the rest to the Los Angeles River; 1,814 AF delivered to Griffith Park by City of Los Angeles for irrigation and to Los Angeles-Glendale plant for wash down, cooling, and irrigation; 5 AF used by Cal/Trans for freeway landscape irrigation.

(c) Water used for in plant use.

(d) Water supply from nearby well.

(e) Land irrigation

(f) Water supply from pipeline from LADWP.

(g) Reclamation plant outside of ULARA Basin, water released to ULARA drainage.

TABLE 8
REPRESENTATIVE MINERAL ANALYSIS OF WATER

Well Number or Source	Date Sampled	MINERAL CONSTITUENTS IN Milligrams per liter (mg/l)														
		$EC \times 10^6$ 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	(TH) Total Hardness as $CaCO_3$ mg/l
Imported Water																
Colorado River Water at Eagle Rock Reservoir	88-89	782	7.81	56	24	74	3.8	-	118	180	74	1.1	0.29	0.15	508	240
Los Angeles Aqueduct Filtration Plant Effluent	88-89	456	7.8	27	10	49	4.2	-	113	40	46	1.1	0.48	0.47	269	110
Los Angeles Aqueduct Filtration Plant Influent	88-89	364	8.4	27	6	39	4.5	-	-	27	17	<1	0.64	-	222	93
State Water Project at Joseph Jensen Filtration Plant (Influent)	04/11/89	677	8.38	30	18	82	3.9	-	-	58	116	2.4	0.20	-	374	149
Surface Water																
Los Angeles River At Sepulveda Blvd.	87-88	840	7.1	43	15	91	10	0	128	108	68	16	-	0.59	510	168
Burbank Western Wash at Los Angeles River	87-88	1163	7.9	46	21	152	13	3	162	171	146	20	-	0.54	757	202
Los Angeles-Glendale Reclamation Plant Discharge to Los Angeles River	88-89	-	7.3	42	18	140	13.9	-	-	140	149	2.0	0.58	0.76	-	178
Groundwater																
(San Fernando Basin - Western Portion)																
4757C (Reseda No. 6)	10/13/83	944	7.8	115	31	43	2.1	-	301	200	33	2.6	0.31	0.24	595	416
(San Fernando Basin - Eastern Portion)																
3800D*** (No. Hollywood No. 30)	08/16/89	913	7.38	120	22	46	4.8	0	427	50	49	43	0.28	NA	547	392
3841C (Burbank No. 6)	02/09/88	475	7.9	55	10.5	32	3.6	1.05	211	45	15	1.2	0.30	-	280	181
3913H (Grandview No. 16)	06/14/89	520	7.8	194	12.4	36.1	3.3	0.85	212	56	21	11.4	0.47	-	320	194
(San Fernando Basin - L.A. Narrows)																
3959E (Pollock No. 4*)	07/27/89	834	7.46	81	25	53	2.9	0	229	115	63	35	0.38	NA	529	302
(Sylmar Basin)																
4840J (Mission No. 5)	08/31/89	652	7.7	76	18	32	4.1	-	208	80	31	1.1	0.34	-	420	267
5959 (San Fernando No. 3)	02/13/85	850	7.6	100	17	30	3.1	-	-	65	32	21	0.31	-	400	319
(Verdugo Basin)																
3971 (Glorietta No. 3)	06/14/89	870	6.8	91.8	31.7	38.8	3.0	0.1	226	101	70	52.8	0.20	-	520	362
5058 (CVCWD No. 6**)	11/15/88	760	6.8	72	28	35	3.2	0.08	177	92	63	66.4	0.08	-	490	298

* Substituted for Pollock No. 6
** Substituted for CVCWD No. 14
*** Substituted for No. Hollywood No. 19

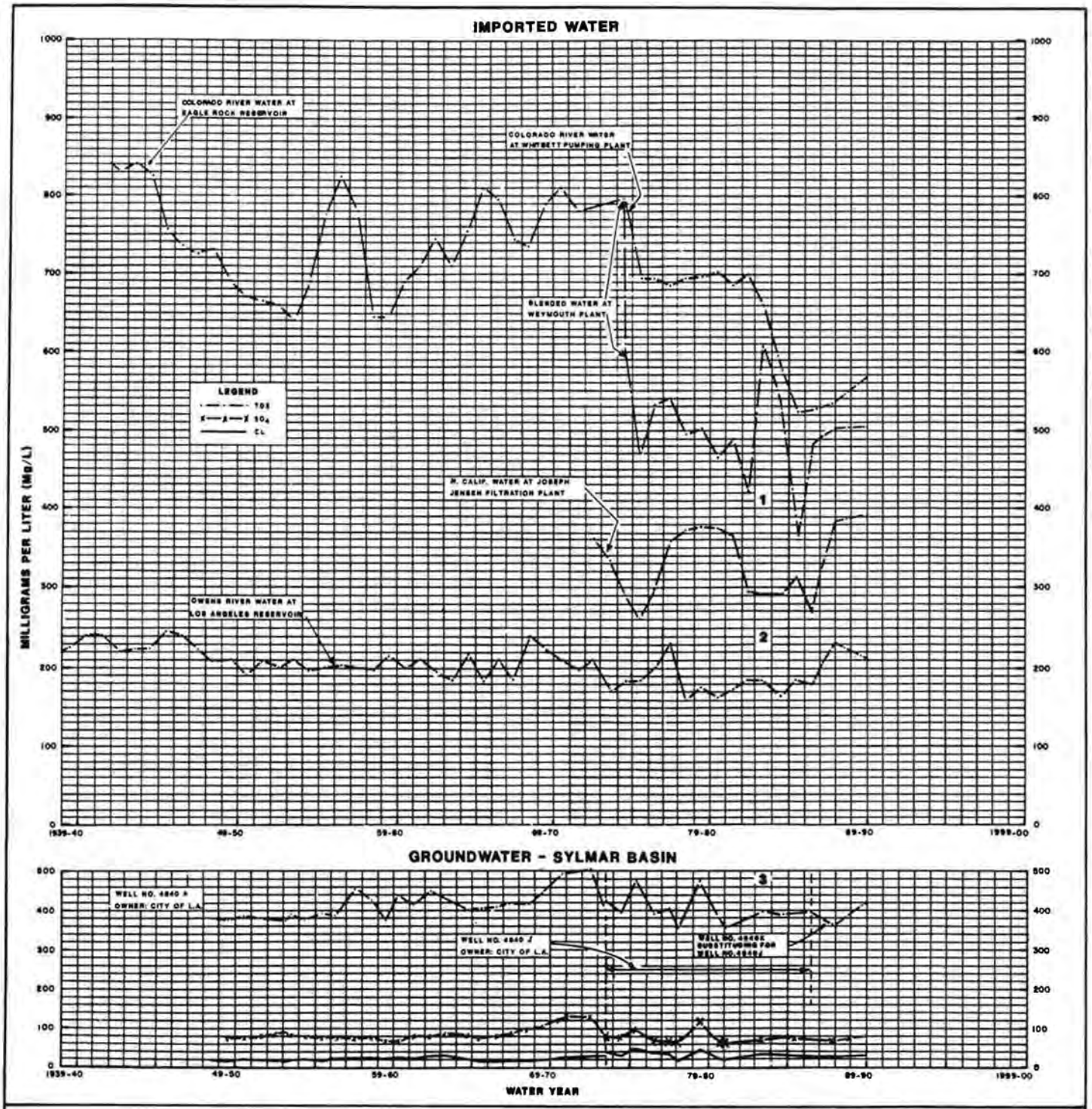


Figure 3 - MINERAL CONSTITUENTS OF WATER SOURCES IN THE ULARA

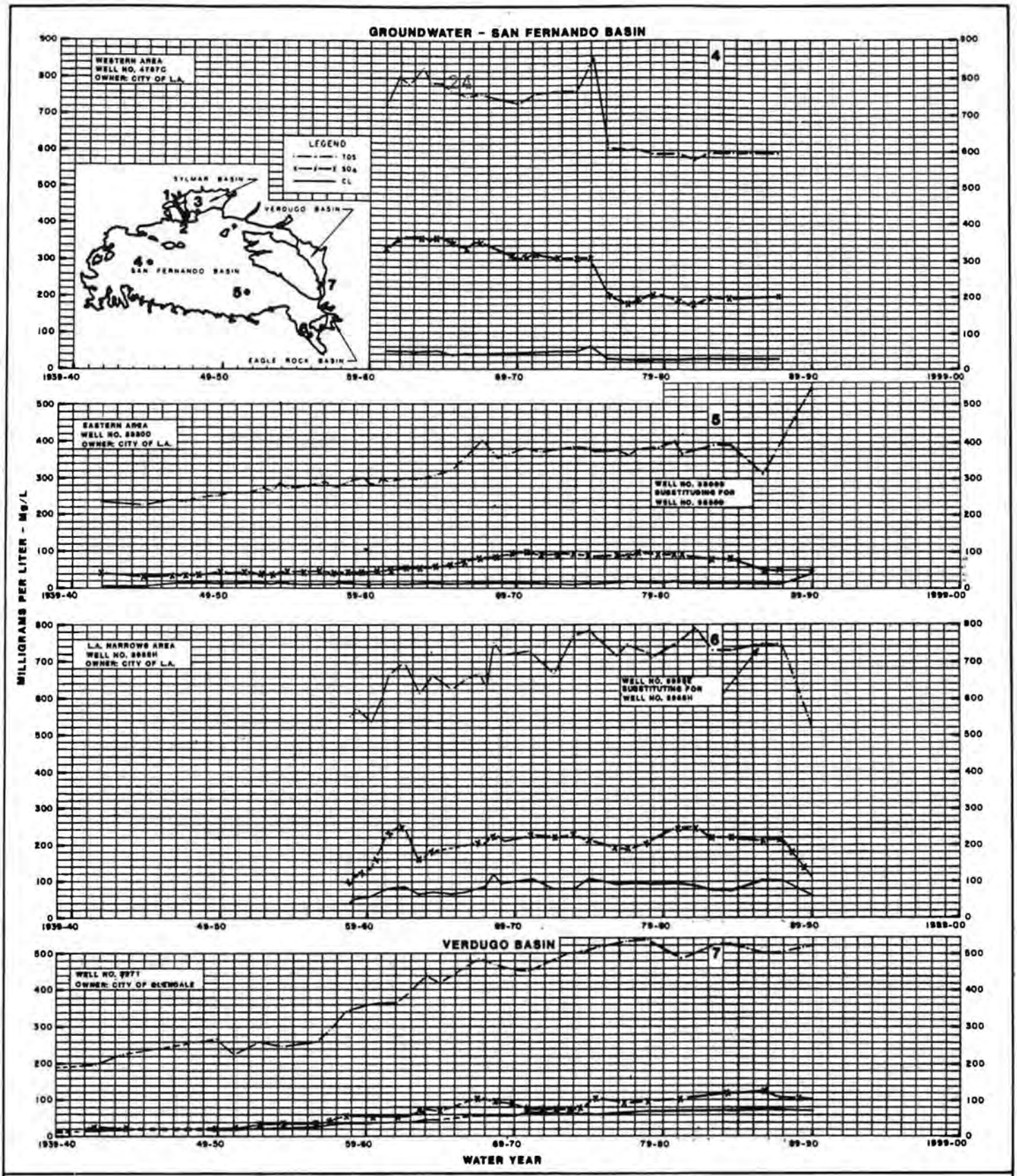


Figure 3(cont.) - MINERAL CONSTITUENTS OF WATER SOURES IN THE ULARA

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/l) for 30 years before 1969. The highest on record was 320 mg/l on April 1, 1946, and the lowest 150 mg/l on September 17, 1941. Average TDS concentration for 1988-89 was 269 mg/l, which was 16 percent greater than the 232 mg/l for 1987-88.

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/l in August 1955 and a low of 625 mg/l in April 1959. The average TDS over the 34-year period was approximately 740 mg/l. Tests conducted at Lake Matthews showed an average TDS of 559 mg/l for 1988-89, an increase of 4 percent from last year 1987-88.

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 has had a high TDS concentration of 392 mg/l (1988-89) and a low of 247 mg/l. Tests of Northern California water are taken at the Joseph Jensen Filtration Plant. Average TDS concentration during 1988-89 was 392 mg/l, an increase of 2 percent over last year 1987-88 due to changes in the quality of MWD source waters.

D. Colorado River and Northern California water were first blended at the Weymouth Plant location in May 1975. In the 1988-89 period, TDS had an average value of 506 mg/l which was a 1 percent increase from 1987-88. Blending ratios 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 1987-88, (no data available for 1988-89), low flows in the Los Angeles River at Colorado Boulevard had an average TDS content of 589 mg/l and a total hardness of 224 mg/l, an increase over the year before of 3 and 4 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 in character.

Groundwater is generally within the recommended limits of the California Title 22 Drinking Water Standards, except for: 1) areas of the eastern San Fernando Valley and part of the Verdugo Basin where high concentrations of TCE and PCE are present; 2) wells in the western end of the San Fernando Basin having excess concentrations of sulfate; and 3) those in the lower part of the Verdugo Basin and various portions of the S.F. Basin,having abnormally high concentrations of nitrate. In each area the groundwater delivered is either being treated or blended in order to meet State Drinking Water Standards.

Groundwater Quality Management Plan

During 1988-89, the Interagency Coordinating Committee (ICC) continued to implement the recommendations of the Groundwater Quality Management Plan (GWQPM) - San Fernando Valley Basin which were formulated to protect the groundwater basin. Special emphasis was placed on monitoring the organic contaminants TCE and PCE found in the groundwater.

Underground Tanks, Sumps, and Pipelines - The City of Los Angeles Fire Department (LAFD) is the lead agency in the city to implement the State-mandated Underground Tank Program and is actively carrying on a program to bring the large number of underground tanks in the San Fernando Valley into compliance with current law. They have prepared detailed fire permit application forms and procedures for use during the inspection and other regulation activities of the Underground Tank Program.

Private Sewage Disposal System - In order to eliminate existing commercial and industrial Private Sewage Disposal Systems (PSDS) and their discharge of wastewater to the groundwater basin, a sewer construction program has been in progress for 20 designated Groundwater Improvement Districts (GID) in the San Fernando Valley. During the year 1988-89, the first sewer construction project (GID-1) was completed and connected to the system. Contracts for the construction of two additional GIDs are planned to be awarded by the end of this year. Programs for the construction of 15 more GID projects are now being processed.

The enforcement division of the Bureau of Sanitation has been pursuing a PSDS elimination program for commercial and industrial properties. Since the program has been initiated, over eight hundred notices to connect have been issued. Reminder notices will be issued to currently non-complying parties. They will also continue the monitoring of commercial and industrial PSDS for contaminants where sewers are yet not available.

Landfills - Solid Waste Assessment Test (SWAT) reports are being reviewed for evaluation of the impact of solid waste disposal sites upon the air and water quality for many SWAT Ranks 1 and 2 landfills in the Los Angeles area. The reports that have been completed or are near completion and under review by the Regional Water Quality Control Board (RWQCB) are listed in Table 9. A summary of the various SWAT Reports reviewed is included in Appendix F. The summaries include incomplete data on depth to trash and expectable groundwater elevations, as well as information on gas control systems.

Water Quality Monitoring - Water supply agencies in the ULARA continued to monitor for volatile organic contamination in their production wells. Table 9a summarizes the number of ULARA wells that are contaminated at various levels above the California Drinking Water Standards of 5 ppb for TCE and 5 ppb for PCE.

Water Treatment

1. Advanced Oxidation Process

   The Los Angeles Department of Water and Power (LADWP) during the year 1988-89 continued pilot studies for the removal of volatile organic compounds using the Advanced Oxidation Process that employs an ozone, hydrogen peroxide treatment method. The LADWP Board approved a Negative Declaration for this project. James M. Montgomery has completed design drawings and the total project capital cost is estimated at $1.2 million. The award for the ozonation equipment has been made by LADWP for approximately $400,000. The start-up of the treatment unit is scheduled for late 1990.

2. North Hollywood Aeration Facility of the Los Angeles Department of Water and Power

   The design and construction of the North Hollywood Aeration Facility was completed during the year. The start-up phase of the project began after the dedication ceremony on March 30, 1989. Various electrical and equipment improvements have been completed and the facility was in full operation in November 1989. The construction of the Aeration Facility was funded by the U.S. Environmental Protection Agency (EPA) and the State Department of Health Services, 90% and 10% respectively.

3. Nitrate Removal

   The Crescenta Valley County Water District's Glenwood Nitrate Water Treatment Plant using an ion-exchange process for nitrate removal from the District's well water is now in full-time operation.

TABLE 9

ULARA LANDFILLS UNDER SWAT INVESTIGATION

(reported to Interagency Coordinating Committee)

Rank	Name	Owner	Location	SWAT Report Status
1	Bradley West	Valley Reclamation Co.	Sun Valley, Southeast of Sheldon Street	Report completed June 1987 Supplement - March 1988
2	Bradley East	Valley Reclamation Co.	Southeast of Sheldon St.	Report completed June 1987
1	Sheldon-Arleta	City of Los Angeles Bureau of Sanitation	Sun Valley District Near Hollywood & Golden State Freeways.	Report Preliminary May 1987 Report approved February 1990
2	Sunshine Cyn.	Browning - Ferris Industries	Southeast Santa Susana Mtns. West of Golden State Fwy.	Report completed July 1988 Addendum - July 1989
2	Gregg Pit/Bentz	Cal Mat Company	Between Pendleton Street and Tujunga Ave.	Report completed July 1989 Report approved February 1990
2	Branford	City of Los Angeles Bureau of Sanitation	Sun Valley District Northwest of Tujunga Wash	Report completed June 1988 Supplement (not reviewed)
2	Cal Mat (Sun Valley #3)	Cal Mat Properties	Sun Valley District Northeast of Glenoaks Blvd.	Report completed July 1988 Supplement - July 1989
2	Lopez Canyon	City of Los Angeles Bureau of Sanitation	North of Hansen Dam Between Lopez and Kagel Cyn.	Report completed June 1988 Supplement - July 1989 Report approved February 1990
2	Toyon Canyon	City of Los Angeles Bureau of Sanitation	Griffith Park	Report completed June 1988 4th quarter monitoring completed
2	Tuxford Pit	Los Angeles By-Products Co.	Sun Valley District Southwest of Golden State Freeway and Tujunga Ave.	Report completed June 1988 Supplement - July 1989
2	Penrose & Newberry Strathern Pit	Los Angeles By-Products Co.	Sun Valley District N. of Strathern St., Tujunga Ave.	Report completed June 1988 Supplement - July 1989 Report approved September 1989
2	Hewitt Pit	Cal Mat Properties	North Hollywood District Hollywood Fwy., Laurel Canyon Blvd.	Report completed June 1988 Supplement - July 1989
2	Cal Mat (old) Bradley Land-fill Complex	Valley Reclamation Co.	Sun Valley District Sheldon St., San Fernando	Report completed June 1987 Last quarterly report due March 1990
4	Pendleton St.	Department of Water & Power	Sun Valley intersection Pendelton St., Glenoaks Blvd.	SWAT Proposal September 1988 SWAT Report due July 1990

TABLE 9a

1988-89
ULARA WELL FIELDS(a)
WELLS EXCEEDING CALIFORNIA STATE MCL(b)
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	8	0	1	0	2	2	1	14	0	7	0	21
20-100	7	2	2	6	0	3	0	20	4	2	0	26
> 100	6	0	0	0	0	0	0	6	3	2	0	11
Total	21	2	3	6	2	5	1	40	7	11	0	58
PCE Levels (ppb)												
> 5-20	10	0	3	3	0	1	1	18	0	5	3	26
20-100	0	0	0	1	0	0	0	1	4	0	0	5
> 100	0	0	0	0	0	0	0	0	3	0	0	3
Total	10	0	3	4	0	1	1	19	7	5	3	34

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

(a) Wells are categorized based upon annual averages. Where data was not available for 1988-89, data from the most recent water year was used to compile this table.

(b) Maximun Contaminant Level
PCE = 5 ppb
TCE = 5 ppb

Remedial Investigation (RI) - San Fernando Groundwater Basin

The drilling of 14 wells or vertical profile boreholes (VPB's) in the North Hollywood area for the monitoring of groundwater and sediment was approved by EPA. The results of the subsequent analyses of these wells and the VPB's for the Crystal Springs National Priority List (NPL) site for TCE/PCE are now available. VPB's will be also drilled at the Pollock and Verdugo NPL sites.

There are also plans to drill VPB's in the Burbank and surrounding areas.

EPA Superfund Update

The Burbank Operable Unit/Feasibility Study (OU/FS) was completed in December 1988. LADWP has prepared and processed California Environmental Quality Act (CEQA) documentation for the proposed treatment facility which resulted in a Negative Declaration for the project. The EPA has sent a Special Notice of Liability to each of the Potentially Responsible Parties (PRP's) in the Burbank area. The EPA and the PRPs are conducting preliminary negotiations relating to groundwater cleanup in an attempt to develop an agreement for a Consent Decree.

The EPA has also completed an initial analysis of the Glendale area OU/FS. The LADWP has begun the Remedial Investigation on the Glendale OU project.

Groundwater Quality Investigations

During the year 1988-89, groundwater contamination investigations were performed under the direction of the Regional Water Quality Control Board (RWQCB), including the following sites:

Philips Components (Centralab)

A small, on-site treatment unit has been on-line since July 1988 , but effective cleanup has not been achieved due partially to production problems with their existing extraction well. They have decided to drill a new production well with stainless steel screens and larger perforations.

Lockheed Corporation

The Aqua Detox treatment facility with a design capacity of 1000 gpm for removal of TCE and PCE is being operated by Lockheed at a Burbank site. An application by Lockheed for a National Pollutant Discharge Elimination System (NPDES) waste discharge permit for reinjecting of treated groundwater has been prepared. Lockheed has also prepared a comprehensive site assessment report and is planning to drill more observation wells.

Rockwell-Rocketdyne

Observation wells were installed upgradient and downgradient of the Canoga Park facility to delineate groundwater contamination in the area. Groundwater contamination problems may also exist at the Santa Susana Field Laboratory. Remedial investigations are in progress at these sites.

3M-Pharmaceuticals (Riker Lab/3M)

Installation of new extraction wells are in progress. Alternative methods for treating the contaminated groundwater are under investigation.

Bendix Corporation (North Hollywood area)

A site assesment study is nearly complete.

Hughes Aircraft Co. (Canoga Park Area)

Installation of monitoring wells on the Hughes site and also off-site (on LADWP's property) is in progress.

Leaking Underground Tank Investigations - During 1988-89, major underground tank leak investigations with the potential for impacting ground water were active at various sites. The sites being investigated include Philips Components, Lockheed, 3M-Pharmaceuticals, Bendix, and Rockwell-Rocketdyne. As part of these investigations, which are being conducted under the direction of the Regional Water Quality Control Board - Los Angeles Region, wells have been drilled and ground water has been extracted for the purpose of well development , testing or clean-up. Design work to implement remedial measures is in progress. Following is the amount of water pumped by these parties and non-parties during 1988-89:

	Amount of Water Pumped		Method of Disposal
Party	Clean-up	Devl./Test.	
Philips Component a/	43.58	0.00	Recharge
Lockheed b/	923.19	0.40	Storm Drain
Los Angeles, City of	0.38	0.64 d/	Aeration Tower
3M-Pharmaceutical c/	9.77	0.00	Storm Drain
Rockwell	0.00	0.00	Storm Drain
Total	976.92	1.04	

a/ Formerly known as Centralab
b/ Lockheed is a party to the Judgment entered on January 26, 1979.
c/ Formerly known as Riker Labs
d/ Water was recharged back into Basin.

Other Activities - The LADWP completed construction of the Rinaldi-Toluca (RT) production well field in the Sun Valley area of the San Fernando Valley. The construction of the Tujunga Well Field (TJ) was initiated in 1989 with the construction of TJ-12.

III. WATER USE AND DISPOSAL

Water delivered for use in ULARA is either imported water, local ground water, reclaimed, or a mixture of local and imported water, depending on the area and water system operation. During the 1988-89 water year, the total amount delivered to water users in ULARA was 388,211 acre-feet. Of this total, 17,305 acre-feet was ground water, 364,279 acre-feet was imported water, and 6,627 acre-feet was reclaimed water. Refer to Figure 5 for a monthly breakdown. The ULARA basins contain 587 wells, of which 149 are active and 438 are inactive, observation, test, capped, etc.

The original trial court adjudication of ground water rights in ULARA 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 1954-55 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 by 50,000 to 90,000 acre-feet per year and that, for the water years 1968-69 to 1988-89, the difference between imports and extractions has increased to between 110,000 and 250,000 acre-feet.

Figure 5 provides an analysis of the monthly relationship between rainfall, ground water extractions used in ULARA, and imported supply. Data relates to all of 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 1988-89 water year, and Plate 6 shows the approximate location of the well fields which pumped this water. A total of 132,582 acre-feet was pumped from the San Fernando Basin. Of this total, 104,289 acre-feet constitutes extraction rights by parties in the San Fernando Basin (see Table 15, 1988-89) and 2,799 acre-feet is pumping for nonconsumptive use (see Table 13).

A total of 5,459 acre-feet was pumped from the Sylmar Basin and 4,349 acre-feet from the Verdugo Basin. The respective safe yield values for the San Fernando Basins is 102,491 (native safe yield of 43,660 and an import return of 58,831), 6,210 (Sylmar Basin), and 7,150 acre-feet (Verdugo Basin). Pumping in the Verdugo Basin is less than safe yield due to water quality (high nitrate) 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 approach pumping its prescriptive right in the Verdugo Basin. In addition, the completion of the Glenwood Nitrate Water Treatment Plant will enable Crescenta Valley County Water District to also approach pumping its prescriptive rights.

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 solely by the City of Los Angeles, and include both imported (pass through) Owens River water and ground water. Table 10 summarizes the nontributary imports and exports from ULARA. Ground water imports and exports in and out of ULARA are listed in Tables 12A, 12B, 12C, and 12D.

Physical Data by Basins

The Watermaster has collected and summarized data in Tables 12A, 12B, 12C, and 12D, which show the water supply and disposal in each of the basins.

The information for Tables 12A, 12B, 12C, and 12D was submitted by the parties. Estimates made by the parties, for water delivered to hill and mountain areas, sewage exported, etc., were based upon methods consistent with previous estimates made by SWRCB for the San Fernando Valley reference (1962). 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 1989-90. Table 15 shows San Fernando Basin stored water as of October 1, 1988 and October 1, 1989. All rights are based on the City of Los Angeles vs. City of San Fernando, et al., Judgment, dated January 26, 1979.

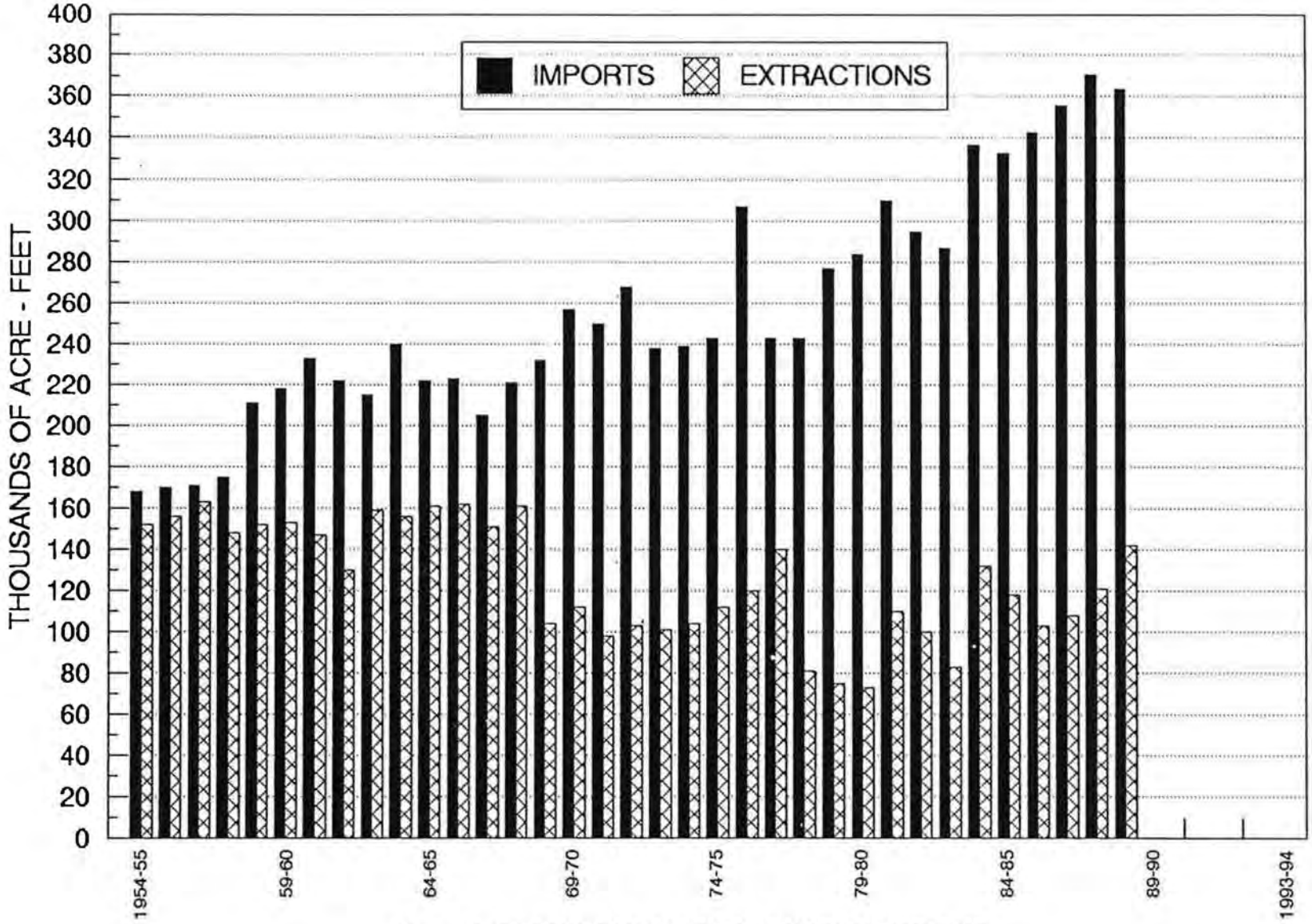


Figure 4 - GROUNDWATER EXTRACTIONS AND USE OF IMPORTED WATER IN UPPER LOS ANGELES RIVER AREA

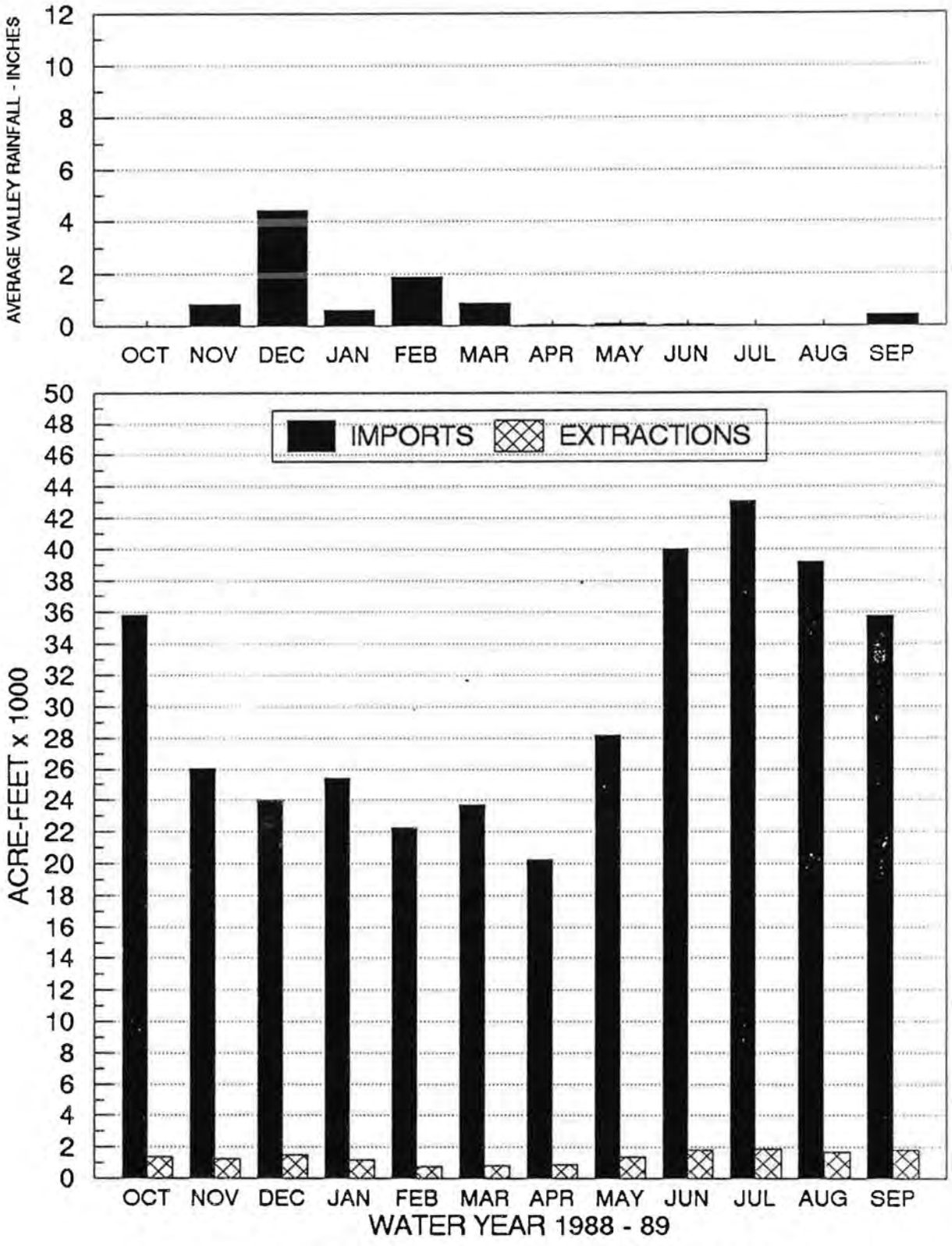


Figure 5 - MONTHLY WATER DEMAND AND AVERAGE RAINFALL
IN UPPER LOS ANGELES RIVER AREA

TABLE 10

ULARA - NONTRIBUTARY WATERS,
IMPORTS AND EXPORTS

(In Acre-Feet)

Source and Agency	1987-88	1988-89
Imports		
MWD water(a)		
Burbank, City of	22,827	22,936
Crescenta Valley County Water District	2,650	2,619
Glendale, City of	27,506	28,407
Los Angeles, City of	13,816	13,232
La Canada Irrigation District	1,038	1,145
Las Virgenes Municipal Water District (nonparty)	16,175	19,598
San Fernando, City of	1,102	1,641
	85,114	89,578
Owens River water		
Los Angeles, City of	574,664 (b)	565,524 (b)
Total	659,778	655,102
Exports		
Owens River water		
Los Angeles, City of	288,722	290,737
Net Imports	371,056	364,365

(a) Colorado River and Northern California waters combined.

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

Sylmar Basin Allowable Extractions

Table 16 shows Sylmar Basin stored water as of October 1, 1988 and October 1, 1989. All rights are based on the March 22, 1984 stipulation between the City of San Fernando and the City of Los Angeles (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, of which a regulatory storage capacity of 350,000 acre-feet is 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 stored ground water 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 1988-89 was estimated as -30,550 acre-feet, and the cumulative change in storage from 1954-55 through 1988-89 was -254,270 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 1988-89 was 17.56 inches, compared to a long-term average of 16.48 inches of rainfall. From 1968-69 to 1988-89, the basin gained approximately 191,650 acre-feet of stored water. Through spreading and in-lieu replenishment** activities, 219,320 acre-feet were stored. Thus, the net storage has decreased 27,670 acre-feet. Refer to Table 11 for the annual precipitation and change in storage.

Sylmar Basin. The change in storage for 1988-89 was -749 acre-feet, and the cumulative change in storage from 1954-55 through 1988-89 was -22,324 acre-feet.

Verdugo Basin. The change in storage for 1988-89 was -2532 acre-feet, and the cumulative change in storage from 1954-55 through 1988-89 was +13,133 acre-feet.

* 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.

** In-lieu recharge is a credit in stored ground water equal to an intentional reduction of pumping.

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	-7980	259140
1986-87	5.99	-31940	227200
1987-88	18.62	-5000 (E)	222200 (E)
1988-89	9.12	-30550 (E)	191650 (E)
21-yr. average	17.56		

Notes:

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

(2) Stored water through spreading and in-lieu pumping = 219,320 AF.

(3) Change in storage = +191,650 AF - 219,320 AF = -27670 AF.

(4) The change in storage is based on the methodology used in the Report of Referee (Volume II, Appendix Q) filed with the court in July 1962.

(E) - Estimate.

TABLE 12A

1988-89
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	29 (i)	1,315	126,641	0	4,596 (a)	132,581
Used on valley fill	0	(e)	1,620	(e)	(e)	(e)
Imports						
MWD water	22,936	28,407	8,935	1,641	19,598 (j)	81,517
Owens River water	--	--	553,807 (g)	--	695 (j)	554,502
Ground water from Sylmar Basin	--	--	3,259	2,001	0	5,260
Ground water from Verdugo Basin	--	1,173	--	--	--	1,173
Reclaimed water	927 (h)	498 (f)	2,434 (d)	--	2,768	6,627
Exports						
Ground water:						
to Verdugo Basin	--	0	0	--	0	0
out of ULARA	--		125,010	--	0	125,010
Owens River water:						
to Eagle Rock Basin	--	--	0	--	--	0
to Sylmar Basin	--	--	86	--	--	86
out of ULARA	--	--	290,737	--	0	290,737
MWD:						
to Verdugo Basin	--	4,222	0	--	--	4,222
Total net delivered water	23,863	27,169 (b)	279,243	3,642	27,657	361,574
Water delivered to hill and mountain area						
Ground water	(e)	(e)	0	0	0	(e)
Owens River water	--	--	42,308	--	695 (j)	43,003
MWD water	(e)	(e)	3,167	0	19,598 (j)	(e)
Verdugo Basin water	--	(e)	--	--	--	(e)
Water outflow						
Surface	--	--	--	--	--	136,843 (c)
Subsurface	--	--	--	--	--	421
Sewers	11,557	18,794	71,000 (k)	1,590	--	102,941
Reclaimed	4,591	9,548	56,962	--	--	71,101

(a) See Table 13 for parties included.

(b) Total delivered water to the City of Glendale was 32,283 AF. Verdugo Basin metered sales times 105 percent equaled 5,114 AF. Therfore, the San Fernando Basin delivered water was 27,169 AF (32,283 AF minus 5,114 AF). Refer to Section 5.2.1.3 of Judgment

(c) At Station F-57C-R where 29-year mean (1929-57) base low flow is 7580 acre-feet.

(d) 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

(e) These values are no longer calculated as per Judgment.

(f) 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.

(g) Includes Owens River water exported to Eagle Rock Basin and exported out of ULARA.

(h) This value no longer estimated. Actual amount of reclaimed water is being metered by the city of Burbank.

(i) Water pumped for water quality testing only.

(j) Las Virgenes Municipal Water District (see Table 10).

(k) Estimated, 5 year trend.

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

TABLE 12B

1988-89
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 extracted	3,259	2,199	1	5459
Used on valley fill	0	198	0	198
Imports				
MWD water	--	0	--	0
Owens River water	10,235	86 (c)	--	10,321
Exports				
Ground water: to San Fernando Basin	3,259	2,001	0	5,260
Water delivered to hill and mountain area				
Owens River water	401	--	--	401
Water outflow				
Surface	--	--	--	(b)
Subsurface: to San Fernando Basin(a)	--	--	--	--
Sewers	830 (d)	157	0	987

(a) Computations not possible, well destroyed

(b) Surface outflow is not measured. Calculated average surface outflow of 5000 Ac-Ft per year made by Mr. Laverty - SF Exhibit 57.

(c) Temporary connection.

(d) Estimated, 5 year trend.

TABLE 12C

1988-89
SUMMARY OF WATER SUPPLY AND DISPOSAL
VERDUGO BASIN
(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	2,285	2,064	0	0	4,349
Used on valley fill	2,225	(c)	0	0	(c)
Imports					
MWD water	2,619	4,222	1,145	0	7,986
Owens River water	--	--	--	701	701
Groundwater from:					
San Fernando Basin	--	--	--	--	--
Reclaimed water	--	--	--	--	--
Exports					
Groundwater to:					
San Fernando Basin	--	1,173	--	--	1,173
Water delivered to hill and mountain areas					
MWD water	69	(c)	0	0	(c)
Owens River water	--	--	--	96	96
Groundwater from:					
Verdugo Basin	60	(c)	--	0	(c)
San Fernando Basin	--	0	--	0	0
Water outflow					
Surface	--	--	--	--	6,448 (a)
Subsurface:					
to Monk Hill Basin	--	--	--	--	300 (b)
to San Fernando Basin	--	--	--	--	70
Sewage	1,723	1,120	0	190 (d)	3,033

(a) Information obtained from Station F-252C-R.
(b) Based on 29-year average (1929-57).
(c) These values are no longer required as per Judgment of January 1979.
(d) Estimated, 5 year trend.

TABLE 12D

1988-89
SUMMARY OF WATER SUPPLY AND DISPOSAL
EAGLE ROCK BASIN
(In Acre-Feet)

Water Source and Use	City of Los Angeles	Deep Rock(c) Water Company	Sparkletts Drinking(c) Water Corporation	Total
Extractions				
Total quantity	0	0	169	169
Used on valley fill	0	0	0	0
Imports				
Owens river water	0	--	--	0
MWD water	4,297	--	--	4,297
Groundwater	0	0	0	0
Exports				
Groundwater	0	0	169	169
Water delivered to hill and mountain areas				
MWD water	2,323	--	--	2,323
Owens river water	0	--	--	0
Water outflow				
Surface(a)	--	--	--	0
Subsurface(b)	--	--	--	0
Sewers	1,940 (d)	0	0	1,940

(a) Information not available

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

(c) 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.

(d) Estimated, 5 year trend.

TABLE 13

1988-89
PUMPING BY NONCONSUMPTIVE USE, PHYSICAL SOLUTION,
AND PARTIES WITHOUT RIGHTS
SAN FERNANDO BASIN

(In Acre-Feet)

I. Nonconsumptive Use Parties		
1. CalMat Co.	1,051	
2. Livingston-Graham Co.	5	
3. Sears, Roebuck and Company	39	
4. Sportsmen's Lodges, Inc.	0	
5. Toluca Lake Property Owners Assn.	7	
6. Walt Disney Productions	1,697	
7. Total	2,799	
II. Physical Solution Parties		
1. Environmentals Inc.	85	
2. First Financial Plaza Site	24	
3. Lockheed	923	(a)
4. Forest Lawn Cemetery Assn.	399	
5. Sportsmen's Lodge, Inc.	1	
6. Toluca Lake Property Owners Assn.	30	
7. Valhalla Memorial Park	290	
8. Valley Reclamation Company	29	
9. Total	1,781	
III. Parties Without Rights		
1. Harper, Cecilia De Mille	15	(b)
2. Mena, John and Barbara	1	
3. Total	16	
IV. Total Pumping by Private Parties	4,596	

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

(a) Lockheed was given a .4 AF credit for well development. Actual water pumped was 923.59 AF.

(b) Presently under investigation.

TABLE 14

1989-90
SAN FERNANDO BASIN EXTRACTION RIGHTS
(In Acre-Feet)

Item	Cities of		
	Burbank (1)	Glendale (2)	Los Angeles (3)
1. Delivered water 1988-89	23,863	27,169	279,243
2. Import delivered 1988-89	--	--	--
3. Deivered to hill & mountain 1988-89	--	--	45,475
4. Delivered to valley fill 1988-89	--	--	233,768
5. Percent Recharge	20.0%	20.0%	20.8%
6. Return water extraction right 1989-90	4,773	5,434	48,624
7. Native safe yield	0	0	43,660
8. Total exraction right 1989-90	4,773	5,434	92,284

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
cols. (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 for calculation.

TABLE 15

STORED WATER
SAN FERNANDO BASIN
(In Acre-Feet)

	Cities of		
	Burbank (1)	Glendale (2)	Los Angeles (3)
1987-88			
1. Stored water as of Oct. 1, 1987	34,022	19,841	194,668
2. Delivered water 1986-87	23,649	26,282	234,773
3. Return water extraction right 1987-88	4,729	5,256	48,833
4. Native safe yield	0	0	43,660
5. Total extraction right for 1987-88	4,729	5,256	92,493
6. Extractions for year	30 (a)	1,020	104,452
7. Physical solution extractions	253	456	59
8. Spread water	0	0	0
9. Stored water as of Oct. 1, 1988	38,498	23,621	182,650
1988-89			
10. Delivered water 1987-88	23,712	25,927	243,762
11. Return water extraction right 1988-89	4,742	5,185	50,702
12. Native safe yield	0	0	43,660
13. Total extraction right for 1988-89	4,742	5,185	94,362
14. Extractions for year	29 (a)	1,315	126,641
15. Physical solution extractions	1,213	484	84
16. Spread water	0	0	0
17. Stored water as of Oct. 1, 1989*	42,027	27,007	150,287

Item 3 & 11 = Items 2 & 10 x percent recharge
Item 5 & 13 = Items 3 + 4 & 11 + 12, respectively
Item 9 = Items 1 + 5 -6 -7 + 8
Item 7 & 15
col. (1) = Valhalla + Lockheed pumping
col. (2) = Forest Lawn + Environmentals Inc. pumping.
col. (3) = Toluca Lake + Sportsmen's Lodge + First Financial Plaza Site pumping + Valley Reclamation pumping. Only consumptive use portion charged to Los Ange

Item 10
col. (1) = Table 14 Item 1 of previous year
col. (2) = Table 14 Item 1 of previous year
col. (3) = Table 14 Item 4 of previous year
Item 17 = Items 9 + 13 - 14 -15 + 16
* = Does not include return flow occuring during water year 1988-89.

(a) Water pumped for water quality testing only.

TABLE 16

STORED WATER AND
1989-90 EXTRACTION RIGHTS
SYLMAR BASIN
(In Acre-Feet)

	Cities of		
	San Fernando (1)	Los Angeles (2)	All Others (3)
1987-88			
1. Stored water as of Oct. 1, 1987	6	(18) (b)	—
2. Safe yield	3,105	3,105	—
3. Total extraction right 1987-88	2,804 (c)	3,087	(a)
4. Extraction for year	2,804	3,134	0.6
5. Stored water as of Oct. 1, 1988	(0)	(47) (b)	—
1988-89			
6. Stored water as of Oct. 1, 1988	(0)	(47) (b)	—
7. Safe yield	3,105	3,105	—
8. Total extraction right 1988-89	2,765 (c)	3,058	(a)
9. Extraction for year	2,199	3,259	0.6
10. Stored water as of Oct. 1, 1989	566	(201) (b)	—
		0	
1989-90			
11. Stored water as of Oct. 1, 1989	566	(201) (b)	—
12. Safe yield	3,105	3,105	—
13. Total extraction right 1989-90	3,338 (c)	2,904	(a)

Note: The safe yield of the Sylmar Basin is 6210 acre-feet. Effective October 1, 1984, the safe yield less pumping by overlying parties, which in 1988-89 was near zero,is equally shared by Los Angeles and San Fernando.The extraction right also takes into account deficit stored water.

(a) Entitled to reasonable overlying landowner pumping amount.

(b) Parentheses indicate a deficit of stored water.

(c) An audit performed on San Fernando's pumping records discovered over-pumping of 980 AF during a two-year period. The City of San Fernando requested to reduce extractions for a three-year period beginning 1987-88. The Watermaster has agreed to this.

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

APPENDIX A

GROUNDWATER EXTRACTIONS

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft) OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						San Fernando Basin								
City of Burbank														
3841C	6A	0.78	0.34	0.73	0.69	1.31	0.00	0.53	0.67	0.44	1.35	0.64	0.78	8.26
3882P	7	0.37	0.03	0.23	0.19	0.14	0.00	0.20	0.00	0.35	0.37	1.12	0.36	3.36
3851E	12	0.18	0.29	0.30	0.58	0.00	0.00	0.44	0.56	0.20	0.50	0.54	0.62	4.21
3851K	13A	0.68	0.25	0.63	0.56	1.12	0.00	0.48	0.54	0.35	0.46	0.51	0.65	6.23
3882T	15	0.17	0.35	0.20	0.23	0.57	0.00	0.20	0.00	0.28	0.08	0.23	0.30	2.61
3841G	18	0.42	0.18	0.39	0.28	0.69	0.00	0.28	0.35	0.22	0.31	0.33	0.38	3.83
Party Total		2.60	1.44	2.48	2.53	3.83	0.00	2.13	2.12	1.84	3.07	3.37	3.09	28.50
CalMat Co.														
4916A	2	17.93	0.00	241.18	216.07	74.95	21.49	21.49	0.22	0.98	0.67	26.10	3.30	624.38
4916	3	62.46	73.16	99.86	101.39	36.42	16.44	11.65	8.22	7.44	6.66	2.50	0.03	426.23
Party Total		80.39	73.16	341.04	317.46	111.37	37.93	33.14	8.44	8.42	7.33	28.60	3.33	1050.61
Environmentals Inc.														
3934A	M050A	7.23	8.25	6.97	6.80	6.54	7.09	6.54	7.62	8.29	7.20	8.81	3.86	85.20
First Financial Plaza Site														
N/A	F.F.P.S.	1.99	1.77	2.32	1.95	1.90	2.05	1.84	1.99	2.70	1.65	2.13	1.96	24.25

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft) OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						San Fernando Basin								
Forest Lawn Cemetery Assn.		Glendale												
3947A	2	9.99	4.31	2.97	1.28	1.12	7.36	10.37	30.20	20.10	33.48	23.47	0.00	144.65
3947B	3	8.71	3.67	2.38	0.65	0.92	6.27	8.75	25.04	20.25	28.90	20.25	0.00	125.79
3947C	4	7.15	1.74	2.25	0.97	0.84	5.66	8.22	23.92	18.82	27.03	16.15	0.00	112.75
3858K	7	3.85	2.01	1.19	0.47	0.00	0.79	7.32	0.22	0.00	0.00	0.00	0.00	15.85
Party Total		29.70	11.73	8.79	3.37	2.88	20.08	34.66	79.38	59.17	89.41	59.87	0.00	399.04
City of Glendale														
3924N	STPT 1	1.40	1.90	0.45	16.89	1.15	1.75	5.32	2.19	1.54	23.01	2.39	6.67	64.66
3924R	STPT 2	0.87	0.20	0.24	0.54	0.00	0.00	0.21	0.16	0.13	4.00	0.05	0.28	6.68
GVENT	GVENT	0.00	185.67	91.46	172.48	168.49	146.08	34.07	0.00	135.04	139.95	96.37	73.66	1243.27
Party Total		2.27	187.77	92.15	189.91	169.64	147.83	39.60	2.35	136.71	166.96	98.81	80.61	1314.61
Harper, Cecilia DeMille		Outside												
4940A	NORTH	1.25E	1.25E	1.25E	1.25E	1.25E	1.25E	1.25E	1.25E	1.25E	1.25E	1.25E	1.25E	15.00
Livingston-Graham, Inc.														
4916B	SnVal	0.43	0.35	0.32	0.01	0.20	0.30	0.23	0.26	0.35	0.12	1.37	1.22	5.16

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft) OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						San Fernando Basin								
Lockheed														
3861C	B175-E1	38.35	64.28	76.45	119.96	48.20	47.86	31.02	43.61	110.20	119.84	123.22	100.60	923.59
City of Los Angeles														
Crystal Springs (CS)														
3914L	CS-45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3914M	CS-46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CS Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Erwin (E)														
3831H	E-1	202.55	58.06	0.00	0.00	0.00	0.00	0.00	0.00	5.74	0.00	0.00	0.00	266.35
3821I	E-2A	268.02	253.15	123.60	0.00	196.70	263.29	250.37	251.15	233.27	230.30	207.46	180.92	2458.23
3831G	E-3	199.15	180.42	178.93	167.68	136.85	147.71	73.42	99.84	138.09	131.18	121.51	112.63	1687.41
3921F	E-4	46.79	46.03	47.31	46.76	42.70	44.93	38.36	39.26	13.89	0.00	0.00	0.00	366.03
3831F	E-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821H	E-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.67	57.67
3811F	E-10	0.00	0.00	0.00	7.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.08	131.50
E Total		716.51	537.66	349.84	221.86	376.25	455.93	362.15	390.25	390.99	361.48	328.97	475.30	4967.19
Headworks (H)														
3993L	H-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3893K	H-27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3893M	H-28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft) OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						San Fernando Basin								
Headworks (H)														
3893N	H-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3893P	H-30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H Total		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
North Hollywood (NH)														
3800	NH-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3780	NH-4	138.84	135.33	141.94	141.21	128.31	139.44	132.67	135.72	131.25	135.74	134.48	129.96	1624.89
3810S	NH-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3770	NH-7	130.30	127.64	133.24	132.78	120.73	135.17	129.68	132.19	127.73	131.02	126.84	122.77	1550.09
3810	NH-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810A	NH-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810B	NH-14A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3790B	NH-15	107.37	95.98	115.40	111.27	117.33	123.83	116.94	111.98	34.48	0.00	0.00	0.00	934.58
3820D	NH-16	265.11	77.37	0.00	0.00	0.00	0.00	0.00	0.76	130.10	267.10	264.10	252.76	1257.30
3820C	NH-17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.49	224.93	300.09	289.85	288.18	1104.54
3820B	NH-18	365.54	354.87	366.62	359.41	0.00	0.00	0.00	62.67	0.00	0.00	1.29	0.00	1510.40
3830D	NH-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft)												
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							San Fernando Basin							
North Hollywood (NH)														
3830C	NH-20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22	136.32	279.16	274.54	262.28	953.52
3830B	NH-21	133.40	130.24	135.56	136.16	125.16	136.75	132.03	132.12	121.86	119.10	115.81	105.19	1523.38
3790C	NH-22	243.76	237.33	248.58	246.67	222.71	211.00	233.31	263.23	228.12	234.64	231.96	218.50	2819.81
3790D	NH-23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3800C	NH-24	13.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.15
3790F	NH-25	160.35	164.14	169.15	160.47	145.20	145.66	138.59	139.79	131.31	135.65	135.26	128.70	1754.27
3790E	NH-26	211.02	154.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.80	151.70	522.41
3820F	NH-27	166.25	165.36	167.29	161.23	144.17	154.41	146.05	141.30	44.65	0.00	0.00	0.32	1291.03
3810K	NH-28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810L	NH-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3800D	NH-30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08	0.00	0.00	0.76	0.00	1.84
3810T	NH-31	73.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73.58
3770C	NH-32	284.44	274.34	284.07	280.24	252.69	275.67	261.20	263.50	255.17	216.35	234.85	245.59	3128.11
3780C	NH-33	172.77	166.48	173.26	169.51	151.79	165.06	156.11	155.35	150.28	154.25	150.09	140.50	1905.45
3790G	NH-34	217.72	210.49	218.96	202.39	177.62	192.38	183.93	181.61	179.89	187.60	183.49	171.58	2307.66
3830N	NH-35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3790H	NH-36	0.00	0.00	0.00	232.88	213.48	231.82	223.21	206.11	220.32	225.74	220.43	208.93	1982.92
3790J	NH-37	367.45	364.12	382.53	378.08	341.35	372.39	360.63	365.68	353.26	363.34	336.27	274.38	4259.48

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft) OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						San Fernando Basin								
North Hollywood (NH)														
3810M	NH-38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810N	NH-39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.32	0.00	0.00	1.29	0.00	3.61
3810P	NH-40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	391.23	385.72	780.05
3810Q	NH-41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95	0.00	0.46	2.41
3810R	NH-42	265.68	255.83	0.00	0.00	0.00	0.00	0.00	0.00	3.05	0.00	0.00	0.00	524.56
3790K	NH-43A	417.34	401.33	429.36	427.02	381.80	389.44	285.98	288.09	276.24	282.62	271.05	268.05	4118.32
3790L	NH-44	371.58	352.44	364.72	351.63	315.68	346.74	339.49	343.25	333.59	344.03	339.74	324.98	4127.87
3790M	NH-45	443.16	422.16	441.05	433.01	389.33	423.33	410.91	414.49	399.61	412.12	407.28	389.51	4985.96
NH Total		4548.81	4090.34	3771.73	3923.96	3227.35	3443.09	3250.73	3343.95	3482.16	3793.60	4115.41	4070.06	45061.19
Crystal Springs (CS)														
3904J	CS-52(#1)	2.46	0.96	0.94	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.35
3904J	CS-52(#2)	2.25	1.40	1.40	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.14
CS Total		4.71	2.36	2.34	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.49
Pollock (P)														
3959E	P-4	100.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	225.76	225.37	551.64
3958H	P-6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3958J	P-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P Total		100.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	225.76	225.37	551.64

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft)												
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							San Fernando Basin							
Rinaldi-Toluca (RT)														
4909E	RT-1	553.61	280.24	0.00	333.13	499.64	550.26	525.44	531.66	514.08	361.04	485.88	467.45	5102.43
4898A	RT-2	533.96	517.15	534.58	527.44	472.98	519.59	492.31	513.94	350.53	398.51	527.48	507.97	5896.44
4898B	RT-3	0.00	0.00	0.00	0.00	0.00	0.00	252.16	543.25	431.38	480.10	533.27	510.54	2750.70
4898C	RT-4	0.00	0.00	0.00	0.00	0.00	0.00	262.58	565.16	215.45	492.66	557.40	533.36	2626.61
4898D	RT-5	0.00	0.00	0.00	0.00	0.00	0.00	269.10	577.41	443.48	164.03	17.65	551.52	2023.19
4898E	RT-6	0.00	0.00	0.00	0.00	0.00	0.00	240.41	528.49	500.21	205.44	512.58	390.54	2377.67
4898F	RT-7	0.00	0.00	0.00	0.00	0.00	0.00	254.09	545.07	422.82	456.89	534.81	512.45	2726.13
4898G	RT-8	0.00	0.00	0.00	0.00	0.00	0.00	260.36	560.31	426.04	48.83	0.28	537.01	1832.83
4898H	RT-9	0.00	0.00	0.00	0.00	0.00	0.00	237.88	425.94	410.93	427.07	422.34	310.84	2235.00
4909G	RT-10	515.91	484.03	495.94	489.70	440.80	522.66	506.39	519.59	148.33	457.99	519.15	492.36	5592.85
4909K	RT-11	524.71	506.02	524.04	512.12	459.23	505.35	481.11	495.73	136.23	429.25	490.80	472.46	5537.05
4909H	RT-12	554.14	530.58	547.82	543.87	490.55	545.37	520.57	530.72	343.67	316.14	537.70	515.06	5976.19
4909J	RT-13	550.92	529.50	546.40	533.34	475.88	524.04	501.27	513.78	383.24	311.57	512.17	485.20	5867.31
4909L	RT-14	0.00	0.00	0.00	458.70	481.39	529.32	508.98	516.67	497.91	494.38	509.62	478.47	4475.44
4909M	RT-15	0.00	0.00	0.00	473.19	496.47	544.75	522.68	532.88	516.33	532.14	500.32	507.65	4626.41
RT Total		3233.25	2847.52	2648.78	3871.49	3816.94	4241.34	5835.33	7900.60	5740.63	5576.04	6661.45	7272.88	59646.25

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft)												
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							San Fernando Basin							
4992A	Tujunga Gallery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Verdugo (V)														
3863H	V-1	47.22	45.43	47.15	47.50	42.98	48.37	45.59	45.04	44.01	46.19	44.65	43.32	547.45
3853	V-2	0.00	0.00	170.52	228.88	194.74	204.96	178.90	168.21	144.95	124.59	147.31	116.94	1680.00
3863J	V-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.78	0.00	5.79	156.79	152.07	417.43
3863L	V-11	217.68	210.29	215.75	214.40	194.47	216.90	204.13	208.11	202.64	210.75	129.43	29.89	2254.44
3853G	V-13	28.99	27.71	28.28	27.50	23.37	26.56	27.11	25.16	24.17	23.16	21.60	22.68	306.29
3854F	V-22	41.87	41.28	41.05	40.34	34.55	40.63	49.59	2.89	0.00	0.00	0.00	0.00	292.20
3844R	V-24	204.59	198.65	202.64	201.52	181.25	201.65	189.19	197.25	187.56	192.01	185.92	179.85	2322.08
V Total		540.35	523.36	705.39	760.14	671.36	739.07	694.51	749.44	603.33	602.49	685.70	544.75	7819.89
Whitnall (W)														
3820E	W-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821B	W-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821C	W-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821D	W-4	163.96	157.35	163.50	163.45	145.34	171.99	160.22	2.20	0.00	1.42	234.23	229.78	1593.44
3821E	W-5	288.82	280.42	290.52	291.49	255.74	282.19	143.69	281.38	96.14	0.00	0.00	179.75	2390.14
3831J	W-6A	147.50	143.80	147.50	147.27	130.88	142.26	120.62	121.60	42.31	0.00	0.00	0.00	1143.74

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft) OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						San Fernando Basin								
Whitnall (W)														
3832K	W-7	161.71	155.33	158.75	156.87	138.59	152.25	139.85	141.87	48.71	0.00	0.00	0.00	1253.93
3832L	W-8	183.06	173.92	171.47	163.73	143.76	150.00	129.62	127.37	114.05	109.83	99.26	87.76	1653.83
3832M	W-9	152.92	140.31	130.88	117.65	7.02	0.00	0.00	0.00	0.00	0.00	0.00	0.11	548.89
3842E	W-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W Total		1097.97	1051.13	1062.62	1040.46	821.33	898.69	694.00	674.42	301.21	111.25	333.49	497.40	8583.97
Aeration (A)														
3800E	A-1	--	--	--	--	--	0.01E	0.01E	0.01E	0.01E	0.00	0.00	0.00	0.04
3810U	A-2	--	--	--	--	--	0.01E	0.01E	0.01E	0.02E	0.00	0.00	0.00	0.05
3810V	A-3	--	--	--	--	--	0.01E	0.01E	0.02E	0.01E	0.00	0.00	0.00	0.05
3810W	A-4	--	--	--	--	--	0.00	0.01E	0.01E	0.01E	0.00	0.00	0.00	0.03
3820H	A-5	--	--	--	--	--	0.01E	0.01E	0.01E	0.01E	0.00	0.00	0.00	0.04
3821J	A-6	--	--	--	--	--	0.01E	0.02E	0.01E	0.01E	0.01E	0.00	0.00	0.06
3830P	A-7	--	--	--	--	--	0.01E	0.01E	0.01E	0.02E	0.00	0.00	0.00	0.05
3831K	A-8	--	--	--	--	--	0.01E	0.01E	0.01E	0.01E	0.01E	0.00	0.00	0.06
A TOTAL		--	--	--	--	--	0.07E	0.09E	0.10E	0.10E	0.02E	0.00	0.00	0.38
City of Los Angeles Total		10242.11	9052.37	8540.70	9818.99	8913.23	9778.19	10836.81	13058.76	10518.42	10444.88	12350.78	13085.76	126641.00

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft) OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						San Fernando Basin								
Mena, John & Barbara														
4973J		0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.96
Sears Roebuck & Co.														
3945	3945	11.03	0.31	14.98	2.38	0.16	1.41	1.40	1.41	1.00	1.62	1.92	1.44	39.06
Sportman's Lodge, Inc.														
3785A	1	0.08	0.07	0.06	0.07	0.08	0.10	0.10	0.10	0.10	0.09	0.10	0.09	1.04
Toluca Lake Property Owners Assn.														
3845F	3845F	0.44	0.03	0.00	0.00	0.00	0.00	0.00	0.00	15.35	8.15	6.22	7.24	37.43
Valhalla Memorial Park														
3804K	4	27.37	15.17	2.92	3.77	0.63	4.82	30.78	31.45	40.12	47.84	55.47	30.05	290.39
Valley Reclamation Co.														
4916D		2.24	1.90	0.96	1.01	0.95	1.75	3.00	4.38	3.36	0.00	3.94	5.96	29.45
Walt Disney Production														
3847E	EAST	0.00	0.00	49.78	65.44	26.78	71.82	71.82	71.83	24.60	68.66	72.78	67.06	590.57
3847F	WEST	110.85	146.47	72.26	80.03	32.77	70.63	70.63	70.64	120.35	92.85	138.70	100.06	1106.24
Party Total		110.85	146.47	122.04	145.47	59.55	142.45	142.45	142.47	144.95	161.51	211.48	167.12	1696.81
Basin Total		10558.41	9566.40	9213.51	10615.01	9320.49	10193.19	11165.03	13385.67	11052.31	11061.00	12957.42	13493.66	132582.10

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft) OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						Sylmar Basin								
City of Los Angeles														
Plant	Mission	394.42	377.50	272.68	49.47	0.00	0.00	124.13	449.75	412.63	411.00	395.57	372.18	3259.33
Meurer Engineering Co.														
5998	3	0.05E	0.05E	0.05E	0.05E	0.05E	0.05E	0.05E	0.05E	0.05E	0.05E	0.05E	0.05E	0.60
City of San Fernando														
5969D	2A	121.91	22.09	21.01	12.14	0.41	34.42	21.76	129.37	179.58	207.88	187.68	167.34	1105.59
5959	3	78.26	7.05	13.50	6.22	0.00	14.79	13.57	118.34	131.97	133.46	115.01	108.95	741.12
5969	4	17.19	2.76	4.35	0.74	0.46	2.83	9.91	23.47	37.75	33.72	31.88	27.37	192.43
5968	7A	3.96	0.00	0.01	0.81	0.00	5.23	1.45	21.42	0.11	23.77	57.39	45.89	160.04
Party Total		221.32	31.90	38.87	19.91	0.87	57.27	46.69	292.60	349.41	398.83	391.96	349.55	2199.18
Basin Total		615.79	409.45	311.60	69.43	0.92	57.32	170.87	742.40	762.09	809.88	787.58	721.78	5459.11

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft)												
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						Verdugo Basin								
Crescenta Valley County														
5058B	1	21.88	15.60	2.32	2.94	3.14	3.53	4.08	3.17	19.87	43.83	35.75	30.68	186.79
5058H	5	4.76	9.20	4.60	1.21	2.75	5.10	1.49	6.61	3.98	5.23	14.13	22.65	81.71
5058	6	8.43	3.35	4.50	0.59	0.00	2.08	19.18	12.28	11.04	16.64	8.11	22.89	109.09
5047B	7	0.00	0.00	0.00	1.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.72
5069J	8	61.61	58.84	35.19	0.00	0.00	0.00	0.00	38.55	66.76	67.41	51.67	0.00	380.03
5047D	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5058D	10	63.26	23.73	63.74	92.92	81.58	90.97	84.46	74.99	72.33	87.05	86.87	82.80	904.70
5058J	12	0.00	1.43	3.04	15.17	12.74	22.42	34.41	16.83	0.02	0.00	13.14	42.97	162.17
5069F	14	36.55	36.12	31.75	25.39	21.83	29.57	41.60	36.33	34.96	35.31	38.39	49.06	416.86
	PICK	4.37	4.19	4.41	1.72	0.00	3.22	4.14	4.22	4.03	3.89	3.99	3.99	42.17
Party Total		200.86	152.46	149.55	141.66	122.04	156.89	189.36	192.98	212.99	259.36	252.05	255.04	2285.24
City of Glendale														
3961-3971	GL3-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3970	GL-6	117.85	107.72	104.65	99.13	86.55	92.68	87.77	56.16	0.00	0.00	40.20	98.51	891.22
-	MM-1	95.97	88.36	86.52	88.45	73.13	77.12	69.18	109.16	144.73	142.71	100.69	96.52	1172.54
Party Total		213.82	196.08	191.17	187.58	159.68	169.80	156.95	165.32	144.73	142.71	140.89	195.03	2063.76
Basin Total		414.68	348.54	340.72	329.24	281.72	326.69	346.31	358.30	357.72	402.07	392.94	450.07	4349.00

1988-1989 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Well No.	Owners Designation	Extractions (Ac-Ft)												
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							Eagle Rock Basin							
Sparkletts Drinking Water														
3987A	1	4.89	4.70	4.82	4.74	3.95	4.96	4.85	4.88	5.35	4.95	5.47	5.64	59.20
3987B	2	3.73	3.76	4.05	4.26	4.06	4.98	2.79	4.65	4.56	4.54	4.56	2.91	48.85
3987F	3	5.93	4.37	4.73	4.73	4.48	5.42	5.17	5.00	5.20	5.19	5.43	5.37	61.02
Party Total		14.55	12.83	13.60	13.73	12.49	15.36	12.81	14.53	15.11	14.68	15.46	13.92	164.09
Basin Total		14.55	12.83	13.60	13.73	12.49	15.36	12.81	14.53	15.11	14.68	15.46	13.92	164.09
ULARA Total		11603.43	10337.22	9879.43	11027.41	9615.62	10592.49	11694.93	14500.80	12187.13	12287.61	14153.40	14679.43	142559.28

APPENDIX B

KEY GAGING STATIONS SURFACE RUNOFF

GAGING STATION SUMMARY

LOS ANGELES COUNTY
Department of Public Works
Hydraulic/Water Conservation Division

Station Location and Description L.A. RIVER ABOVE ARROYO SECO

for Water-Year 19 69 19 69

Station No. F57C-R (ALERT)

Drainage Area ..... Square Miles (..... Observer)

Gage Road .....

Rating Table No. .....

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			916.0			618.1			262.0			1402.4			86.4			87.9	1
2			916.0			735.2			141.8			870.9			68.1			1102.7	2
3			875.0			712.9			362.9			1093.1			160.1			85.9	3
4			916.0			454.7			207.8			1054.6			1035.7			85.9	4
5			916.0			561.3			318.9			1740.9			ND			85.9	5
6			803.9			739.0			430.0			1644.5			78.9			86.4	6
7			765.6			846.9			331.3			959.9			85.1			86.9	7
8			834.0			454.2			518.0			988.9			1118.3			86.9	8
9			798.5			735.9			486.0			832.7			2555.8			85.9	9
10			811.2			969.3			720.9			784.6			81.5			86.4	10
11			811.2			754.2			534.0			818.2			78.9			86.8	11
12			790.9			667.8			416.6			718.8			78.9			86.8	12
13			768.1			760.5			534.0			855.9			85.1			85.9	13
14			742.8			1676.3			508.7			670.9			78.9			86.8	14
15			808.7			427.8			4695.4			575.0			78.9			111.4	15
16			808.7			421.2			4521.2			542.2			78.9			112.0	16
17			758.0			527.5			1398.1			529.5			79.9			114.3	17
18			707.3			255.9			1046.9			907.8			85.9			187.1	18
19			720.0			298.8			1072.0			850.4			ND			118.1	19
20			720.0			316.0			1312.4			741.4			ND			114.3	20
21			697.2			350.5			6016.5			916.0			80.7			117.1	21
22			690.6			293.0			1521.7			ND			80.7			116.2	22
23			693.9			722.0			1424.3			1198.6			85.1			114.3	23
24			679.7			854.0			3575.9			1129.6			80.7			113.3	24
25			708.6			919.2			2123.3			951.5			80.7			1136.4	25
26			708.6			232.6			1114.9			860.-			22.4			171.9	26
27			596.8			256.1			287.3			NP			22.4			102.6	27
28			680.5			251.4			241.2			91.2			75.9			109.5	28
29			693.9			251.2			227.3			DE.6						110.5	29
30			658.3			288.6			254.5			88.1						111.4	30
31			589.7						1134.5			87.2						114.3	31

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			109.5			122.8			100.0			111.4			169.0			149.1	1
2			119.0			117.1			ND			111.4			178.3			135.5	2
3			111.4			115.2			107.6			107.6			169.0			135.7	3
4			110.5			ND			122.8			111.4			172.1			138.3	4
5			113.3			124.7			107.6			107.6			172.1			139.3	5
6			115.2			126.6			122.8			ND			153.5			141.2	6
7			110.5			ND			115.2			115.2			162.8			140.3	7
8			119.0			ND			115.2			ND			156.6			137.1	8
9			119.0			115.2			122.8			ND			162.8			135.8	9
10			119.0			115.2			111.4			ND			147.3			132.6	10
11			115.2			119.0			103.8			111.4			153.5			132.7	11
12			120.0			119.0			103.8			120.9			ND			139.1	12
13			117.1			115.2			103.8			122.8			ND			130.4	13
14			113.9			115.2			119.0			111.4			ND			144.7	14
15			119.0			152.5			107.6			124.7			150.4			137.1	15
16			119.0			126.5			113.3			ND			156.6			132.1	16
17			120.0			85.6			113.3			126.6			156.6			ND	17
18			119.0			109.5			109.5			134.2			144.2			ND	18
19			117.1			107.6			113.3			ND			141.1			1122.9	19
20			111.4			107.6			110.1			138.0			134.2			113.3	20
21			115.2			109.5			98.2			150.4			136.1			ND	21
22			120.0			108.9			107.6			150.4			144.2			ND	22
23			119.0			108.9			111.4			150.4			138.0			126.6	23
24			120.9			115.2			107.6			156.6			136.1			122.5	24
25			142.1			101.9			100.0			150.4			141.1			126.6	25
26			124.7			104.7			ND			153.5			138.0			122.8	26
27			109.5			115.2			ND			156.6			134.2			122.8	27
28			117.1			ND			106.7			159.7			141.1			129.8	28
29			111.4			ND			ND			165.9			138.0			130.4	29
30			117			98.2			103.9			165.9			156.4			132.3	30
31						111.4						175.0			147.6				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																			1
2																			2
3																			3
4																			4
5																			5

* ND = NO DATA available

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

GAGING STATION SUMMARY

LOS ANGELES COUNTY
Department of Public Works
Hydraulic/Water Conservation Division

Station Location and Description PACOIMA CREEK FLUME BELOW PACOIMA DAM for Water-Year 19 88 19 87

Station No. F11BB-R

Drainage Area ..... Square Miles (..... Observer)

Gage Read CONTINUOUS

Rating Table No. 44-1

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	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.0		0.0	0.00		0.0	0.00		0.0	1
2	"	"	"	"	"	"	"	"	"	0.0		0.0	"	"	"	"	"	"	2
3										0.0		0.0							3
4										0.53		19.3							4
5										0.51	-.02	3.16							5
6										0.32	-.01	12.0							6
7										0.00	0	0.00							7
8																			8
9				0.00	0	0.00													9
10																			10
11																			11
12													0.00	0.0					12
13													0.27	17.9					13
14													0.52	35.3					14
15							0.00	0	0.00				0.52	35.3					15
16							0.05	7	3.4				0.52	34.9					16
17							0.00	0	0.00				0.53	35.7					17
18							"	"	"				0.52	35.4					18
19							"	"	"				0.52	35.2					19
20							0.00	0	0.00				0.52	35.2					20
21							0.44	-.53	13.4				0.53	36.0	0.00	0.0			21
22							0.01	0	.64				0.53	36.0	0.26	18.1			22
23							0.0	0	.16				0.52	35.1	0.41	28.8			23
24							0.0	0	0.0				0.51	34.4					24
25													0.49	22.6					25
26													0.49	32.4					26
27													0.48	32.3					27
28													0.48	32.0					28
29															0.41	28.8			29
30				0.00	0	0.00									0.23	16.4			30
31	0.00	0	0.00				0.0		0.0						0.00	0.0			31
1	0.00			0.00			18.22			76.9			535.7			236.1			1
2	0.00			0.00			.59			2.48			19.1			7.6			2
3	0			0			36.3			152.3			1063			580			3
4	0			0			13.4			35.6			36.0			28.8			4
5	0			0			0			0			0			0			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	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	1
2	0.0		"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	2
3																			3
4																			4
5	0.0		0.0																5
6																			6
7																			7
8																			8
9	0.0		0.0																9
10	0.27		28.8																10
11	0.49		28.0																11
12	0.49		28.0																12
13	0.24		16.7																13
14	0.0		0.0																14
15																			15
16																			16
17																			17
18																			18
19																			19
20																			20
21																			21
22																			22
23																			23
24																			24
25																			25
26																			26
27	H		1.98																27
28																			28
29																			29
30	0.0		0.0													0.0		0.0	30
31				0.0		0.0				0.0		0.0	0.0		0.0				31
1	91.4			0.0			0.0			0.0			0.0			0.0			1
2	3.04			0.0			0.0			0.0			0.0			0.0			2
3	181			0.0			0.0			0.0			0.0			0.0			3
4	28.8			0.0			0.0			0.0			0.0			0.0			4
5	0			0.0			0.0			0.0			0.0			0.0			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	958.4
2	2.62
3	2012.6
4	36.0
5	0.0

Maximum stage 2.70 feet at 0836 on 12/21 Discharge 309 Second-feet.

Minimum stage 0.0 feet at VARIOUS TIMES Discharge 0 Second-feet.

GAGING STATION SUMMARY

LOS ANGELES COUNTY
Department of Public Works
Hydraulic/Water Conservation Division

Station Location and Description BIG TUJUNGA CK. BELOW BIG TUJUNGA DAM for Water-Year 1988 1989

Station No. F-168-B

Drainage Area 82.3 Square Miles (ROD Observer)

Gage Read

Rating Table No. 78-01

DAY	OCTOBER			NOVEMBER			DECEMBER			JANUARY Ey			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	2.52		8.50	2.17		1.28	2.19		1.59	2.26		2.61	2.25		2.52	4.17	-.34	114	1	3.05	-.28	16.9	2.46	-.07	6.44	2.22		2.12	1.65		0.0	2.35		2.45	1.90		0	1
2	2.53		8.50	(		1.23	(		(	2.25		2.52	2.25		2.52	4.14	-.21	114	2	3.04	-.27	16.9	2.81	-.16	12.6	2.22		2.00	1.59		(	2.22		2.06	1.90			2
3	2.52		8.50			1.23				2.26		2.54	2.25		2.58	4.11	-.17	115	3	3.03	-.26	16.9	2.79	-.37	6.16	2.21		1.93	1.53			2.21		1.87	1.90			3
4	2.52		8.50			1.17				2.25		2.52	2.38		4.99	3.44	-.16	55	4	3.03	-.25	17.0	2.80	-.15	12.5				1.50			2.20		1.84	1.90			4
5	2.52		8.50	2.17		1.19				2.26		2.61	2.30		3.49	3.10	-.07	29.7	5	3.02	-.23	17.6	2.60	-.09	8.24				1.43			2.18		1.15	1.90			5
6	2.52		8.50	2.16		1.15	)		)	2.28		3.16	2.28		2.98	3.13	-.11	31.1	6	3.01	-.22	17.7	2.36	-.03	3.85				1.40			2.11		0.54	1.90			6
7	2.47		7.18	H		2.64	2.19		1.59	2.27		2.87	2.26		2.75	3.12	-.16	25.6	7	2.57	-.26	7.01	2.21		1.86				1.33			2.13		0.81	1.90			7
8	2.28		3.16	2.28		3.08	2.20		1.71	2.26		2.69	2.28		3.01	3.12	-.16	25.5	8	2.24		2.49	2.25	-.01	2.40			1.93	1.34			2.14		0.91	1.90			8
9	2.36		2.61	2.29		3.19	2.19		1.64	2.25		2.53	2.35		4.33	3.12	-.16	25.5	9	2.26		2.59	2.25	-.01	2.36	2.21		1.92	1.27			2.17		1.17	1.90			9
10	2.24		2.28	2.25		2.60	2.20		1.80	2.25		2.52	2.31		3.59	3.11	-.15	25.3	10	2.24		2.33	2.23		2.17	2.20		1.80	1.26			2.16		1.07	1.90			10
11	2.32		2.07	2.23		2.76	2.21		1.99	2.25		2.52	2.29		3.24	3.11	-.15	25.5	11	2.23		2.20	2.21		1.93	2.17		1.43	1.23			2.15		0.97	1.90			11
12	2.21		1.93	2.22		2.12	2.22		2.12	2.25		2.52	2.28		3.07	3.11	-.15	25.5	12	2.23		2.20	2.21		1.93	2.16		1.09	1.18			2.14		0.85	1.90			12
13	2.21		1.86	2.22		2.08	2.21		1.93	2.24		2.43	2.27		2.90	3.10	-.15	25.1	13	2.23		2.12	2.22		2.01	2.14		0.84	1.13			2.13		0.71	1.90			13
14	2.20		1.80	2.26		2.78	2.21		1.96	2.24		2.43	2.27		2.86	3.67	-.26	60.9	14	2.22		2.06	2.22		2.05	2.14		0.83	1.15			2.07		0.39	1.90			14
15	2.19		1.69	2.24		2.40	2.26		2.75	2.25		2.52	2.26		2.69	4.03	-.31	86.2	15	2.22		(	2.21		1.93	2.12		0.68	1.13			2.03		0.18	1.90			15
16	2.19		1.50	2.23		2.20	2.42		6.00	2.25		2.52	2.26		2.69	H	-.24	53.4	16	(		(	2.21		1.93	2.09		0.48	1.10			2.02		0.14	1.90			16
17	2.18		1.33	2.22		2.12	2.30		3.44	(		(	(		(	3.06	-.26	17.9	17	(		(	(		(	2.06		0.28	1.01			1.94		0.01	1.90			17
18	H		2.95	2.22		2.06	2.29		3.17							3.05	-.25	17.8	18							2.07		0.31	1.06			1.92		0.0	1.90			18
19	2.25		2.50	2.21		1.97	2.27		2.96							3.04	-.24	17.8	19	2.22		2.06	)		1.93	2.07		0.29	1.04			1.85			1.90			19
20	2.23		2.15	2.21		1.93	2.26		2.76							3.01	-.22	17.6	20	H		10.9	2.21		1.87	2.03		0.18	1.01			1.84			1.90			20
21	2.22		2.04	2.20		1.86	2.35		4.29							3.00	-.24	17.6	21	2.22	-.02	16.0	2.20		1.85	1.97		0.07	1.00		0.0	1.77			1.90			21
22	2.21		1.88	2.20		1.80	2.29		3.20							3.01	-.22	17.6	22	2.23		2.27	2.52	+.12	13.2	1.93		0.0	2.09	-.09	2.80	1.75			1.90			22
23	2.20		1.80	2.20		1.84	2.27		2.95							3.00	-.21	17.6	23	2.26		2.26	2.62	+.16	16.9	1.91		(	2.51	-.13	4.80	1.67			1.90			23
24	2.20		1.71	2.21		1.87	2.28		3.07							3.00	-.21	17.6	24	2.25		2.53	2.64	+.18	17.3	1.93			2.52	-.12	5.14	1.63			1.90			24
25	2.19		1.59	2.21		1.88	2.29		3.31							3.02	-.22	17.9	25	2.24		2.42	2.65	+.13	17.1	1.95			2.56	-.11	5.43	1.63			1.90			25
26	2.18		1.59	2.20		1.80	2.27		2.92							3.00	-.21	17.6	26	2.24		2.36	2.66	+.10	16.1	1.84		(	(	-.09	5 83	1.56			1.90			26
27	2.19		1.59	(		1.80	2.26		2.72				2.26		2.69	3.00	-.21	17.6	27	2.23		2.27	2.50		8.0	1.77		(	(	-.07	6.46	1.54			1.90			27
28	2.19		1.59	(		1.80	2.26		2.69				H		65.2	3.03	-.23	17.7	28	2.23		2.20	2.30		3.50	1.76		(	(	-.06	6.75	1.47			1.90			28
29	2.18		1.47	(		1.80	2.25		2.57							3.07	-.27	18.0	29	2.54		12.1	2.23		2.20	1.77		(	2.52	-.04	7.25	1.44			1.90			29
30	2.19		1.40	2.20		1.70	2.25		2.57							3.06	-.27	17.7	30	2.63	+.15	17.1	2.23		2.20	1.65		0.0	2.51	-.07	7.82	1.37			1.90			30
31	2.18		1.32				2.26		2.61	2.25		2.52				3.06	-.27	17.6	31				2.23		2.20				2.36	0.0	4.99	1.34		0.0				31
1			103.9			58.83			78.26			74.35			145.0			1102.9	1			209.2			178.6			25.89			57.17			17.12			0	1	2056.2
2			3.4			1.96			2.52			2.56			5.18			35.6	2			7.0			5.76			.86			1.84			.55			0	2	6.11
3			206.0			116.7			155			157			207.6			2187	3			414.9			354			51			113			34			0	3	4079.1
4			8.5			3.19			6.00			3.16			65.2			115	4			17.7			17.3			2.12			7.82			2.45			0	4	115.0
5			1.3			1.15			1.59			2.52			2.52			17.6	5			2.06			1.85			0.0			0.0			0.0			0	5	0

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

99

GAGING STATION SUMMARY

LOS ANGELES COUNTY
Department of Public Works
Hydraulic/Water Conservation Division

Station Location and Description: Verdugo Wash @ Estelle Ave.
Station No.: F252-R
for Water-Year 19 88 19 89
Drainage Area: 26.8 Square Miles
Observer: R. Velez
Gage Read: Every 15 min
Rating Table No.: 47-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	0.22	0	5.0	0.19	-.01	2.30	0.18	-.01	2.0	0.21	-.01	3.1	0.22	-.01	4.0	0.22	-.05	2.6	1	0.20	-.01	2.7	0.25	-.03	5.0	0.22	-.04	2.3	0.23	-.13	0.3	0.21	-.07	1.3	0.21	-.04	2.1	1
2										0.18		2.0	0.31		19.6	0.46		2.5	2	0.22	-.02	2.6	0.26	-.03	5.9		-.04	2.2		-.12	0.5		-.05	1.7	0.22		2.3	2
3									2.1	0.21		4.3			23.0	0.22	-.04		3					-.04	5.0		-.05	1.9		-.11	0.9	0.22	-.06	1.7			2.3	3
4							0.19		2.3			3.6	0.73	-.02	259.0	0.21	-.03		4				0.27		5.9	0.25	-.07	2.7		-.10	1.0		-.05	1.9			2.4	4
5	0.21		4.0	0.20		2.50				0.31		43.4	0.37		8.3				5	0.21	-.01				6.2	0.23		1.7		-.09	1.2	0.21		1.7			2.3	5
6			3.9			2.50				0.29		28.2	0.21	-.04	2.1		-.02		6	0.20		2.5			5.9			1.7		-.08	1.5		-.04	1.9			2.2	6
7	0.23		6.2							0.18		2.0	0.20	-.05	1.7				7				0.26	-.05	3.9			1.7			1.5			1.9	0.23		2.4	7
8	0.22		4.7	0.21	0	3.70		0	2.6	0.17		1.8	0.43	-.02	87.6				8						3.9		-.08	1.5			1.5	0.23		2.7	0.23		2.5	8
9	0.21		3.9	0.23		5.10						1.7	0.74	-.03	201.0	0.20	-.01		9						4.1	0.25	-.10	1.6		-.07	1.7	0.24		3.6	0.21		2.0	9
10	0.20		3.1	0.24		7.20	0.20		2.8				0.26		5.8	0.21	-.02		10	0.18		2.3			6.0			1.5	0.23		1.9	0.21		2.0			1.9	10
11	0.18	-.01	1.9	0.22		6.0			2.0				0.22		2.6				11	0.18		2.0	0.21	-.04	2.0			1.5	0.24		2.1	0.22		2.3			2.0	11
12	0.19		2.2			5.9			2.8				0.22		2.3				12	0.20		2.7			1.9			1.5			2.0			2.3			2.0	12
13			2.3	0.27		28.3							0.23	-.04	3.7	0.22		2.9	13	0.18		2.2			2.0	0.27	-.11	1.7			2.0			2.2	0.22		2.2	13
14			2.3	0.51	-.01	201.0							0.22		2.3	0.18	-.01	1.9	14	0.19		1.9	0.23	-.05	2.3	0.26		1.5			2.1			2.3	0.21		2.0	14
15			1	0.22		2.9	0.58		258.0				0.20	-.05	1.6	0.22	-.02	2.1	15				0.28	-.05	8.5	0.25		1.3	0.25		2.3	0.21		2.1			2.0	15
16			1	0.21		2.3	0.71		301.0	0.17		1.7			1.5	0.19	0	2.6	16	0.17		1.8	0.21	-.04	1.8			1.3	0.25		2.3	0.24		1.7			2.0	16
17	0.20		2.5				0.28		14.5	0.18		2.2				0.18		2.4	17	0.20		2.4	0.19		1.5			1.2	0.24		2.1	0.22		2.2	0.27		5.9	17
18						2.7	0.31		21.3	0.21		2.8				0.19			18	0.22	-.02	2.8						1.3	0.22		1.5	0.21		2.1	0.23		2.5	18
19				0.20	0	2.2	0.20		3.1	0.22		3.7				0.19			19	0.21	-.01	2.9						1.2			1.5	0.22		2.3	0.52		133	19
20	0.21		3.9			2.8	0.24		10.2	0.21		2.9	0.20			0.18		2.3	20			2.8			1.6			1.2			1.5			2.3	0.25		4.2	20
21	0.20		2.8				0.57		222.0	0.22		3.4	0.20		1.6			2.3	21	0.22	-.02		0.24		1.8	0.25		1.2	0.23		1.7			2.2	0.20		1.8	21
22	0.18		2.0			2.1	0.25		11.0			3.9	0.21		1.7	0.19		2.5	22	0.22		2.9	0.21		2.0	0.24		1.0	0.24		2.1			2.3	0.19		1.5	22
23				0.34		68.1	0.27		12.6	0.24		7.4			2.0	0.20		2.8	23						2.1			1.1	0.23		1.7			2.2	0.16		1.2	23
24				0.21		4.1	0.43		115.0	0.21		2.8		-.04	2.0			2.8	24			4.2	0.22		2.3	0.25		1.2	0.24		1.9	0.20		1.7				24
25			2.1	0.25		14.4	0.32		29.2	0.20		2.9	0.22		2.2	0.42	-.01	78.5	25	0.21	-.03	5.9	0.23	-.05		0.24		1.0	0.22		1.7							25
26	0.19		2.3	0.18	-.01	1.9	0.22		4.5			2.5	0.20	-.02	2.3	0.25		8.5	26									1.0						1			1.2	26
27						1.9	0.21		3.9	0.22		3.7	0.21	-.03	2.3	0.20	0	3.1	27									0.9				0.19		1.5			1.3	27
28						2.0			4.2			4.2	0.22	-.05	2.0	0.21		3.6	28									0.9				0.20		1.7	0.20	-.04	1.7	28
29							0.30		2.8			4.2						3.7	29	0.25		5.0				0.24		0.9	0.25		2.2			1.8	0.22	-.05	2.2	29
30				0.18	-.01	2.0				0.21		2.9				0.20	-.01	2.7	30	0.25	-.03	5.0	0.23			0.25	-.11	1.2	0.24		2.0			1.7	0.23	-.05	2.2	30
31	0.19	-.01	2.3				0.21	0	3.7	0.22	-.01	3.7				0.20	-.01	2.6	31				0.22	-.04	2.3				0.22	-.07	1.4	0.20	-.04	1.7				31
1	95.3			396.2			1054.7			1588			749.7			258.1			1	50.2			100.8			42.9			51.4			62.5			195.6			1	32523
2	3.1			13.2			34			5.0			26.7			8.3			2	3.0			3.2			1.4			1.7			2.0			6.5			2	0.3
3	189			786			2092			307			1,484			512			3	179			200.0			85.1			102			124			388			3	6450.8
4	6.2			201			301			~~89~~ 243.4			301			78.5			4	5.0			8.5			2.7			2.3			3.6			133			4	301
5	1.9			1.9			2.0			1.7			1.5			1.9			5	1.8			1.5			0.9			0.3			1.3			1.2			5	0.3

Maximum stage 1.66 feet at 0500 on 12-16-88 Discharge 1,700 Second-feet.
Minimum stage 0.23 feet at 0515 on 07-01-89 Discharge 0.1 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

GAGING STATION SUMMARY

LOS ANGELES COUNTY
Department of Public Works
Hydraulic/Water Conservation Division

Station Location and Description: BURBANK WESTERN STORM DRAIN @ RIVERSIDE DR.
for Water-Year 19 88 19 89
Station No.: E285-R
Drainage Area ..... Square Miles (A. HAMMER ..... Observer)
Gage Read: 15 MIN PUNCH TAPE
Rating Table No.: 59-1

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	0.11	+.01	10.2	0.15		14.3	0.14		12.5	0.14		12.3	0.12		10.0	0.14		12.8	1
2	0.11	+.01	10.2	0.15		14.8	(		12.7	0.13		11.3	0.12		10.1	0.37		53.2	2
3	0.10	+.02	10.2	0.15		13.6	(		13.0	0.15		13.8	0.12		10.6	0.29		38.9	3
4	0.10	+.02	10.2	0.14		12.6	(		12.4	0.13		11.1	0.28		57.0	0.17		17.1	4
5	0.09	+.03	10.2	0.14		12.9	(		12.4	0.18		22.6	0.22		26.4	0.14		13.2	5
6	0.08	+.04	10.9	0.14		13.1	(		12.5	0.19		22.9	0.14		13.3	0.13		11.7	6
7	0.07	+.06	11.5	0.14		12.5	(		13.1	0.14		12.1	0.13		11.6	(		11.5	7
8	0.07	+.06	11.5	0.14		12.2	(		12.4	0.13		12.1	0.27		41.1	(		(	8
9	0.07	+.07	11.5	0.15		13.7	(		12.3	0.13		12.1	0.38		194	(		(	9
10	0.06	+.07	11.5	0.16		15.8	0.14		12.2	0.14		13.2	0.21		34.9	(		11.5	10
11	0.05	+.08	11.5	0.15		13.9	0.13		11.4	0.12		10.6	0.16		15.6	0.13		11.8	11
12	0.05	+.08	11.5	0.16		15.0	0.14		12.2	0.12		10.7	0.13		11.8	0.14		12.8	12
13	0.04	+.09	11.5	0.17		17.8	0.14		13.1	(		10.5	0.13		11.5	0.14		12.8	13
14	0.03	+.10	11.5	0.27		54.7	0.14		12.8	(		10.5	0.13		11.5	0.14		13.0	14
15	0.03	+.10	11.5	0.14		13.3	0.42		131	(		10.1	0.12		10.5	0.15		14.1	15
16	0.02	+.11	11.5	0.16		15.1	0.49		143	0.12		10.0	(		10.2	0.15		14.1	16
17	0.01	+.12	11.5	0.17		16.8	0.15		14.5	0.10		8.1	(		10.3	0.15		14.1	17
18	0.01	+.12	11.5	0.17		16.5	0.21		35.3	0.11		8.7	0.12		10.6	0.14		13.0	18
19	0.00	+.13	11.5	0.17		16.9	0.14		12.7	0.11		9.0	0.13		11.0	0.14		12.4	19
20	0.13		/	0.17		17.4	0.15		14.2	0.11		9.5	0.12		10.3	0.13		11.5	20
21	0.13		(	0.16		15.0	0.32		95.6	0.12		10.2	(		10.5	0.12		10.4	21
22	0.13		\	0.15		13.8	0.17		20.2	(		10.2	)		10.7	(		10.2	22
23	0.13		/	0.22		36.4	0.15		13.7	(		10.5	0.12		10.4	(		10.2	23
24	0.13		(	0.14		12.4	0.28		60.7	0.12		10.6	0.13		11.5	0.12		10.2	24
25	0.13		11.5	0.17		14.4	0.15		15.1	0.13		11.5	0.13		11.5	0.17		13.2	25
26	0.13		11.5	0.13		12.1	0.13		11.5	0.14		12.3	0.13		11.8	0.16		15.6	26
27	0.13		11.8	0.13		11.6	0.13		11.5	0.14		12.6	0.14		12.9	0.13		10.9	27
28	0.14		12.2	0.13		11.1	0.13		12.1	0.13		11.5	0.14		12.8	0.11		9.5	28
29	0.15		14.3	0.13		11.6	0.13		11.7	0.13		10.9						9.9	29
30	0.16		14.9	0.14		12.4	0.13		12.1	0.11		9.5						9.0	30
31	0.16		15.1				0.14		13.2	0.11		8.8				0.11		9.0	31
1	360.2			483.7			807.9			359.3			614.3			474.7			1
2	11.6			16.3			25.9			11.6			21.9			15.3			2
3	714			969			1590			712			1218			942			3
4	15.1			54.7			143			22.9			194			83.2			4
5	10.2			11.1			11.3			8.1			10.0			9.0			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	0.11		9.5	0.08		6.0	0.08	+.02	7.9	0.00	+0.09	6.7	0.14	-.04	8.2	0.15	-.03	11.0	1
2	0.11		9.1	(		6.0	(	+.02	7.9	(	(	(	(	-.05	7.1	0.16	(	11.9	2
3	0.11		8.9	(		5.9	(	+.03	9.0	(	(	(	(	(	7.2	0.16	(	11.0	3
4	0.11		8.9	(		6.0	(	(	9.0	(	(	(	(	(	7.3	0.15	(	10.3	4
5	0.10		8.3	(		6.0	0.09	(	9.0	(	(	(	0.14	(	7.0	0.15	(	10.1	5
6	0.12		10.2	0.08		6.1	0.07	(	8.1	(	(	(	0.15	(	7.4	0.15	(	9.9	6
7	0.12		10.4	0.09		6.7	(	+.03	7.9	(	(	(	(	(	8.0	0.14	-.03	9.5	7
8	(		10.7	(		6.7	(	+.04	9.0	(	(	(	(	(	8.2	0.15	-.04	8.7	8
9	(		10.4	(	+.01	7.9	(	(	9.0	0.00	+.09	6.7	(	-.05	8.2	0.15	(	8.8	9
10	0.12		10.3	(	(	7.9	(	(	9.0	0.01	+.02	6.4	(	-.04	8.7	0.15	(	8.7	10
11	0.13		11.5	(	(	7.9	(	(	9.0	0.16	-.09	5.3	(	(	9.4	0.14	(	8.5	11
12	0.13		11.5	(	(	7.9	0.07	+.09	9.0	0.15	-.07	6.0	0.15	(	9.0	0.14	(	7.9	12
13	0.13		11.5	(	(	7.3	0.06	+.09	9.4	0.15	-.07	(	0.14	(	7.9	0.13	(	7.1	13
14	0.13		11.1	(	(	7.9	(	(	9.0	0.14	-.06	(	0.14	(	7.6	0.13	(	6.9	14
15	0.12		10.5	(	(	7.9	(	(	9.0	0.13	-.05	(	0.15	(	8.6	0.13	(	6.9	15
16	(		10.2	(	(	7.9	0.06	(	9.0	0.12	-.04	(	0.14	(	8.3	0.15	(	8.9	16
17	(		10.2	(	(	7.9	0.05	+.09	8.3	0.13	-.05	(	(	(	7.4	0.14	(	7.9	17
18	(		10.2	(	(	7.9	(	+.06	9.0	0.12	-.04	(	(	(	7.9	0.14	(	7.9	18
19	(		10.2	(	(	7.9	(	(	9.0	0.12	-.04	(	0.14	(	7.9	0.19	(	25.2	19
20	0.12		7.3	0.09	(	8.0	(	(	9.0	0.11	-.03	(	0.12	(	6.5	0.14	(	7.6	20
21	0.11		8.5	0.10	(	9.1	0.05	(	9.0	0.11	-.03	(	0.14	(	8.3	0.13	(	7.3	21
22	0.11		8.7	(	(	9.0	0.04	+.06	8.3	0.11	-.03	(	(	(	8.4	0.13	-.04	7.0	22
23	0.10		8.1	(	+.01	9.0	0.04	+.07	9.0	0.10	-.02	(	(	(	8.4	0.14	-.05	6.6	23
24	0.10		7.9	(	+.01	10.4	0.04	(	8.6	0.10	-.02	(	(	-.04	7.6	0.12	(	5.7	24
25	0.09		8.3	0.10	(	10.5	0.03	(	7.9	0.10	-.02	(	(	-.03	9.4	0.11	(	4.4	25
26	0.09		6.7	0.09	(	9.6	0.02	(	7.2	0.09	-.01	(	(	(	8.7	0.11	(	4.5	26
27	0.08		6.2	(	(	9.0	0.02	(	6.7	(	(	(	0.14	(	8.8	0.10	(	4.2	27
28	0.08		6.0	(	(	9.0	0.02	+.07	7.3	(	(	(	0.15	(	10.3	0.11	(	4.6	28
29	0.09		6.0	(	(	9.0	0.01	+.09	6.7	(	(	(	0.15	(	10.1	0.11	(	4.6	29
30	0.09		6.0	(	(	9.0	0.01	+.09	6.4	0.09	-.01	6.0	0.15	(	10.3	0.12	-.05	5.6	30
31				0.09	+.02	8.5				0.13	-.04	7.1	0.16	-.03	11.7				31
1	273.4			245.8			252.9			193.1			259.8			249.1			1
2	9.1			7.9			8.4			6.2			8.4			8.3			2
3	542			488			502			383			515			494			3
4	11.5			10.5			9.4			7.1			11.7			25.2			4
5	6.0			5.9			6.7			5.3			6.5			4.4			5

Maximum stage	1.74	feet at	0430	on	12/16	Discharge	1410	Second-feet.
Minimum stage	0.07	feet at	SEVERAL	on	DATES & TIMES	Discharge	2.2	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	4579.2
2	12.5
3	9069
4	194
5	4.4

GAGING STATION SUMMARY

LOS ANGELES COUNTY
Department of Public Works
Hydraulic/Water Conservation Division

Station Location and Description L.A. River @ Tujunga Ave. for Water-Year 1988 1989

Station No. F300-R

Drainage Area ..... Square Miles (R. Veler Observer)

Gage Read Every 15 min.

Rating Table No. 62-01

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	2.16	+.10	80.5	2.03	+.04	68.9	2.07	+.03	69.6	2.70	+.04	136.0	2.25	+.01	80.3	2.20	.05	79.4	1
2	2.12	↑	78.2	2.09	|	72.1	2.07	+.02	69.4	2.14	+	73.7	2.54	|	113.0	2.13	.04	462.0	2
3	2.16	|	81.1	2.18	+.03	77.5	2.40	+.01	111.0	2.31	|	90.0	2.71	|	271.0	2.51	0.3	111.0	3
4	|	|	80.9	2.17	|	76.8	2.14	+.04	76.0	2.26	|	81.2	3.64	|	714.0	2.21	|	78.5	4
5	2.13	|	78.4	2.14	|	74.9	2.10	+.03	71.8	2.74	|	404.0	2.52	|	102.0	2.17	|	75.9	5
6	1.81	|	61.7	2.15	+.02	74.3	2.08	|	70.3	2.65	|	150.0	2.26	|	81.3	2.18	|	76.7	6
7	2.15	|	80.2	2.17	|	76.0	2.06	|	69.3	2.31	|	95.8	2.17	|	74.8	2.20	|	78.0	7
8	2.13	|	78.5	2.07	|	69.2	2.03	+.02	66.6	2.23	|	81.1	2.55	|	747.0	2.21	|	78.7	8
9	|	|	78.6	2.14	+.01	73.5	2.03	|	67.1	2.13	|	73.7	2.94	↓	1260.6	2.20	|	78.3	9
10	2.17	|	81.5	2.07	|	68.8	2.08	|	69.6	2.18	|	76.8	2.56	-.02	107.0	2.22	|	79.2	10
11	|	|	81.2	2.20	|	77.6	2.07	+.01	68.4	2.12	|	72.6	2.30	|	84.7	2.24	|	81.0	11
12	2.08	|	75.3	2.13	0	71.9	2.09	|	70.2	2.05	|	68.7	2.20	+.03	78.4	2.23	|	79.8	12
13	2.08	|	75.4	2.16	|	76.2	2.08	|	69.2	2.14	|	73.7	2.31	+.02	86.8	2.20	|	77.8	13
14	2.16	|	80.6	2.95	+.04	522.0	2.12	0	70.9	2.17	|	75.9	2.22	|	79.0	2.20	|	77.8	14
15	2.14	|	79.4	2.13	|	74.5	3.37	0	1,330	2.15	|	74.6	2.18	+.03	76.4	2.19	|	77.2	15
16	2.12	|	76.6	2.13	+.03	73.6	3.94	+.02	1,350	2.13	|	73.0	2.16	|	75.6	2.18	|	76.3	16
17	2.16	|	81.0	2.11	|	72.9	2.38	0	94.0	2.16	|	74.6	2.19	|	77.6	2.26	|	114.0	17
18	2.20	|	83.7	2.01	+.02	69.1	2.74	+.02	158.0	2.19	|	76.3	2.18	+.04	77.4	2.41	|	113.0	18
19	2.17	|	81.4	1.98	|	68.6	2.21	+.03	79.1	2.14	|	72.7	2.20	|	79.3	2.16	|	75.3	19
20	2.18	|	82.6	1.99	+.01	68.2	2.65	+.01	251.0	2.18	|	78.4	2.21	+.05	80.5	2.16	|	75.2	20
21	|	|	81.3	1.98	|	68.6	3.55	+.02	1,080	2.15	|	74.1	2.20	↑	79.9	2.15	|	74.7	21
22	2.20	|	83.4	2.03	|	69.8	2.52	+.03	128.0	2.16	|	74.0	2.19	|	78.9	2.13	|	73.4	22
23	2.13	|	78.9	2.44	|	209.0	2.54	0	117.0	2.36	|	188.0	2.21	|	80.8	2.04	|	67.3	23
24	2.18	|	82.1	2.28	+.02	86.4	2.42	0	1,460	2.29	|	83.8	2.21	|	80.3	2.05	|	67.7	24
25	2.16	|	81.0	2.91	|	281.0	2.77	+.02	212.0	2.30	|	76.9	2.19	|	78.5	3.24	|	542.0	25
26	2.17	|	81.7	2.11	+.04	72.8	2.29	|	65.0	2.17	|	75.2	2.20	|	79.7	2.38	|	93.7	26
27	2.16	|	81.1	2.01	|	66.6	2.21	|	78.3	2.21	|	77.9	2.21	|	80.2	2.17	|	76.0	27
28	2.18	|	82.3	2.02	|	67.6	2.20	+.02	77.9	2.26	|	81.2	2.19	↓	78.9	2.20	|	78.4	28
29	2.13	|	78.9	2.07	|	70.9	2.15	+.01	73.6	2.22	|	78.6	X	+.05	X	2.18	|	76.3	29
30	2.12	↓	78.7	2.05	+.04	69.4	2.15	|	73.8	2.28	↓	87.2	X	X	X	2.18	|	76.4	30
31	2.11	+.10	81.6	X	X	X	2.76	+.02	213.0	2.45	+.04	110.0	X	X	X	2.21	.03	78.9	31
1	2468.4			2744.7			~~7882~~ 2926.7			2926.7			49832			~~9436.3~~			1
2	79.6			91.5			~~254 2730~~ 94.1			94.1			178			~~3348~~ 107			2
3	4896			5,444			~~15635~~ 5805			5805			9,884			~~6,756~~ 6642			3
4	83.7			322			1,460			404			1,260			542			4
5	61.7			62.6			66.6			62.7			75.6			67.3			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	2.19	.03	77.2	2.06	-.06	70.5	2.04	+.04	68.1	2.03	+.05	67.5	2.10	+.05	72.3	2.09	+.02	69.9	1
2	2.15	|	74.7	2.09	|	72.5	2.15	|	74.9	2.16	∧	76.4	2.16	|	76.4	2.09	+.01	69.9	2
3	2.16	|	75.0	2.11	|	73.4	2.19	|	77.4	2.07	|	70.1	2.08	+.04	70.8	2.09	0	62.8	3
4	2.15	|	74.8	2.10	|	72.9	2.15	|	75.2	2.02	|	66.8	2.10	+	71.8	2.03	|	64.9	4
5	|	|	74.7	2.10	|	73.0	2.15	|	75.1	2.20	|	79.1	2.08	|	70.6	2.06	|	67.0	5
6	2.17	|	76.1	2.13	|	74.7	2.16	|	75.9	2.04	|	68.2	|	|	70.3	2.07	|	67.5	6
7	2.08	.04	71.8	2.09	+.05	71.7	2.17	|	76.5	1.98	|	64.6	2.14	|	74.0	2.12	|	70.4	7
8	2.20	.03	78.1	2.06	|	69.7	2.15	+.05	75.7	2.19	|	78.3	2.11	|	72.6	2.10	|	69.0	8
9	2.18	.04	73.7	2.02	|	67.9	2.13	|	74.5	2.05	|	68.6	2.09	|	71.3	2.10	-.01	68.7	9
10	2.18	|	77.0	2.05	|	69.2	2.14	|	74.9	1.97	|	64.3	2.12	|	73.3	2.07	|	66.5	10
11	2.25	|	82.2	2.09	|	71.4	2.10	|	75.6	2.16	|	76.5	2.15	↓	75.0	2.09	|	68.3	11
12	2.21	|	79.5	2.05	|	69.0	2.11	|	75.9	2.07	|	70.3	2.11	+.03	71.4	2.08	-.02	66.8	12
13	2.01	.05	67.7	2.06	|	69.9	2.15	|	75.7	2.09	|	71.5	|	+	71.4	2.11	|	68.6	13
14	2.14	.04	74.5	2.09	|	71.8	2.11	|	72.9	2.10	|	72.8	|	|	71.9	2.15	|	70.3	14
15	2.13	|	73.7	2.12	|	74.0	2.14	|	75.1	2.20	|	79.6	2.09	|	70.2	2.11	|	68.1	15
16	|	|	74.2	2.05	|	69.1	2.16	|	76.9	2.21	|	80.0	2.17	|	75.8	2.17	|	72.1	16
17	2.15	.05	75.9	2.08	|	70.8	1.99	|	66.6	2.22	|	80.7	2.11	|	71.5	2.57	|	116	17
18	2.09	|	71.9	2.09	+.04	71.3	2.05	|	69.5	2.23	|	81.1	2.10	|	71.1	2.09	-.03	66.4	18
19	2.08	|	70.9	2.08	|	70.4	2.11	|	72.7	2.21	|	80.3	2.11	|	72.0	2.85	|	336	19
20	1.85	|	64.1	2.09	|	71.2	1.90	↓	59.8	2.20	|	79.3	2.09	|	70.2	2.10	-.04	66.9	20
21	2.05	|	69.2	2.06	|	69.3	1.75	|	55.9	2.20	|	79.4	2.14	|	73.6	2.07	|	64.9	21
22	2.06	|	69.9	2.05	|	68.8	2.13	|	74.0	2.22	|	80.9	2.11	|	71.8	2.10	|	66.6	22
23	2.05	.06	69.6	2.04	|	67.7	2.12	|	73.9	2.21	|	80.3	2.03	|	69.1	2.15	|	67.7	23
24	2.04	|	69.3	2.01	|	66.9	2.11	|	73.2	2.18	|	78.0	2.09	|	70.7	2.11	-.05	67.1	24
25	2.27	|	75.4	1.99	|	65.0	2.10	|	72.5	2.17	|	77.0	2.16	|	75.1	2.14	|	69.6	25
26	2.11	|	73.7	2.04	|	67.5	2.16	|	74.4	2.16	|	76.9	2.07	|	69.3	2.11	|	66.8	26
27	2.07	|	71.1	2.05	|	68.2	2.14	|	76.1	2.15	|	75.9	2.02	|	66.0	2.11	|	66.8	27
28	2.05	|	69.2	2.04	|	68.0	2.05	|	73.1	2.13	|	74.7	2.05	|	67.9	2.16	|	67.8	28
29	1.94	|	67.1	2.00	|	65.7	2.13	|	74.5	2.08	|	70.9	2.15	|	74.5	2.04	|	64.5	29
30	2.07	.06	71.1	2.01	|	66.0	2.11	+.05	72.7	2.10	↓	72.3	2.10	↓	71.6	2.05	-.05	63.2	30
31	X	X	X	2.02	-.04	67.0	X	X	X	2.14	+.05	72.3	2.12	+.03	72.5	X	X	X	31
1	2208.2			2163.9			2187.1			2314.1			2,223.9			2340.3			1
2	73.6			69.8			72.9			74.7			71.7			78			2
3	4,380			4,292			4,338			4590			4411			4,642			3
4	93.4 ~~82.3~~			74.7			77.4			81.1			76.4			336			4
5	63.1			65.0			59.8			64.6			66			62.8			5

Maximum stage	5.44	feet at	1830	on	12-24-88	Discharge 5,140 Second-feet.
Minimum stage	1.70	feet at	1100	on	6-20-89	Discharge 48.9 Second-feet.

REMARKS:

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

YEARLY TOTALS	
1	37,215.5
2	3.4
3	73,811.4
4	1460
5	59.8

APPENDIX C

WELLS DRILLED AND DESTROYED

Wells Destroyed 1988-89

LACDPW

Party	Well No.	Owner No.	Purpose
LADWP	3810S	NH - 5	Production
LADWP	3810T	NH - 31	Production

WELLS DRILLED 1987-88

LACDPW

Party	Well No.	Owner No.	Purpose
LADWP	*	TJ-12	Production
3M-Pharmaceutical	*	REW-4	Groundwater Cleanup
"	*	REW-5	"

WELLS DRILLED 1987-88 FOR
MAJOR GROUNDWATER POLLUTION INVESTIGATIONS

Party

Bendix - no new wells drilled - have one well for site evaluation, testing, and monitoring.

Philips Components - no new wells drilled; have a total of 16 wells for site evaluation, testing, and monitoring.

Lockheed - drilled 21 additional wells and destroyed 1 well (for a total of 61 existing wells) for site evaluation, testing, and monitoring - one well is capable of being used as an extraction well.

3M-Pharmaceutical - 5 new wells drilled (for a total of 30 wells) for site evaluation, testing, and monitoring. Two of the 5 new wells are extraction wells.

Rocketdyne - drilled 7 additional wells (for a total of 105) for site evaluation, testing, and monitoring - 11 wells are capable of being used as extraction wells.

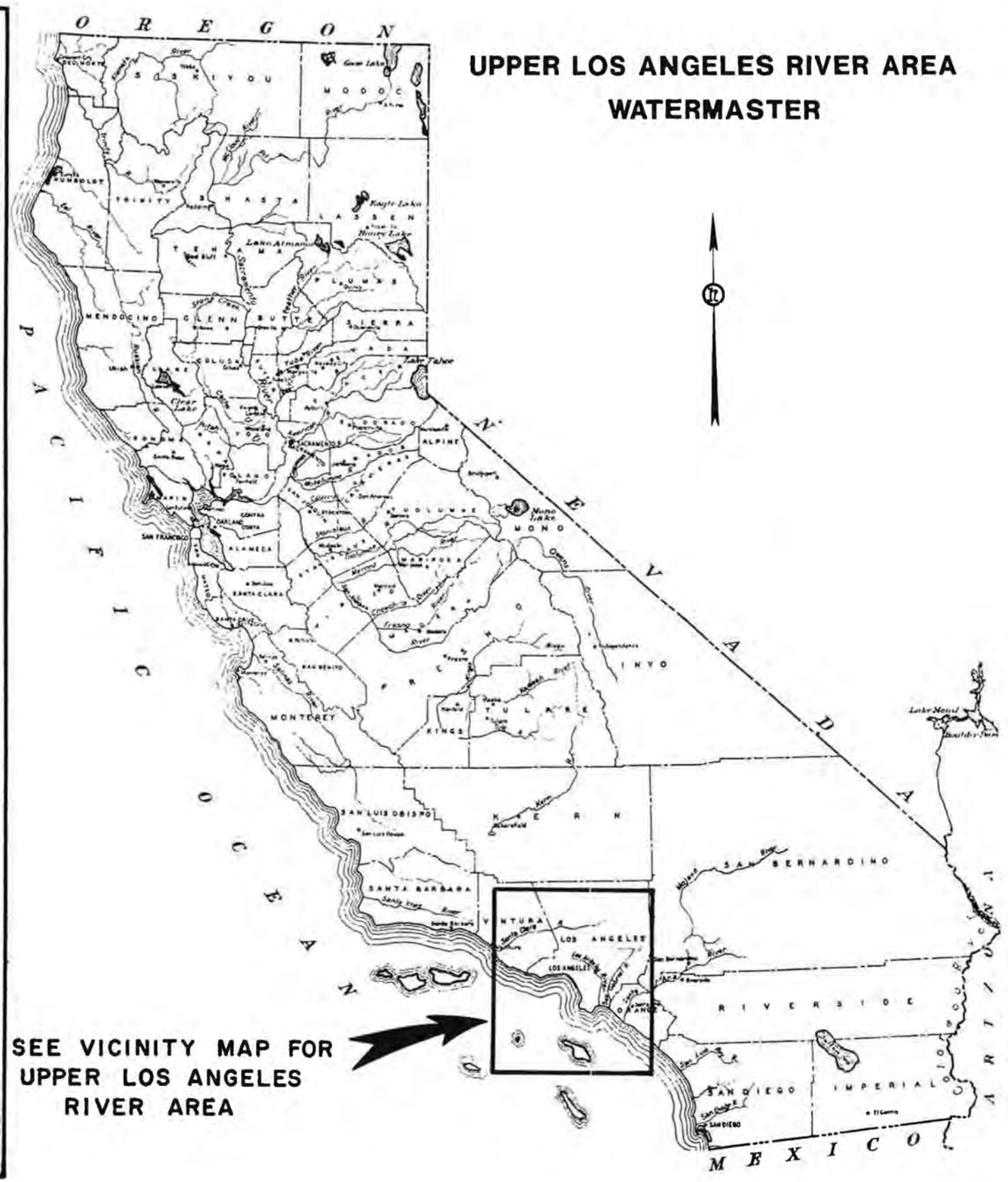
* - Have not been assigned Los Angeles County Department of Public Works well nos.

APPENDIX D

PLATES

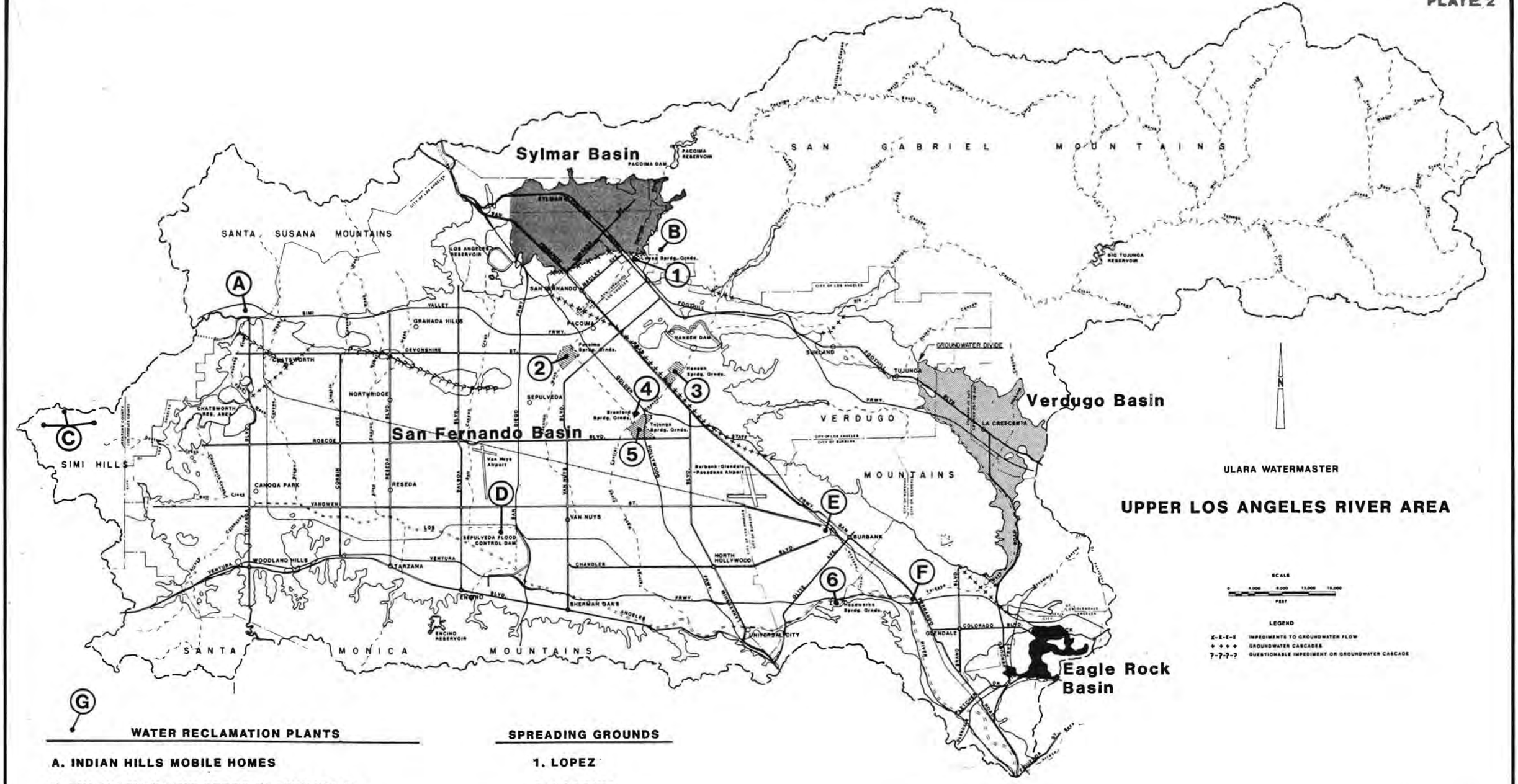
UPPER LOS ANGELES RIVER AREA WATERMASTER

VICINITY MAP
SCALE
0 5 10 15 Miles



LOCATION MAP

PLATE 2



WATER RECLAMATION PLANTS

A. INDIAN HILLS MOBILE HOMES

B. THE INDEPENDENT ORDER OF FORESTERS

C. ROCKETDYNE SANTA SUSANA FIELD LABORATORY

D. DONALD C. TILLMAN

E. CITY OF BURBANK

F. LOS ANGELES-GLENDALE

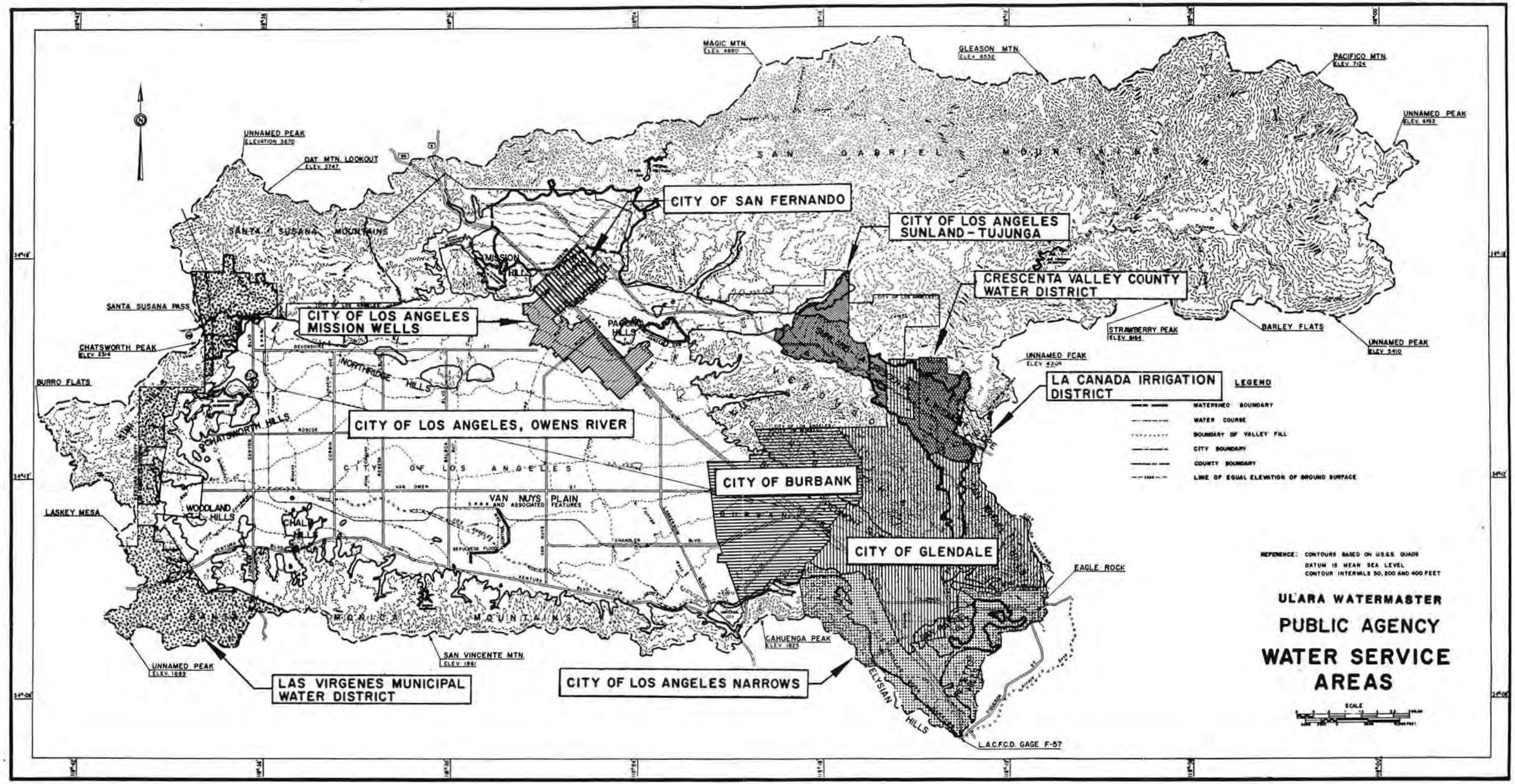
G. TAPIA WATER RECLAMANTION PLANT

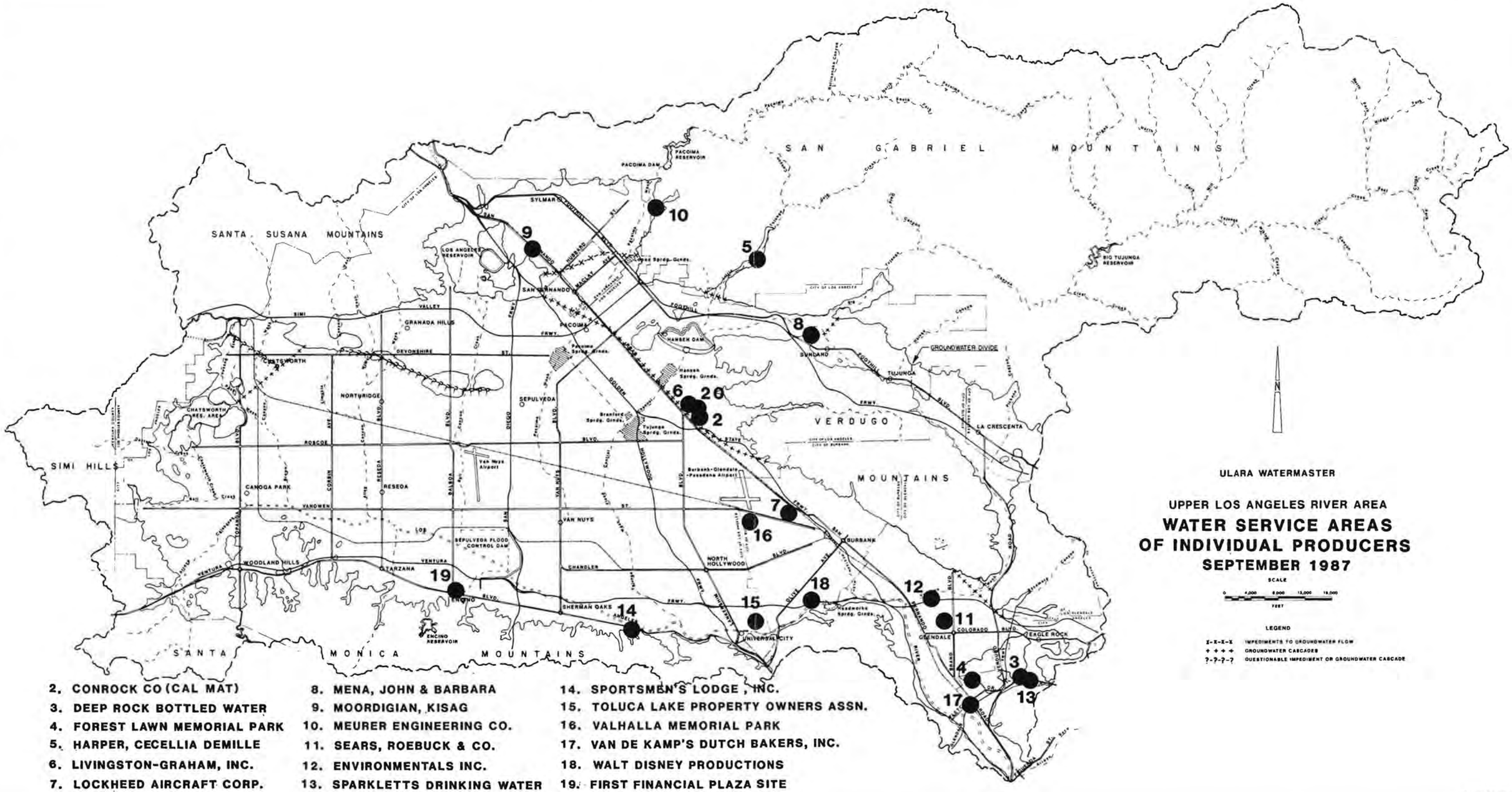
SPREADING GROUNDS

1. LOPEZ
2. PACOIMA
3. HANSEN
4. BRANFORD
5. TUJUNGA
6. HEADWORKS

MRG 3/89

PLATE 3


MAGIC MTN
ELEV. 4880
GLEASON MTN
ELEV. 6532
PACIFICO MTN.
ELEV. 7124
UNNAMED PEAK
ELEV. 6992
UNNAMED PEAK
ELEVATION 3670
OAT MTN LOOKOUT
ELEV. 3747
SANTA SUSANA MOUNTAINS
SAN GABRIEL MOUNTAINS
CITY OF SAN FERNANDO
CITY OF LOS ANGELES
SUNLAND - TUJUNGA
CRESCENTA VALLEY COUNTY
WATER DISTRICT
SANTA SUSANA PASS
CITY OF LOS ANGELES
MISSION WELLS
STRAWBERRY PEAK
ELEV. 6164
BARLEY FLATS
UNNAMED PEAK
ELEV. 5410
CHATSWORTH PEAK
ELEV. 2314
UNNAMED PEAK
ELEV. 4304
LA CANADA IRRIGATION
DISTRICT
BURRO FLATS
NORTHRIDGE HILLS
CHATSWORTH HILLS
CITY OF LOS ANGELES, OWENS RIVER
CITY OF LOS ANGELES
CITY OF BURBANK
VAN NUYS PLAIN AND ASSOCIATED FEATURES
WOODLAND HILLS
LASKEY MESA
CITY OF GLENDALE
EAGLE ROCK
SANTA MONICA MOUNTAINS
CAHUENGA PEAK
ELEV. 1625
SAN VINCENTE MTN.
ELEV. 1861
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



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

WATER SERVICE AREAS OF INDIVIDUAL PRODUCERS SEPTEMBER 1987

SCALE

0 4,000 8,000 12,000 16,000

FEET

LEGEND

X-X-X-X IMPEDIMENTS TO GROUNDWATER FLOW

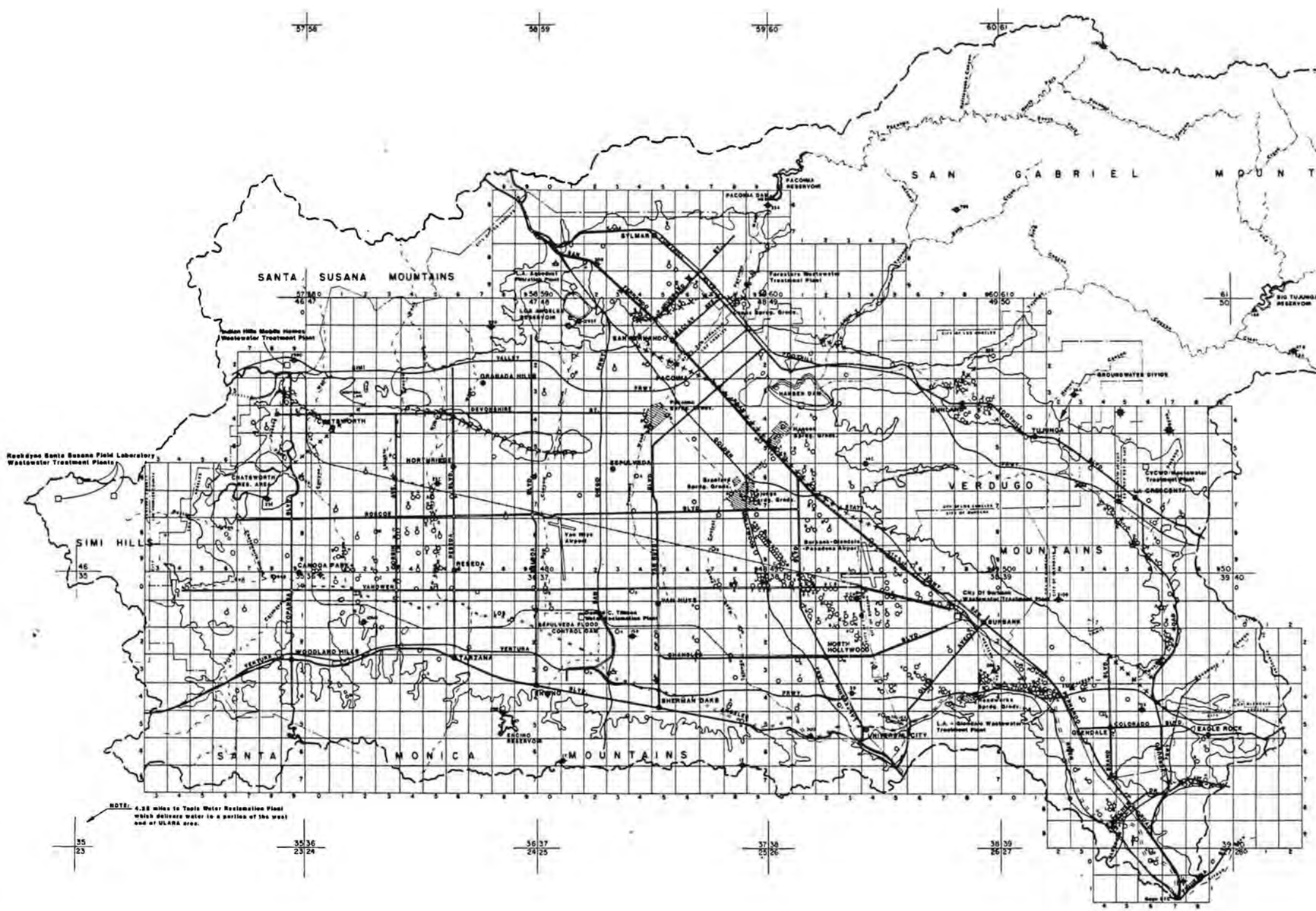
+ + + + GROUNDWATER CASCADES

?-?-?-? QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE

2. CONROCK CO (CAL MAT)
3. DEEP ROCK BOTTLED WATER
4. FOREST LAWN MEMORIAL PARK
5. HARPER, CECELLIA DEMILLE
6. LIVINGSTON-GRAHAM, INC.
7. LOCKHEED AIRCRAFT CORP.
8. MENA, JOHN & BARBARA
9. MOORDIGIAN, KISAG
10. MEURER ENGINEERING CO.
11. SEARS, ROEBUCK & CO.
12. ENVIRONMENTALS INC.
13. SPARKLETTS DRINKING WATER CORP.
14. SPORTSMEN'S LODGE, INC.
15. TOLUCA LAKE PROPERTY OWNERS ASSN.
16. VALHALLA MEMORIAL PARK
17. VAN DE KAMP'S DUTCH BAKERS, INC.
18. WALT DISNEY PRODUCTIONS
19. FIRST FINANCIAL PLAZA SITE
20. VALLEY RECLAMATION CO.

MRG 3/89

PLATE 5



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

LOCATION OF WELLS AND HYDROLOGIC FACILITIES

SCALE

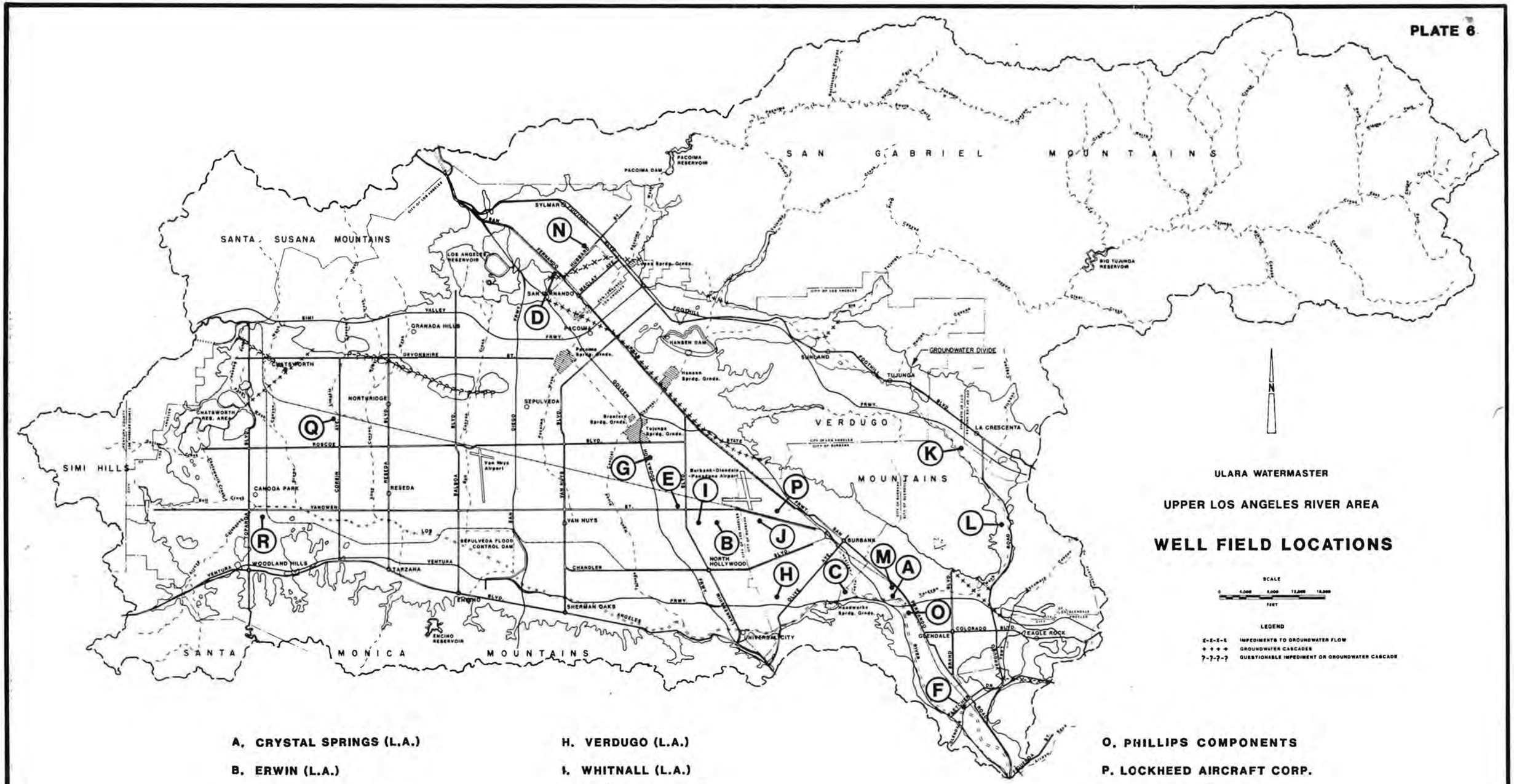
0 2,000 4,000 8,000 12,000

FEET

LEGEND

- IMPEDIMENTS TO GROUNDWATER FLOW
- GROUNDWATER CASCADES
- QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE
- CLIMATIC STATION
- SURFACE WATER GAGING STATION
- SURFACE WATER SAMPLING POINT
- KEY WELL USED FOR HYDROGRAPHS
- KEY WELL USED FOR SAMPLING
- ACTIVE, OBSERVATION, OR TEST WELL
- SURFACE AND GRAVITY DIVERSION

PLATE 6



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

WELL FIELD LOCATIONS

SCALE

0 4,000 8,000 12,000 16,000

FEET

LEGEND

- ≷-≷-≷-≷ IMPEDIMENTS TO GROUNDWATER FLOW
- + + + + GROUNDWATER CASCADES
- ?-?-?-? QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE

A. CRYSTAL SPRINGS (L.A.)

B. ERWIN (L.A.)

C. HEADWORKS (L.A.)

D. MISSION (L.A.)

E. NORTH HOLLYWOOD (L.A.)

F. POLLOCK (L.A.)

G. RINALDI-TOLUCA (L.A.)

H. VERDUGO (L.A.)

I. WHITNALL (L.A.)

J. CITY OF BURBANK

K. CRESCENTA VALLEY COUNTY WATER DISTRICT

L. CITY OF GLENDALE (GLORIETTA)

M. CITY OF GLENDALE (GRANDVIEW)

N. CITY OF SAN FERNANDO

O. PHILLIPS COMPONENTS

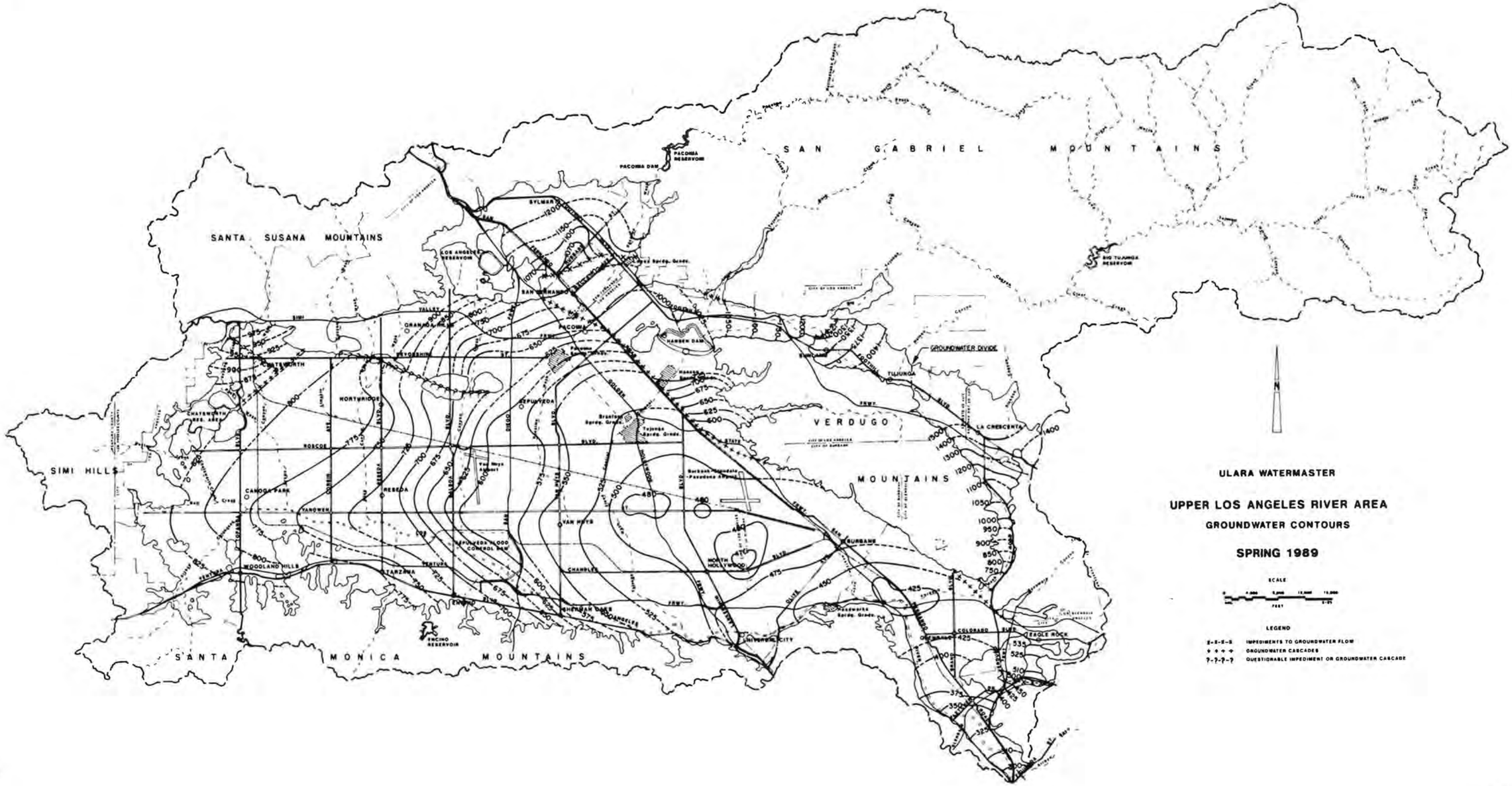
P. LOCKHEED AIRCRAFT CORP.

Q. 3M-PHARMACEUTICAL

R. ROCKWELL INTERNATIONAL

MRG 3/89

PLATE 7



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

GROUNDWATER CONTOURS

SPRING 1989

SCALE

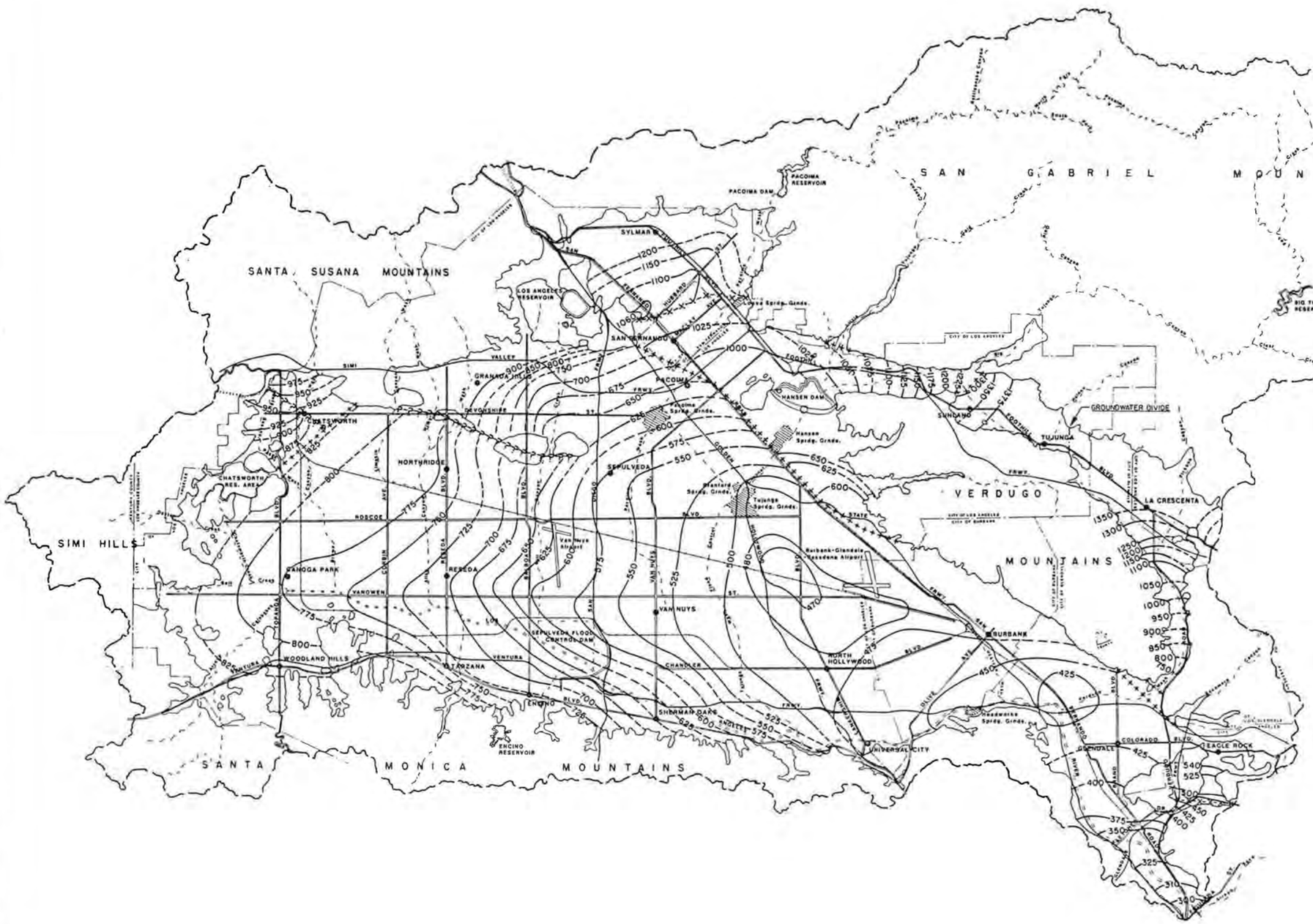
0 2,000 4,000 6,000 8,000 10,000

FEET

LEGEND

B-B-B	IMPEDIMENTS TO GROUNDWATER FLOW
+ + + +	GROUNDWATER CASCADES
?-?-?-?	QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE

PLATE 8



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

GROUNDWATER CONTOURS

FALL 1989

SCALE

0 4,000 8,000 12,000 16,000

FEET

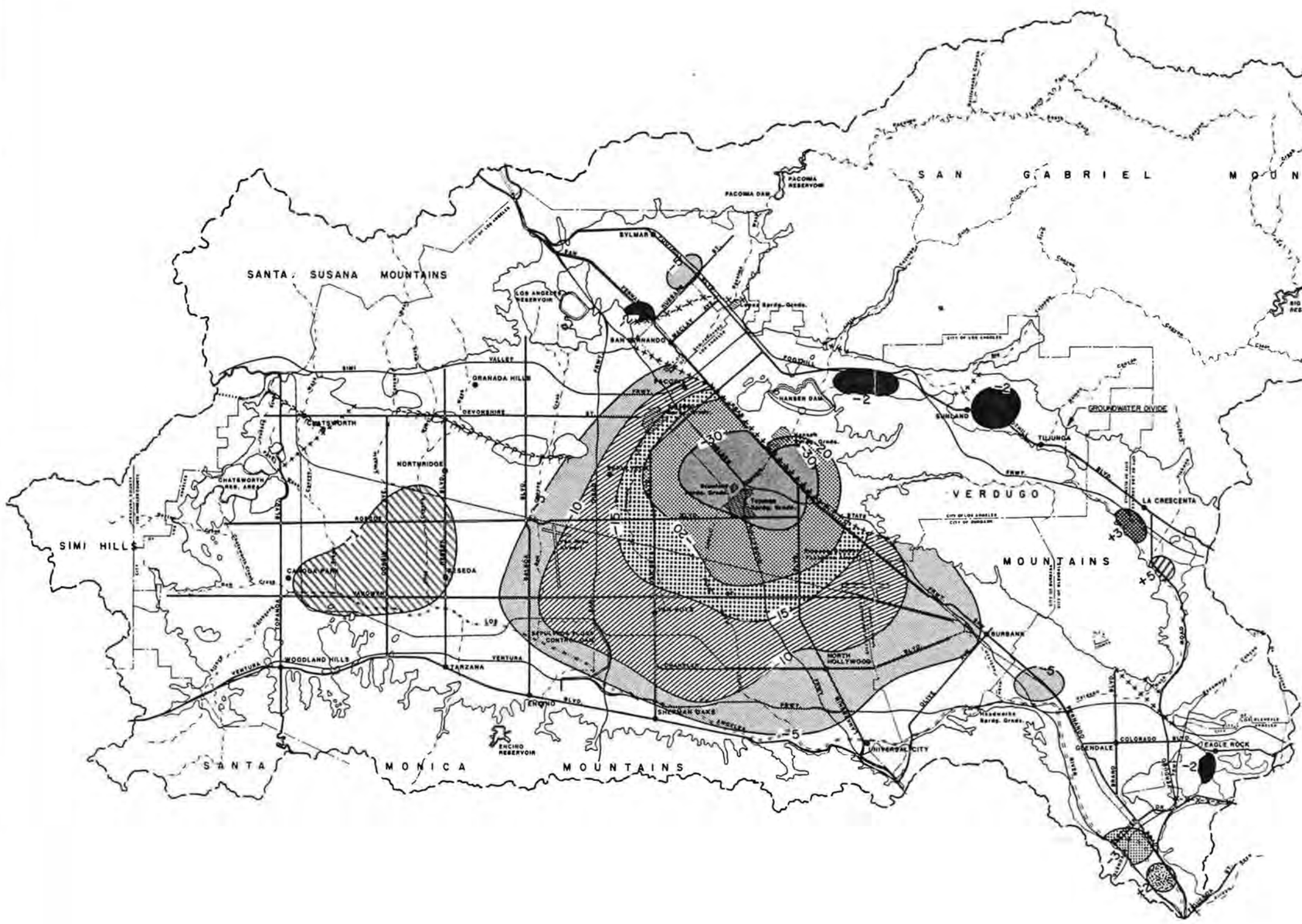
LEGEND

E-E-E-E IMPEDIMENTS TO GROUNDWATER FLOW

+ + + + GROUNDWATER CASCADES

?-?-?-? QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE

PLATE 9



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA
CHANGE IN WATER SURFACE ELEVATION
FALL 1988 - FALL 1989

SCALE

LEGEND

E-E-E-E IMPEDIMENTS TO GROUNDWATER FLOW

+ + + + GROUNDWATER CASCADES

?-?-?-? QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE

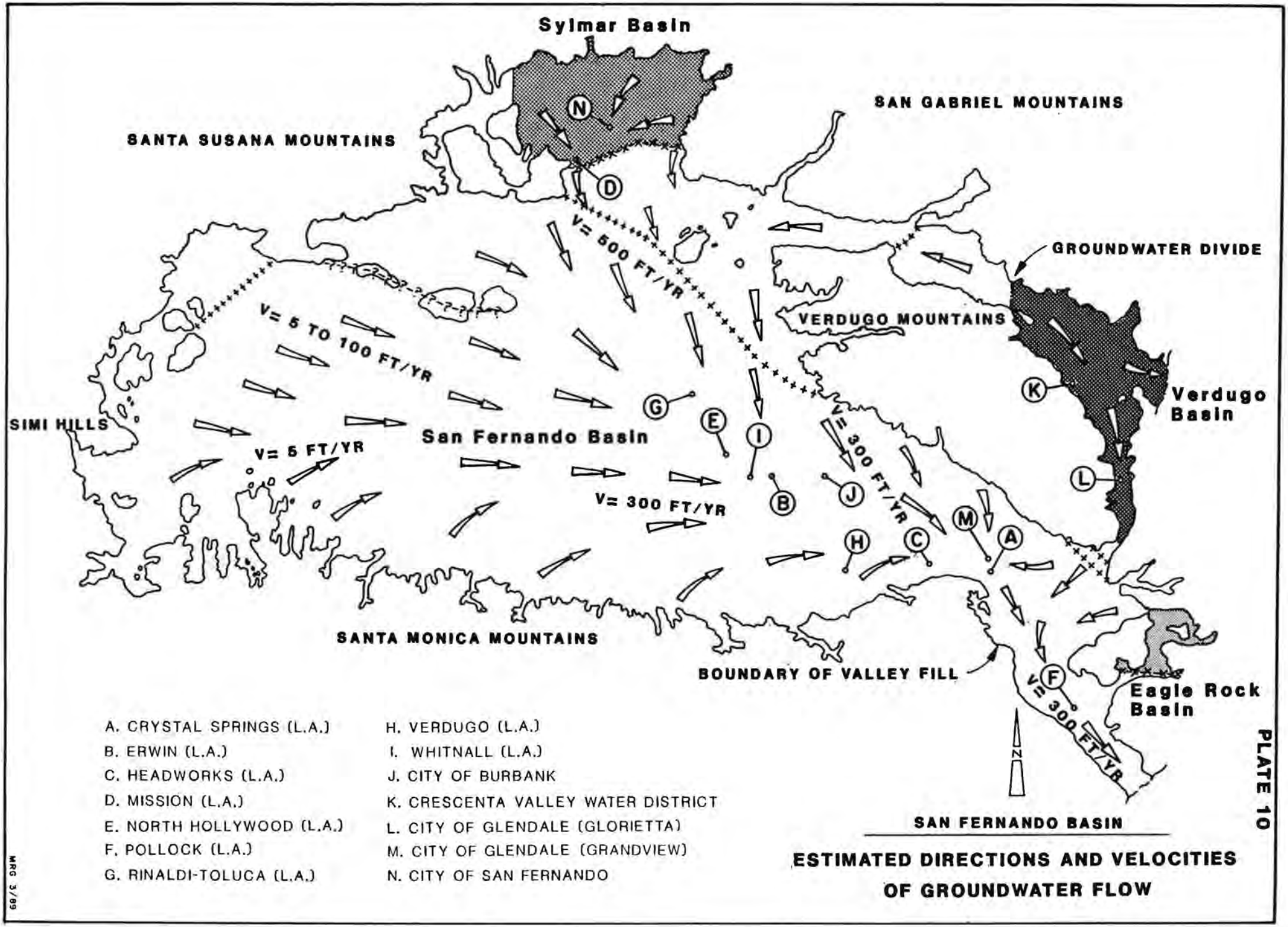
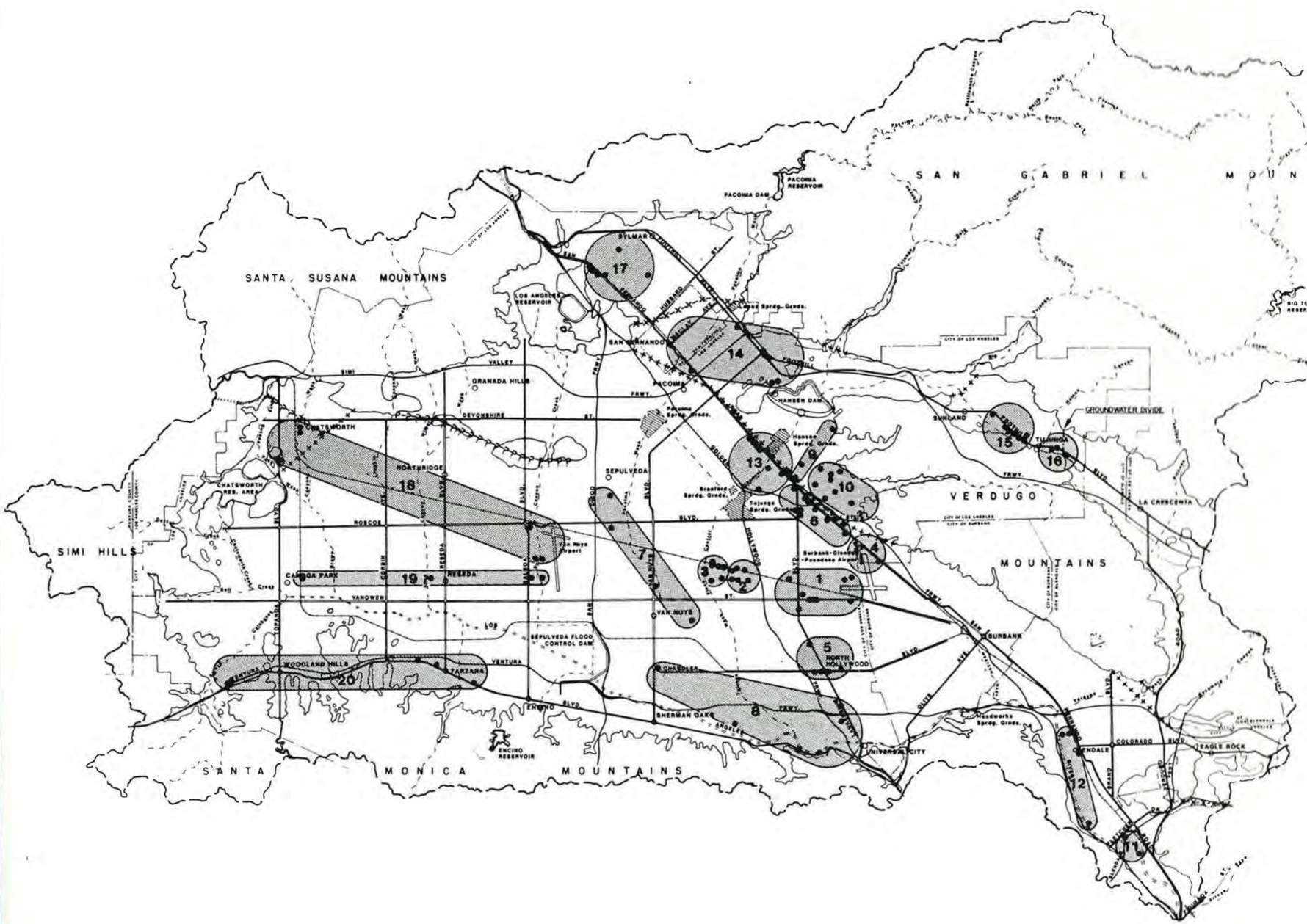

Sylmar Basin
SAN GABRIEL MOUNTAINS
SANTA SUSANA MOUNTAINS
GROUNDWATER DIVIDE
V= 500 FT/YR
V= 5 TO 100 FT/YR
VERDUGO MOUNTAINS
Verdugo Basin
SIMI HILLS
San Fernando Basin
V= 5 FT/YR
V= 300 FT/YR
V= 300 FT/YR
SANTA MONICA MOUNTAINS
BOUNDARY OF VALLEY FILL
Eagle Rock Basin
V= 300 FT/YR
N
SAN FERNANDO BASIN
A. CRYSTAL SPRINGS (L.A.)
B. ERWIN (L.A.)
C. HEADWORKS (L.A.)
D. MISSION (L.A.)
E. NORTH HOLLYWOOD (L.A.)
F. POLLOCK (L.A.)
G. RINALDI-TOLUCA (L.A.)
H. VERDUGO (L.A.)
I. WHITNALL (L.A.)
J. CITY OF BURBANK
K. CRESCENTA VALLEY WATER DISTRICT
L. CITY OF GLENDALE (GLORIETTA)
M. CITY OF GLENDALE (GRANDVIEW)
N. CITY OF SAN FERNANDO
ESTIMATED DIRECTIONS AND VELOCITIES OF GROUNDWATER FLOW
PLATE 10
MRG 3/89

PLATE 11

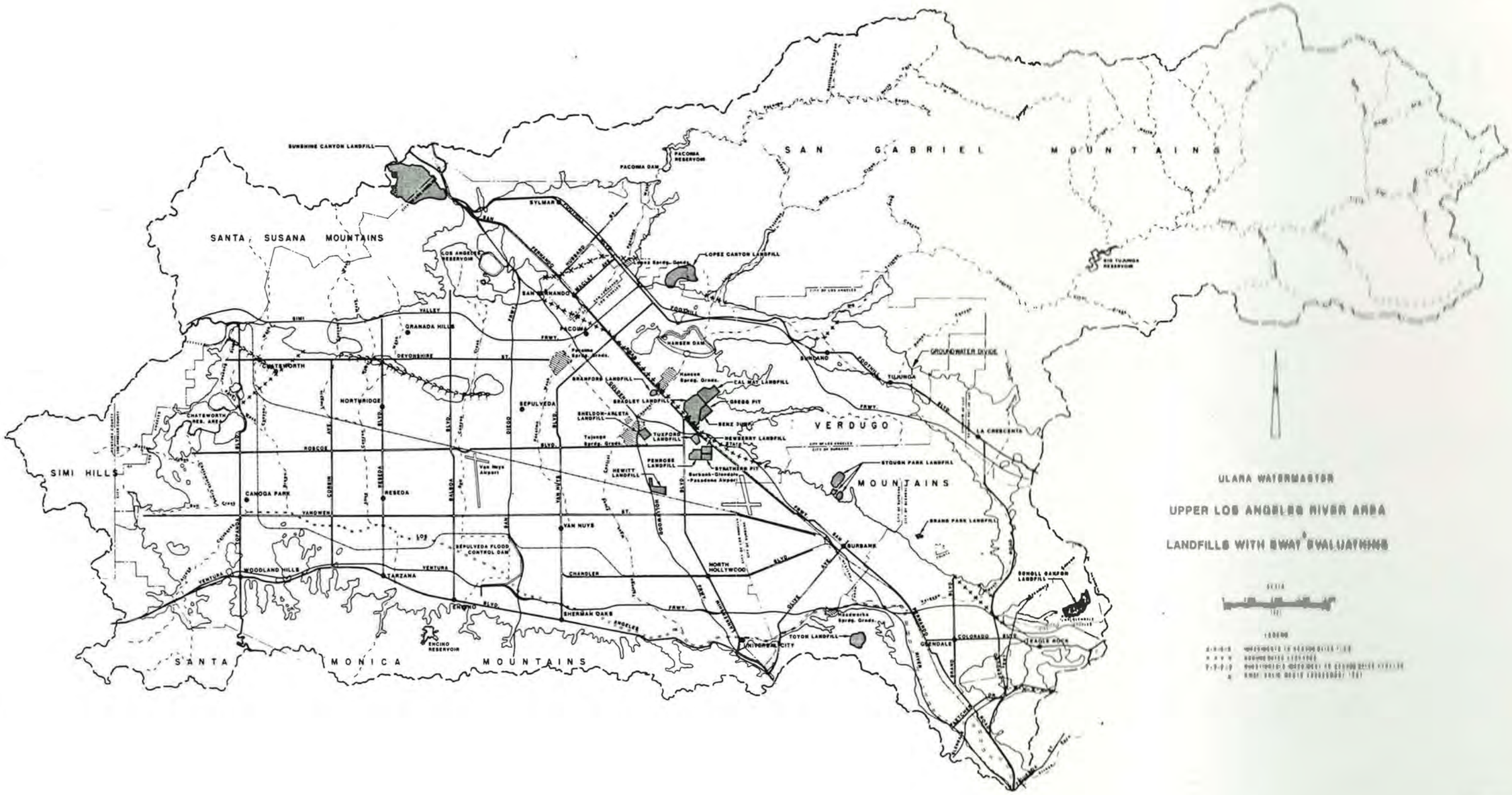


UPPER LOS ANGELES RIVER AREA

CITY OF LOS ANGELES

SEWER CONSTRUCTION PROGRAM

PLATE 12


SAN GABRIEL MOUNTAINS
SANTA SUSANA MOUNTAINS
SIMI HILLS
SANTA MONICA MOUNTAINS
VERDUGO MOUNTAINS
SUNSHINE CANYON LANDFILL
PACOIMA DAM
PACOIMA RESERVOIR
SYLMAR
LOS ANGELES RESERVOIR
SAN FERNANDO
LOPEZ CANYON LANDFILL
BIG TUJUNGA RESERVOIR
GRANADA HILLS
DEVONSHIRE
CHATSWORTH
NORTHRIDGE
PACOIMA
HANSEN DAM
GROUNDWATER DIVIDE
BRANFORD LANDFILL
BRADLEY LANDFILL
CAL MAT LANDFILL
GREGG PIT
SEPULVEDA
SHELDON-ARLETA LANDFILL
TUJUNGA
LA CRESCENTA
TUXFORD LANDFILL
BENZ JUNK
NEWBERRY LANDFILL
PENROSE LANDFILL
HEWITT LANDFILL
STRATHERN PIT
Burbank-Glendale-Pasadena Airport
STOUGH PARK LANDFILL
GRAND PARK LANDFILL
ROSCOE
CANOGA PARK
RESEDA
VAN NUYS
BURBANK
SEPULVEDA FLOOD CONTROL DAM
NORTH HOLLYWOOD
BONELL CANYON LANDFILL
WOODLAND HILLS
TARZANA
CHANDLER
SHERMAN OAKS
ENCINO RESERVOIR
TOYON LANDFILL
GLENDALE
COLORADO
EAGLE ROCK
ULARA WATERMASTER
UPPER LOS ANGELES RIVER AREA
LANDFILLS WITH SWAT EVALUATIONS

APPENDIX E

POLICIES AND PROCEDURES GUIDELINES

NON-PARTY PUMPING - PHYSICAL SOLUTION

APPENDIX E

ULARA WATERMASTER

POLICIES AND PROCEDURES GUIDELINES
Party And Non-Party Pumping - Physical Solution

I. Types of Physical Solution Pumping by Parties and Non-Parties

A. Dewatering for structure protection (Party & Non-Party)

B. Pumping for aquifer cleanup (Party & Non-Party)

C. Pumping of groundwater - special needs (Non-Party)

II. ULARA Policies and Procedures

A. Section 2.5 - Pumping for clean-up (Party and Non-Party).

B. Section 2.6 - Pumping for dewatering (Party & Non-Party).

C. Section 2.7 - Pumping for special needs (Non-Party).

D. Guidelines for groundwater pumping

1. Application letter - (contact person; needs for pumping; location of wells; planned use and disposal) approval by Watermaster required.

2. Groundwater pumped must be metered and monthly report made to Watermaster.

3. Groundwater consumptively used - agreement needed with the city wherein the pumping occurs.

4. California Regional Water Quality Control Board (CRWQCB) - approval by CRWQCB as to the potential occurrence of groundwater contaminants.

III. Payment for Pumped Physical Solution Water -Dewatering for structure protection, pumping for aquifer clean-up, and special needs (non-party)

A. Non-consumptive use pumping: (spreading or re-injection); no payment is required.

B. Consumptive use pumping, discharged to the storm drain system: Cost for the water is the actual cost to Los Angeles for purchasing replacement water from MWD less the average power cost for extraction of groundwater from the San Fernando Basin.

C. Consumptive use pumping - used on site: Cost for the water is what would have been paid had the water been delivered from the Los Angeles distribution system, less the average energy cost for extraction of groundwater by Los Angeles from the San Fernando Basin.

VI. ULARA Watermaster Notification of Need to Pump for Clean-up

A. When a clean-up and abatement order has been issued to a party or a non-party by the California Regional Water Quality Control Board, Los Angeles Region, contacting the ULARA Watermaster is included as one of the requirements.

V. ULARA Watermaster Notification of Permanent Dewatering in the San Fernando Valley

A. Application for a Construction Permit from Los Angeles Department of Building and Safety

1. If a dewatering facility is part of the plans, the applicant must contact and receive clearance from the ULARA Watermaster's office before a construction permit is issued. The ULARA Watermaster's office can be contacted at (213) 481-6177 or (213) 481-6194.

2. ULARA Watermaster will provide the applicant (with copy to the Department of Building and Safety) with a written response saying that the project is not a water rights concern or an agreement with the City of Los Angeles Department of Water and Power (LADWP) for pumping is required.

3. The ULARA Watermaster will be sent a copy of the Department of Building and Safety's list of requirements for a permit.

B. Applicant of a project designed to discharge water to the storm drain system is required to apply to the California Regional Water Quality Control Board (CRWQCB) for an NPDES permit. The CRWQCB can be contacted at (213) 620-4460.

C. Issuance of Certificate of Occupancy (C of O)

If an agreement with the City of Los Angeles Deparment of Water and Power is required, a second letter from the LADWP or the Watermaster must provide to the applicant (with a copy to the Department of Building and Safety) saying that an agreement has been reached between the parties, or the water rights concern has been removed, and the C of O can released as it relates to water rights.

APPENDIX E

Revision of Policies And Procedures *
Sections 2.5 to 2.7 - Physical Solution
Pumping For Cleanup, Dewatering And Special Needs

2.5 PUMPING FOR CLEANUP BY PARTIES AND NONPARTIES

Under Section 8.2.4. of the judgment, the Watermaster is required to identify and report on any new or proposed new ground-water extractions by any party or nonparty. When a Cleanup and Abatement Order has been issued by the California Regional Water Quality Control Board - Los Angeles Region, or when a plan for cleanup at a Superfund site has been approved by the U. S. Environmental Protection Agency, the following guidelines are to be used:

2.5.1. Pumping for Plume Definition It is recognized that small amounts of water may need to be removed from underground storage for developing, sampling, and testing during the plume definition phase of a groundwater cleanup program. At this stage, the permanent treatment facilities would normally not have been installed. Most of the water which would be pumped for developing, sampling, and testing may require special handling, such as hauling to a treatment facility or to an acceptable waste disposal site. In order to expedite the investigation, up to five acre-feet per site will be deemed exempt from any water rights considerations. The plans for testing and the amounts to be pumped are to be reported to the Watermaster before beginning.

2.5.2 Permanent Pumping Program When the permanent cleanup and treatment facilities have been approved and installed, all pumping is to be conducted under the basic objectives of Safe Yield Operation -- to preserve a long-term balance of inflow and outflow and to preserve the ground water storage credits of the parties.

2.5.3 Quality of Treated Ground Water Although the primary responsibility of maintaining the quality of the ground water in the San Fernando Valley lies with the State Department of Health Services and the Regional Water Quality Control Board, the Watermaster has a substantial interest in the maintenance of water quality because of its potential impact upon water rights and distribution of pumping sites.

2.5.4 Use of Treated Ground Water Because of the large volumes of ground water which are expected to be required for cleanup in the San Fernando Valley Basin, it is desirable and expected that as much of the resultant treated water as reasonably possible be put to direct beneficial use. This requires that the quality of the cleaned-up or treated water must be adequate for the intended beneficial use. For example, if the treated water is reinjected; its quality must meet the water quality requirements of the Regional Board.

(*) - Revision to July 1987 - "Policies and Procedures".

2.5.5. Accounting for Cleanup Water As part of his responsibility for Safe Yield Operation, the Watermaster is required to account for all cleanup water -- the amount pumped and its use or disposition. Water consumptively used or discharged from the basin must be charged to a party's pumping entitlement. However, if the treated water is returned to ground water storage, the initial pumping of the water would be considered nonconsumptive, and no water rights arrangements would be necessary.

2.5.5.1 If the treated water is delivered for direct consumptive use, either on-site or off-site, the cleanup pumper must make arrangements with the party whose pumping rights may be affected and with the water purveyor responsible for supplying water to the area. This will ensure that all potentially impacted parties are made whole. The cleanup pumper if the water is used on site, would be required to financially compensate the party whose pumping right is affected. If the treated water is used off-site, arrangements would have to be made with the water purveyor responsible for supplying water to that area.

2.5.5.2 If the treated water is discharged to a storm drain, it is presumed to be wasted from the San Fernando Valley Basin as surface flow in the lined channel of the Los Angeles River. Before such a method of disposal will be considered, the cleanup pumper would have to make arrangements with a party with water rights similar to those in which the treated water is delivered for direct consumptive use.

2.5.5.3 Consistent with Section 4 of these Policies and Procedures, each cleanup pumper is required to report monthly to the Watermaster the metered amounts of: (1) ground water pumped; (2) treated water returned to ground water storage by reinjection; (3) treated water discharged to storm drains or elsewhere; (4) treated water delivered for direct consumptive use; and (5) the amounts of water spread or accumulated in ground water storage by in-lieu accounting through arrangements with a party.

2.6 PUMPING FOR DEWATERING

In the portions of the San Fernando Valley where high water tables exist, permanent dewatering facilities may be required for certain substructures. As such dewatering removes ground water from storage, the Watermaster is required to account for this.

2.6.1 City of Los Angeles If a dewatering facility is part of the building plans, or if there is some reason to believe that such a facility may be necessary, and the project is within the City of Los Angeles, the Department of Building and Safety refers the Application for a Construction Permit to the Watermaster, where a determination is made as to whether or not the pumping may impact water rights. If it is determined that water rights are affected, an agreement for dewatering pumping must be signed with the City of Los Angeles Department of Water and Power before a Certificate of Occupancy is granted.

2.6.1.1 If there is a request to discharge pumped ground water to a storm drain or to use the pumped groundwater consumptively, either on-site or off-site, the pumper would be required to pay Los Angeles for the right to pump its groundwater.

2.6.2 Other Jurisdictions Dewatering arrangements in other governmental jurisdictions in the San Fernando Valley have not yet been developed. As the Watermaster's primary charge is the accounting for and balancing of water volumes in the Safe Yield Operation, the financial arrangements between parties and non-parties which are used, in part, to accomplish this purpose, are left to the entities involved. However, the Watermaster must be kept informed of all matters bearing on ground water storage, such as pumping, recharge, and water rights arrangements.

2.7 PUMPING FOR SPECIAL NEEDS

If a nonparty has a special need to pump groundwater, an application to do so must be filed with the Watermaster. The application should explain the special need and indicate the amounts desired to be pumped, the location(s) of the well(s), and the method of disposal. Such request will be referred to the parties for consideration. To the extent that such water is consumptively used, or otherwise not returned to groundwater storage, financial arrangements must be made to exercise the right of a party in the same basin wherein the pumping will occur. All water pumped must be metered and reported to the Watermaster monthly and accounted for as in Section 2.5.5.

APPENDIX F

LANDFILLS - SUMMARY OF SWAT REPORTS

APPENDIX F

STATUS OF LANDFILLS - SWAT REPORTS

Attached are twelve summary reports on the status of various landfills that exist within the Upper Los Angeles River Area (ULARA). Each of these landfills have had a Solid Waste Assessment Test (SWAT) report prepared and submitted to the Los Angeles Regional Board. There are several more landfills that have SWAT reports completed that will be included in the next report. Also, there are several landfills that are in the process of having SWAT reports prepared for them.

Included in the summary sheets provided are the name and owner of the various landfills, along with location maps and general geohydrologic information at the landfill site.

The following landfills are included in this report:

1. Bradley East
2. Bradley West
3. Branford
4. CalMat (Sun Valley #3)
5. CalMat (old) Class 3 Site
6. Gregg Pit/Bentz
7. Hewitt Landfill
8. Lopez Canyon
9. Penrose/Newberry
10. Sheldon-Arleta
11. Sunshine Canyon
12. Tuxford

These are preliminary reports prepared by Dr. John F. Mann, Jr., consultant to the Watermaster, and the ULARA Watermaster Staff. Additional reports will be available in the future as data becomes available. The date that gas control systems are installed and the depth-to-water at the landfill site are significant parameters as to the potential impact on groundwater. Additional work is required in obtaining these data. A better understanding of the San Fernando Basin's increased hardness and TDs will be provided when these data are available.

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - Bradley East Disposal Site (Bradley Landfill complex)

OWNER - Valley Reclamation Company

LOCATION - Sun Valley District. Southeast of Sheldon Street and northeast of San Fernando Road.

GEOLOGY - Holocene and Late Pleistocene alluvium in the Hansen subarea northeast of San Fernando Road.

GROUND WATER FLOW DIRECTION - Southeasterly

GENERAL OPERATIONS - Part of the 138-acre Bradley landfill complex. Started accepting trash in 1960. Residential and commercial refuse with low moisture and no hazardous waste. Stopped accepting trash in the early 1980's. Contains about 7.5 million tons of trash.

MINIMUM ELEVATION OF TRASH -

ELEVATION RANGE OF WATER TABLE -

VADOSE ZONE MONITORING -

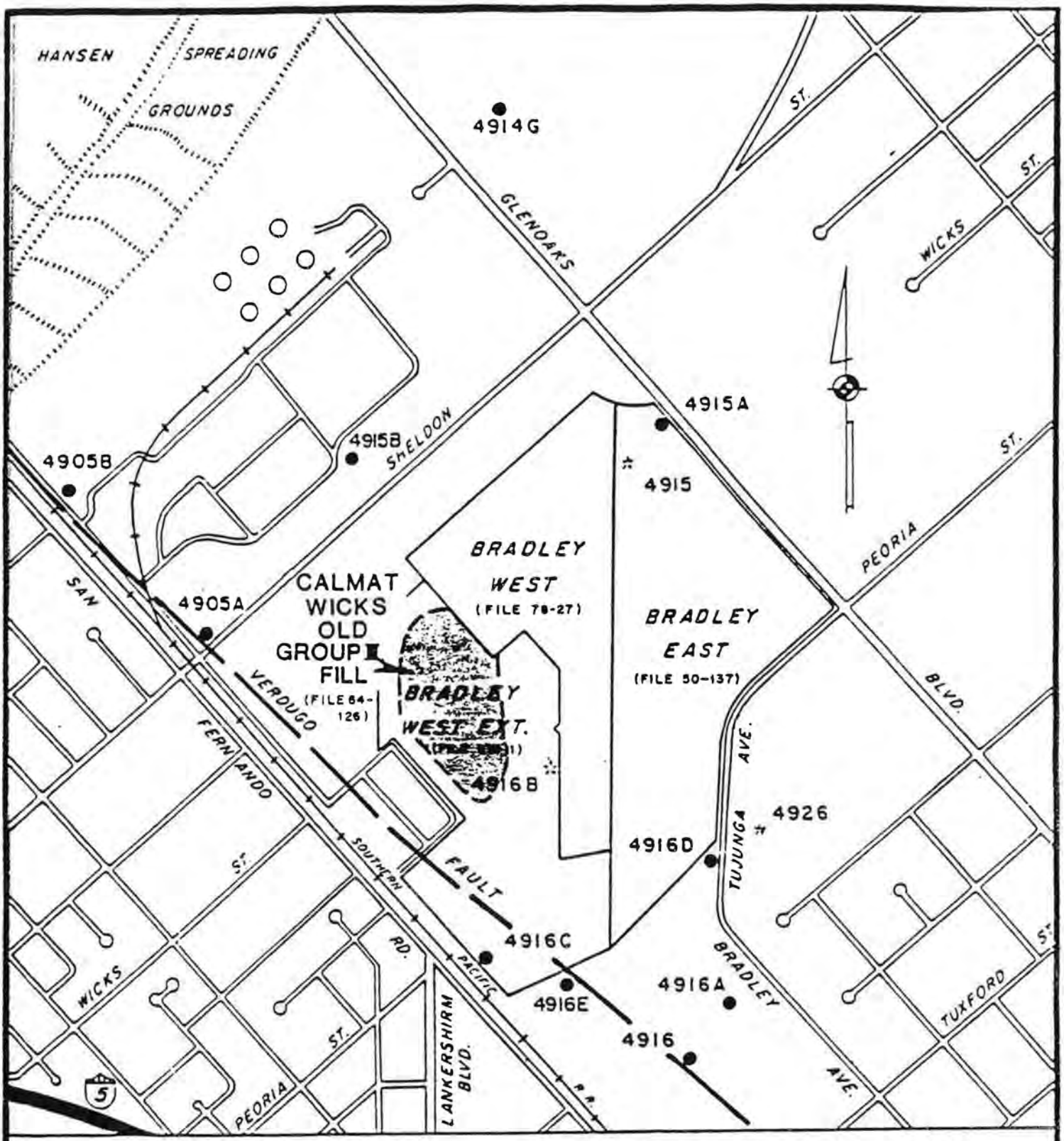
LEACHATE MONITORING - Has no liner. No visible seeps on western slope. No leachate in monitoring wells. No formal leachate collection system.

GROUND WATER QUALITY MONITORING - Downgradient monitoring well not affected by leachate, but has been affected by carbon dioxide gas. VOCs in upgradient wells come from regional plumes.

REPORTS

SWAT Report (Rank 2) - June 26, 1987 - LeRoy Crandall & Assoc.

REGIONAL BOARD -



EXPLANATION:

● 4905B EXISTING WELL

* 4926 ABANDONED WELL

REFERENCE: BASE MAP FROM U.S.G.S. 7.5' BURBANK (1973), SAN FERNANDO (1973), SUNLAND (1973) AND VAN NUYS (1973) QUADRANGLES.

0 1000 2000

SCALE IN FEET

LOCATION OF MONITORING WELLS

LeROY CRANDALL AND ASSOCIATES

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - Bradley West Disposal Site (Part of Bradley Landfill Complex)

OWNER - Valley Reclamation Company

Location - Sun Valley District. Southeast of Sheldon Street and northeast of San Fernando Road.

GEOLOGY - Holocene and Late Pleistocene alluvium in the Hansen subarea northeast of the Verdugo Fault.

GROUND WATER FLOW DIRECTION - Southeasterly.

GENERAL OPERATIONS - Originally designed in 1975-77. Started accepting trash in 1981 -- relatively dry, inert or decomposable, nonhazardous. Bradley West Extension was designed according to 1984 Subchapter 15 requirements, and has a clay liner and leachate collection system.

MINIMUM ELEVATION OF TRASH -

ELEVATION RANGE OF TRASH -

GAS CONTROL SYSTEM - Started . Now delivers 2 1/2 million cubic feet per day to Valley Steam Plant.

VADOSE ZONE MONITORING -

LEACHATE MONITORING - System in operation since _____. As of 6/26/87, no leachate was detected. There was ponding in 1981-82 and about 1/2 million gallons of water percolated into the trash prism. As placed, trash has about 25% moisture. Holding capacity is 40% to 53% moisture.

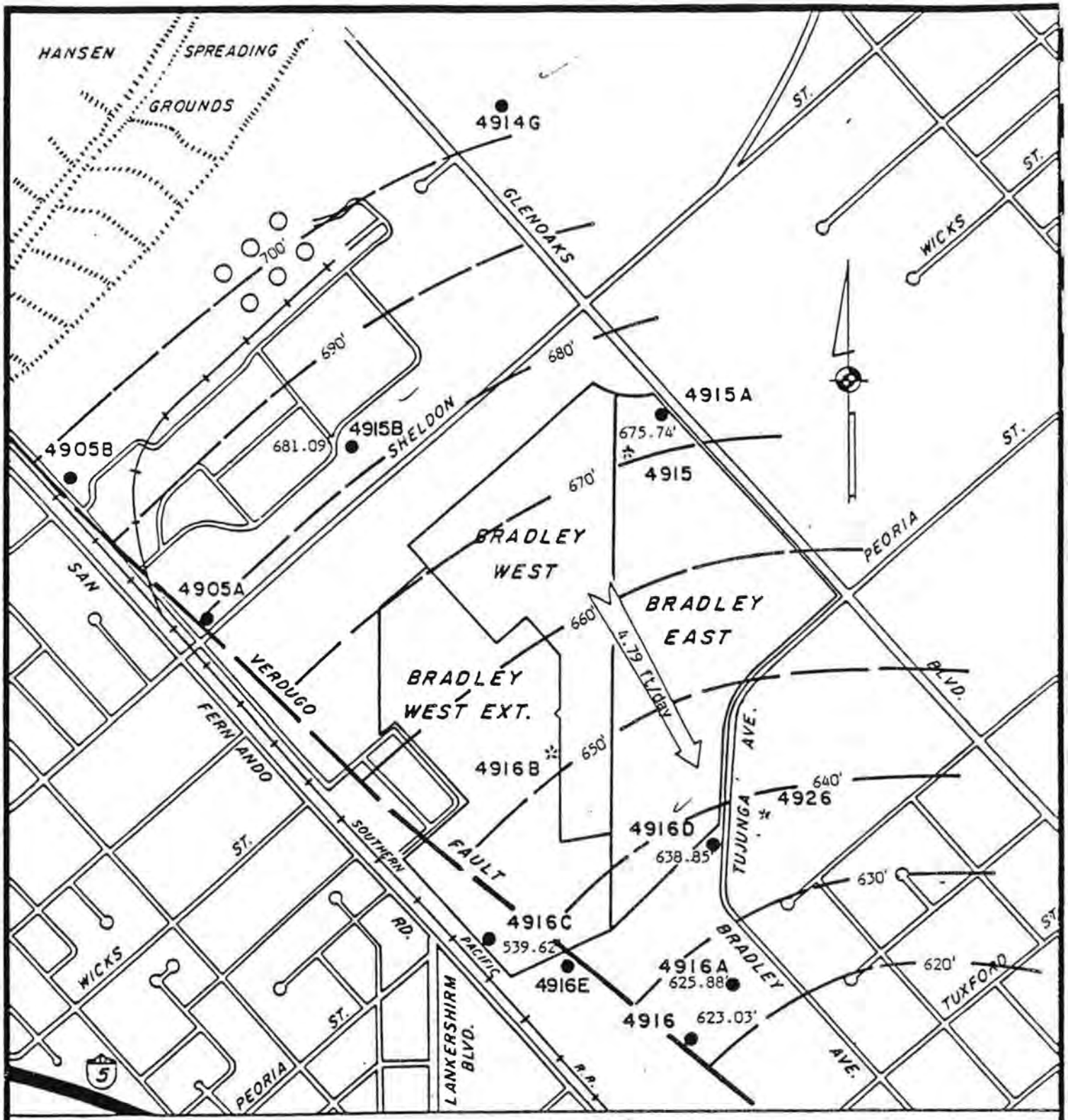
GROUND WATER QUALITY MONITORING - May be slight increase in chloride and TDS with lower water levels. No evidence of chloride increase due to landfill; no evidence of increase in bicarbonate due to the landfill. Liner and gas control system seem to be effective in preventing gas from reaching the water table.

REPORTS

SWAT Report (Rank 1) - June 25, 1987 - LeRoy Crandall & Associates

SWAT Supplement - March 21, 1988 - Law Environmental

REGIONAL BOARD -



EXPLANATION:

625.88' ● 4905B — EXISTING WELL, GROUND WATER ELEVATION

✲ 4926 — ABANDONED WELL

640' — GROUND WATER ELEVATION CONTOUR

4.79 ft/day — GROUND WATER VELOCITY & DIRECTION

REFERENCE: BASE MAP FROM U.S.G.S. 7.5' BURBANK (1973), SAN FERNANDO (1973), SUNLAND (1973) AND VAN NUYS (1973) QUADRANGLES.

0 1000 2000

SCALE IN FEET

83

12-19-87

WELL LOCATIONS, GROUND WATER LEVELS AND VELOCITY MAP

FIGURE 1

LAW ENVIRONMENTAL, INC.

STATUS AS OF MAY 1990

NAME - Branford Sanitary Landfill

OWNER - City of Los Angeles Bureau of Sanitation

LOCATION - Sun Valley District. Southwest of San Fernando Road, northwest of Tujunga Wash.

GEOLOGY - Holocene and Late Pleistocene alluvium just southwest of the Verdugo Fault. Old gravel pit.

GENERAL OPERATIONS - Class III landfill operated by the City of Los Angeles Department of Sanitation. Not open to the public. Accepted only solid, nonhazardous waste.

TIME OF OPERATION - Landfilling began on August 5, 1957 and continued through January 25, 1961. About 435,000 tons of trash was deposited.

MINIMUM ELEVATION OF TRASH - (70 feet below ground surface)

ELEVATION RANGE OF WATER TABLE - (In early 1988, depth to ground water was 334 to 344 feet)

GAS CONTROL SYSTEM -

VADOSE ZONE MONITORING -

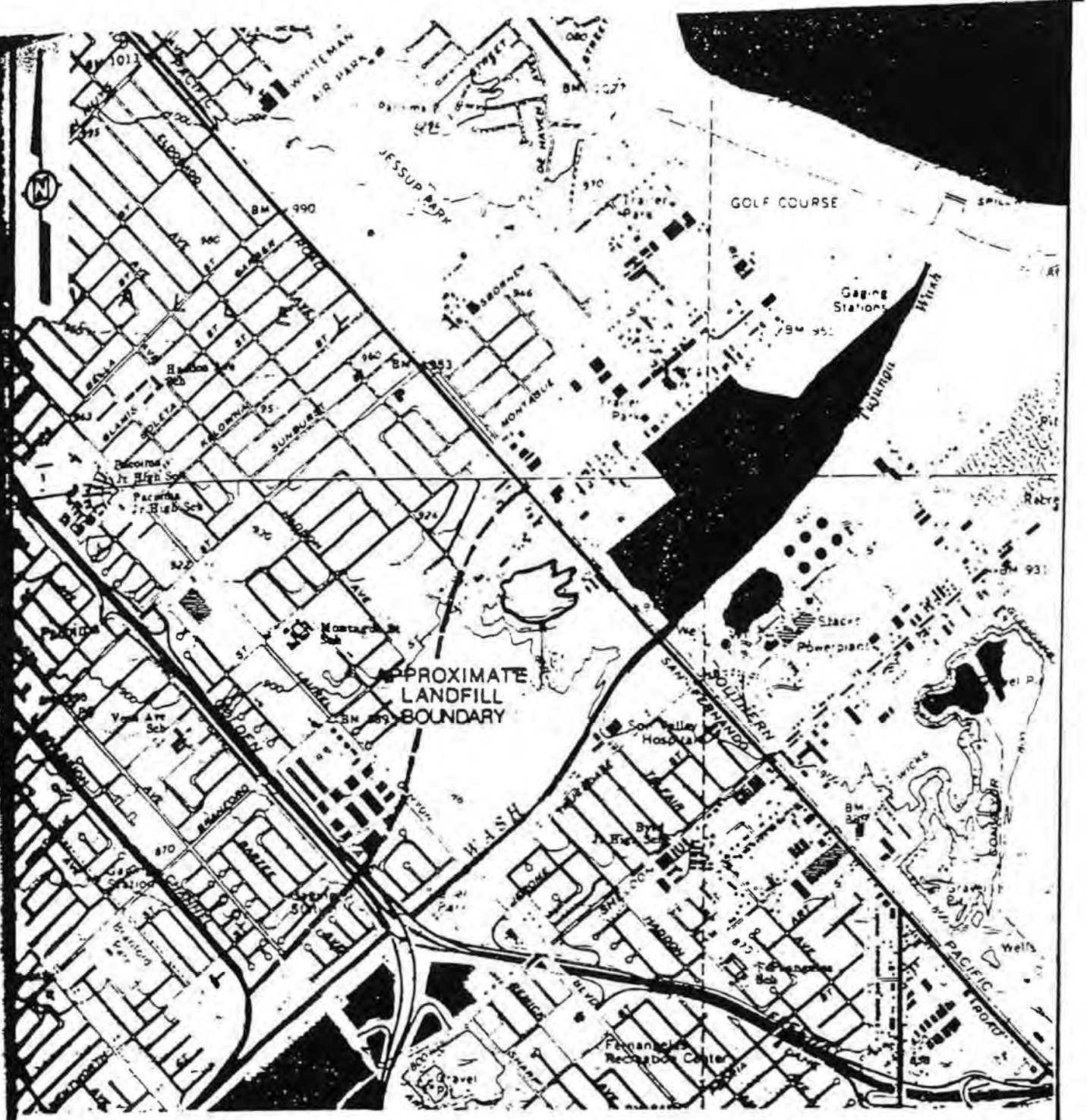
LEACHATE MONITORING -

GROUND WATER QUALITY MONITORING - Two SWAT wells drilled - one up-gradient (ITB-1) and one downgradient (ITB-2). Later, two additional wells were drilled downgradient on CalMat property.

SWAT REPORTS (Rank 2)

June 1988 - IT Corp.
Supplement (not reviewed)

REGIONAL BOARD -



EXPLANATION

SURFACE WATER RETENTION AREA

SCALE

0 2000 4000 FEET

REFERENCE:

USGS 7.5 MINUTE TOPOGRAPHIC MAPS OF VAN NUYS AND SAN FERNANDO, CALIFORNIA QUADRANGLES. DATED: 1966 AND PHOTOREVISED 1972 FOR BOTH SCALE: 1:24,000

"Do Not Scale This Drawing"

FIGURE 14

REGIONAL SURFACE WATERS
BRANFORD LANDFILL

PREPARED FOR

BUREAU OF SANITATION
DEPARTMENT OF PUBLIC WORKS
CITY OF LOS ANGELES

INTERNATIONAL TECHNOLOGY CORPORATION

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - CalMat Landfill (Sun Valley #3)

OWNER - CalMat Properties

LOCATION - Sun Valley District. Northeast of Glenoaks Boulevard and northwest of Peoris Street.

GEOLOGY - Holocene and Late Pleistocene alluvium in the Hansen subarea northeast of the Verdugo Fault.

GENERAL OPERATIONS - Covers 125 acres in an active gravel quarry. Open to the public since 1983 for general rubble and demolition debris (nondecomposable). No metal other than embedded rebar. As of July 1, 1988 contained about one million tons of trash. Receives about 75,000 tons per month. Has a 15-year permit (to 1998). Total capacity 75 million tons.

GAS CONTROL SYSTEM - Not needed because the trash is inert.

VADOSE ZONE MONITORING - One soil boring into the vadose zone. No contamination found.

LEACHATE MONITORING - No evidence of leachate production.

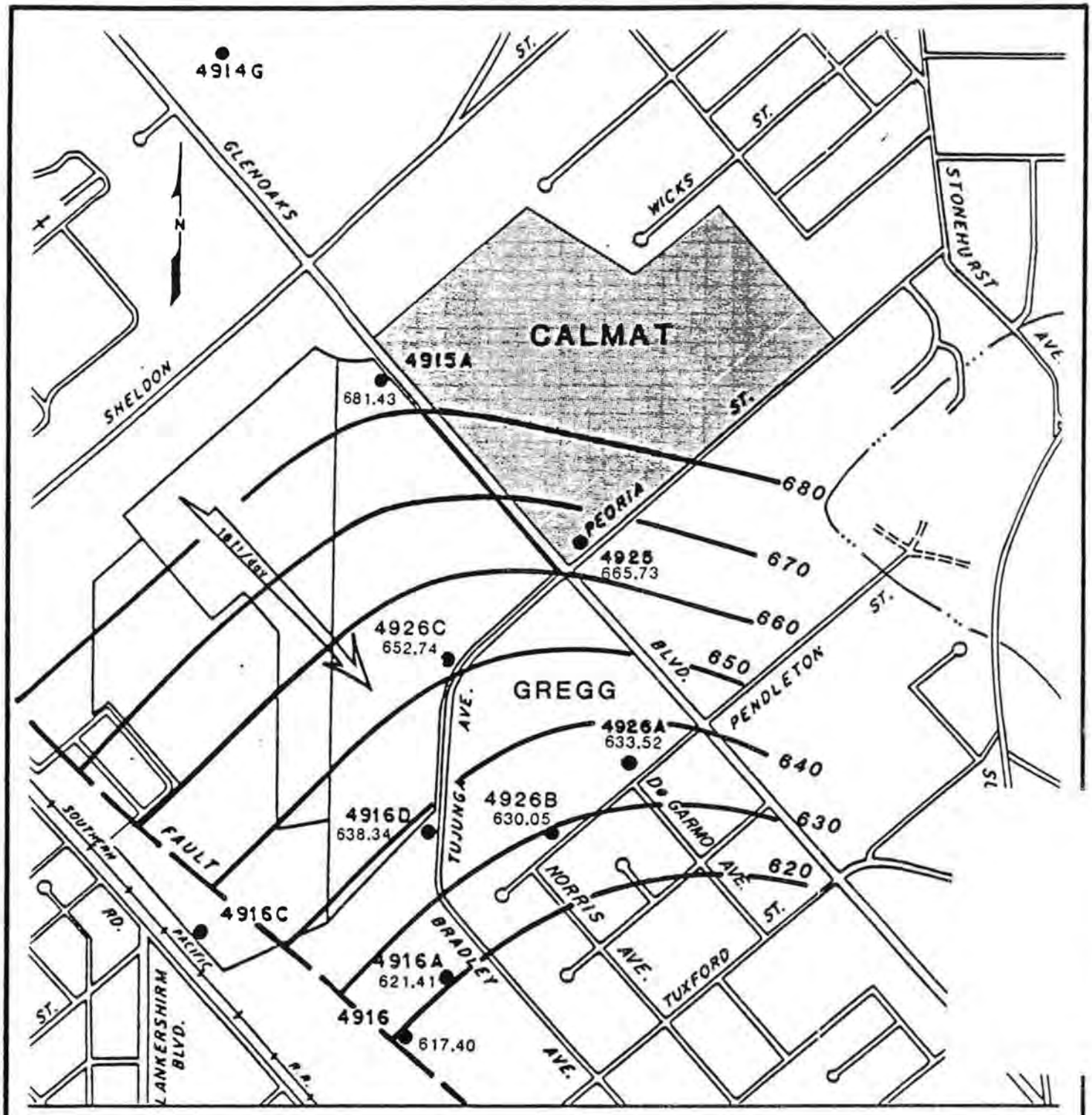
GROUND WATER QUALITY MONITORING - Background quality is obtained from the Bradley landfill complex SWAT wells. Quarterly sampling started in April 1988. There are regional plumes of TCE which are unrelated to the landfill. There are two different water types under the landfill which appear to be related to two different alluvial channels.

REPORTS

SWAT (Rank 2) - July 1, 1988 - Law Environmental

Supplement - July, 1989 - Law Environmental

REGIONAL BOARD -



4915A ● EXISTING WELL

617.40 WATER ELEVATION (feet above sea level)

630 GROUND WATER (elevation contour)

DIRECTION AND VELOCITY OF GROUND WATER FLOW (ft/day)

BASE MAP FROM U.S. GEOLOGICAL SURVEY 7½ MINUTE BURBANK, SAN FERNANDO, SUNLAND AND VAN NUYS QUADRANGLES (1973).

0 1000 2000

FEET

GROUND WATER ELEVATIONS

JUNE 1989

FIGURE 1

LAW ENVIRONMENTAL, INC.

PROJECT No. 58-7125 DATE 6/20/89 PROJ. MGR. A.C. DFTR. MG

DIETERICH POST REORDER NO. 126233

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - CalMat (Old) Class 3 Site (Bradley Landfill Complex)

OWNER - Valley Reclamation Company

LOCATION - Sun Valley District. Southeast of Sheldon Street and northeast of San Fernando Road.

GEOLOGY - Holocene and Late Pleistocene alluvium in the Hansen subarea northeast of the Verdugo Fault.

GENERAL OPERATIONS - Part of the 138-acre Bradley landfill complex. Formerly a concrete wash-out area. Now accepts only inert fill.

GAS CONTROL SYSTEM - Not needed.

VADOSE ZONE MONITORING - Tried nine borings in 1986. Couldn't drill through concrete and steel.

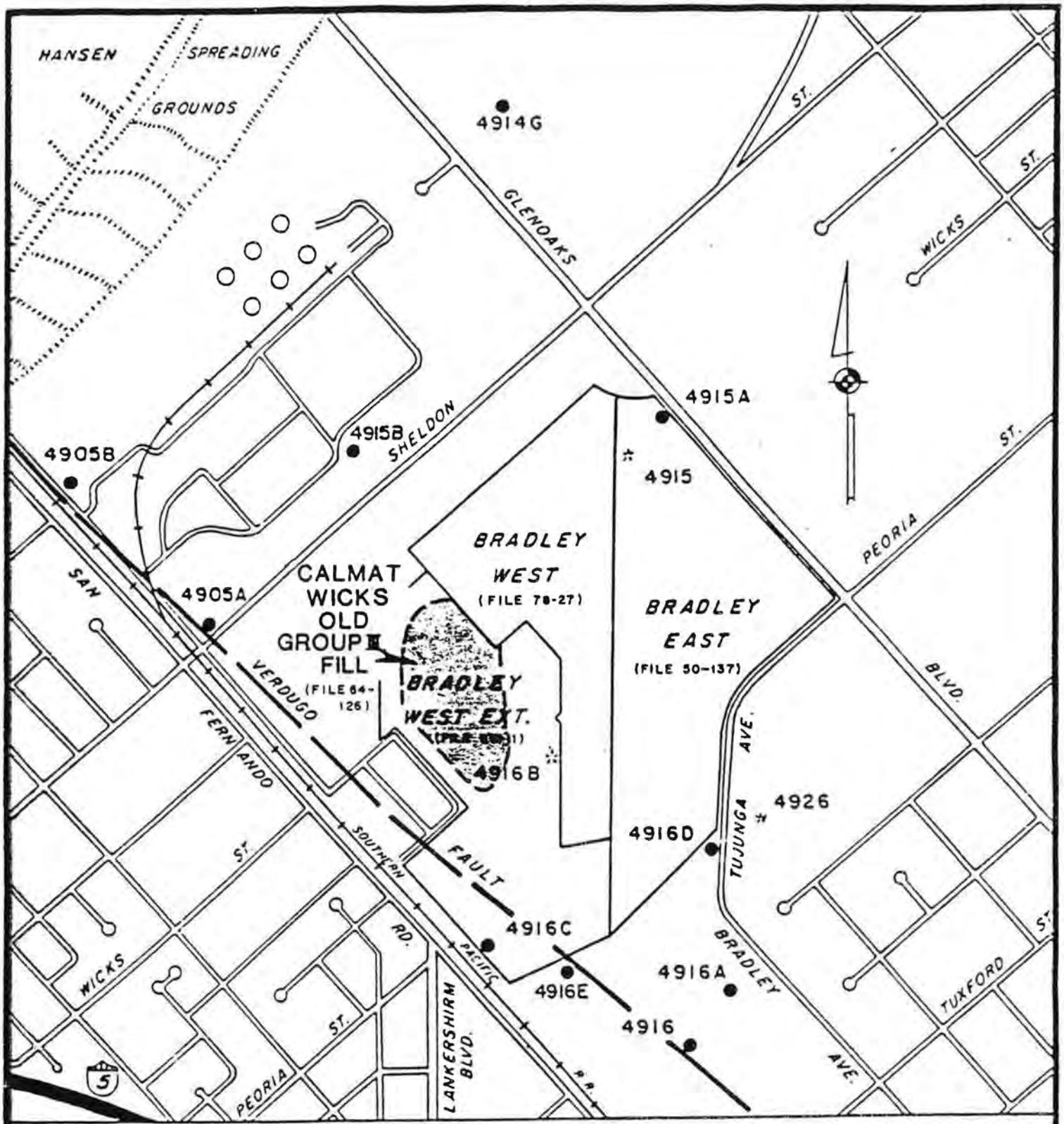
LEACHATE MONITORING - No liquid in any of the borings.

GROUND WATER QUALITY MONITORING - Started in this area in 1980. Higher total dissolved solids at lower levels is attributed to naturally higher salinities with depth. Increasing hardness could be related to landfill gas in one of the other landfills in the complex. High hardness is considered reversible.

REPORTS

SWAT Report (Rank) - June 26, 1987 - LeRoy Crandall & Assoc.

REGIONAL BOARD -



EXPLANATION:

- ● 4905B EXISTING WELL
- ✲ 4926 ABANDONED WELL

REFERENCE: BASE MAP FROM U.S.G.S. 7.5' BURBANK (1973), SAN FERNANDO (1973), SUNLAND (1973) AND VAN NUYS (1973) QUADRANGLES.

0 1000 2000
SCALE IN FEET

LOCATION OF MONITORING WELLS

LeROY CRANDALL AND ASSOCIATES

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - Gregg Pit/Bentz Disposal Sites

OWNER - CalMat Company

LOCATION - Southwest side of Glenoaks Blvd, between Pendleton Street and Tujunga Avenue.

GEOLOGY - Holocene and Late Pleistocene alluvium northeast of the Verdugo Fault. In the Hansen Subarea,

GROUND WATER FLOW DIRECTION - Mostly southerly, changing to southeasterly along the Verdugo Fault.

GENERAL OPERATIONS - Gregg Pit. About 30 acres. Operated from 1955 to 1963. Accepted combustible and noncombustible wastes, but specified wet or hazardous wastes were prohibited. The eastern portion was re-activated after the main Gregg fill closed in 1963. Bentz Dump. The re-activated area, which closed in 1963 to 1966, accepted only demolition debris. It was filled to street level but is still settling. Sign notes "clean fill dirt wanted". Estimate 3.5 million cubic yards in place in combined operation.

GAS CONTROL SYSTEM - Four wells and a gas flare were installed in 1987 (32 years after the first trash was placed). Produces about 310 cubic feet per minute of gas consisting of 30% methane, 30% carbon dioxide, water, nitrogen, and trace gases.

VADOSE ZONE MONITORING - Four wells were drilled into the fill, and one vadose zone well 47 feet deep.

LEACHATE MONITORING - A leachate testhole was drilled into the deepest part of the trash. No leachate found.

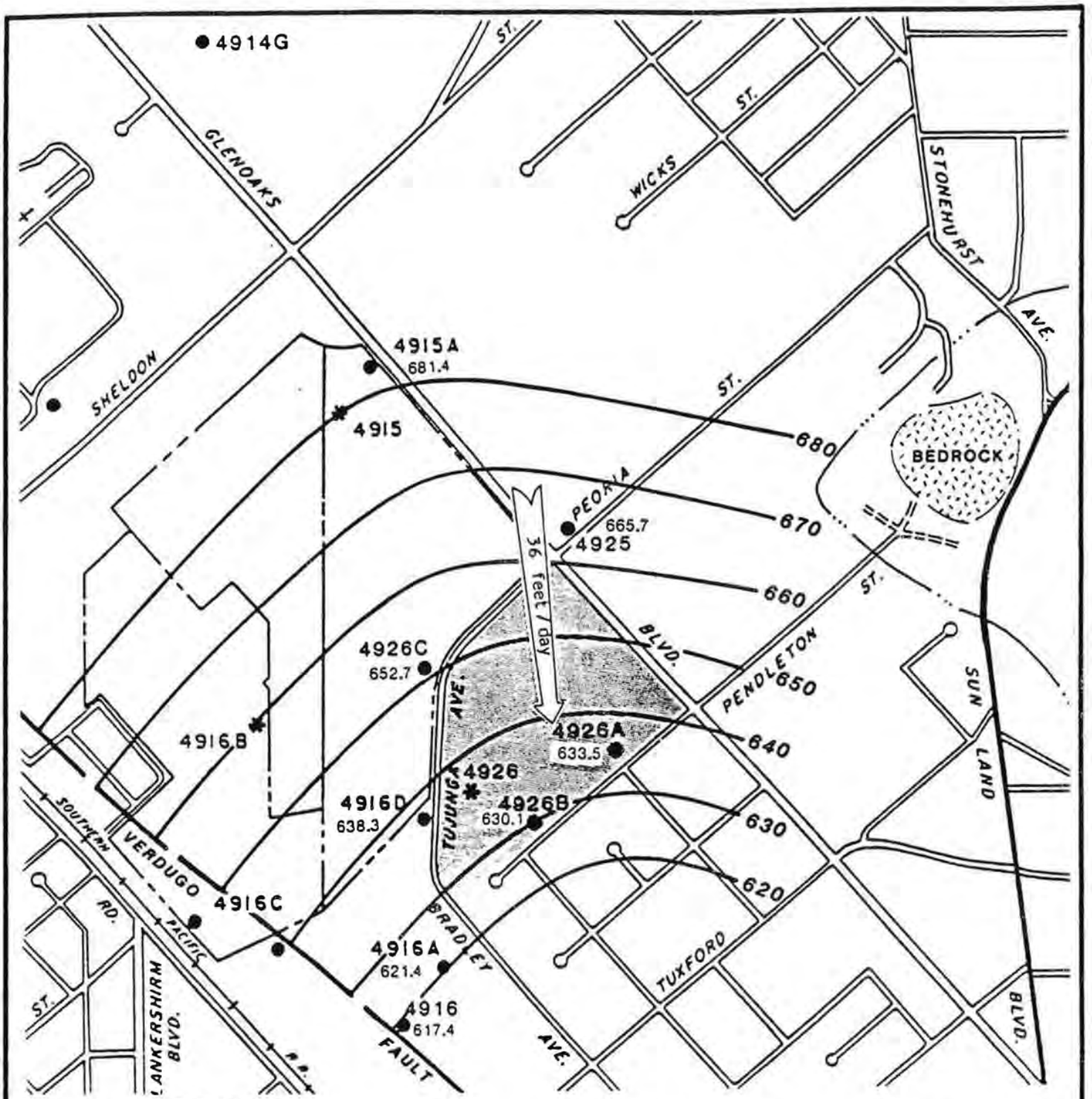
GROUND WATER QUALITY MONITORING - Share monitoring wells with the program for the Bradley landfill complex. Two monitoring wells drilled along Pendleton Street. Pumps with packers used to sample the uppermost 20 feet of saturation. Landfill gas contains no PCE, and the PCE found in upgradient wells is believed to be coming from an industrial area. Fill is not releasing hazardous wastes to ground water.

REPORTS

SWAT Report (Rank 2) - July 1, 1989 - Law Environmental

Supplement - June , 1989 - Law Environmental

REGIONAL BOARD - Approved report on 2/8/90.



LEGEND

- 4926 ● GROUND WATER MONITORING WELL LOCATION AND NUMBER
- 630.1 GROUND WATER ELEVATION IN FEET ASL
- 620 LINE OF EQUAL GROUND WATER ELEVATION IN FEET ASL.
- DIRECTION AND VELOCITY OF GROUND WATER FLOW

BASEMAP FROM U.S. GEOLOGICAL SURVEY 7.5 MINUTE BURBANK (1972) AND VAN NUYS (1972) TOPOGRAPHIC QUADRANGLES

0 2000 FEET

PROJECT No. SB-8628 DATE 09-06-89 PROJ. MGR. A.C. DFTR. M.N.

GREGG PIT / BENTZ DUMP
SUN VALLEY DISTRICT
LOS ANGELES, CALIFORNIA

GROUND WATER CONTOURS

JUNE 1989

FIGURE 1

LAW ENVIRONMENTAL, INC.

DIETERICH POST RECORDER NO. 128233

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - Hewitt Landfill (Closed)

OWNER - CalMat Properties

LOCATION - North Hollywood District, between the Hollywood Freeway and Laurel Canyon Blvd, and north of Sherman Way. Just southwest of the Rinaldi-Toluca well field.

GEOLOGY - Holocene and Late Pleistocene alluvium of the San Fernando Basin.

GROUND WATER FLOW DIRECTION - A little north of east.

GENERAL OPERATIONS - Operated by Los Angeles By-Products Company. Opened to the public from 1962 to November 12, 1975. Below Elevations 555 to 560, waste was limited to solid inert materials. Above those elevations, accepted solid commercial and residential waste.

GAS CONTROL SYSTEM - Installed during the mid-70's, and about 12 years after landfilling started.

VADOSE ZONE MONITORING - Two Timco teflon lysimeters were installed to depths of 50 and 52 feet. Too little moisture to sample.

LEACHATE MONITORING - A leachate well drilled in the trash showed moist conditions but no free leachate.

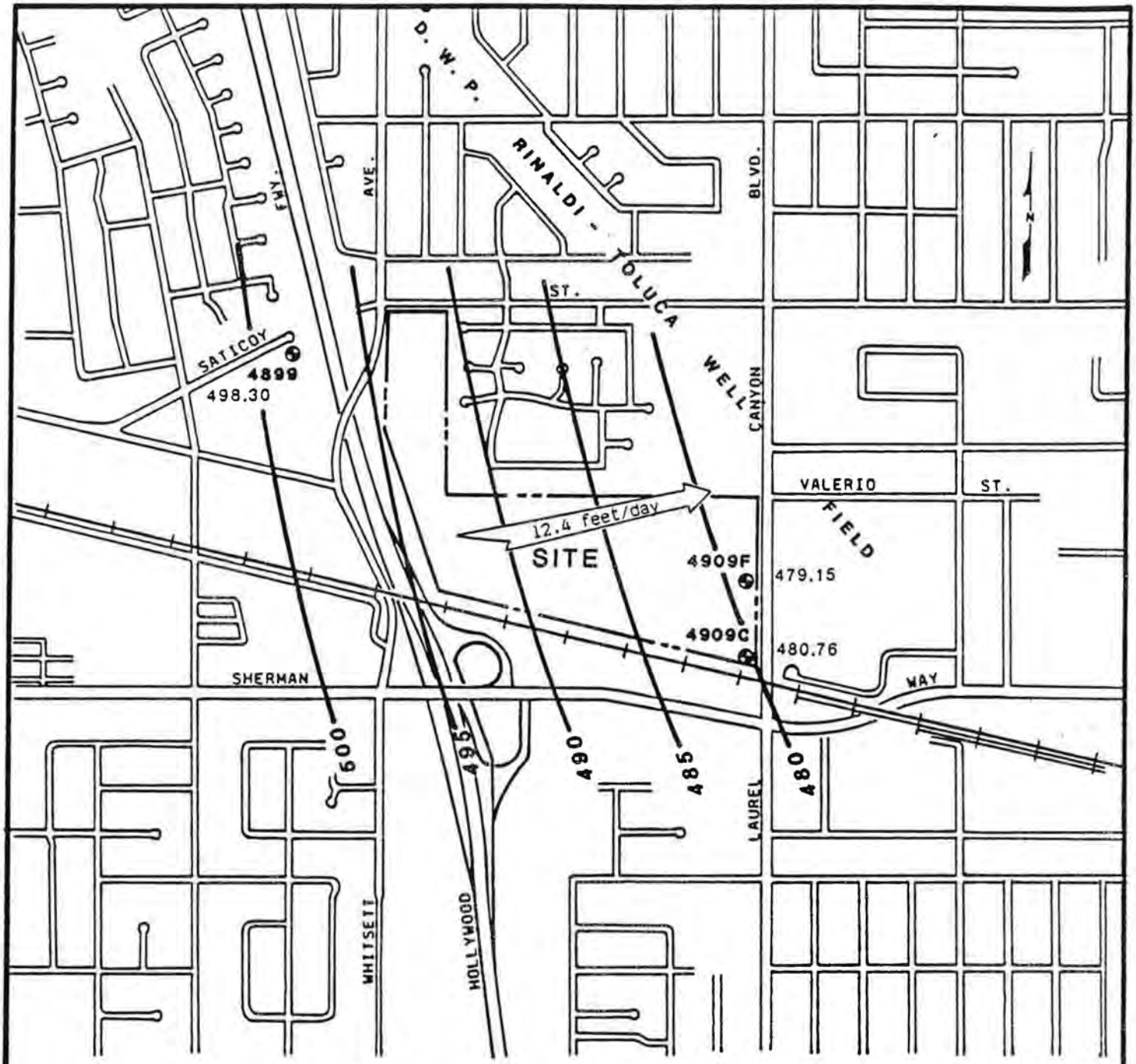
GROUND WATER QUALITY MONITORING - Has one upgradient and two down-gradient wells. Use pump with inflatable packer to sample the top 20 feet of the saturated zone. One downgradient well has four perforated zones with grout seals. Upgradient samples show TCE and PCE above action levels, and high nitrates (over 70 mg/1). These are believed to be derived from upgradient sources the plumes from which are passing under the landfill. High bicarbonates in downgradient wells may be related to gas production before the gas control system was in operation. Low chlorides indicate leachate can not be an important contributor to ground water.

REPORTS

SWAT (Rank 2) - June 6, 1988 - Law Environmental

Supplement - July 1, 1989 - Law Environmental

REGIONAL BOARD -



EXPLANATION

4909C — MONITORING WELL LOCATION AND NUMBER

-500- — LINE OF EQUAL GROUND WATER ELEVATION IN FEET ASL

498.30 — GROUND WATER ELEVATION IN FEET ASL

GROUND WATER FLOW DIRECTION AND VELOCITY

BASE MAP MODIFIED FROM U. S. GEOLOGICAL SURVEY 7.5 MINUTE VAN NUYS TOPOGRAPHIC QUADRANGLE, 1972.

0 1000
FEET

GROUND WATER CONTOURS

FEBRUARY 1989

93

FIGURE 1

LAW ENVIRONMENTAL, INC.

PROJECT No. SB-2052 DATE 06-09-89 PROJ. MGR. AC DFTR. MH

DIETERICH POST REORDER NO. 128233

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - Lopez Canyon Sanitary Landfill

OWNER - City of Los Angeles Bureau of Sanitation

LOCATION - In foothills north of Hansen Dam, between Lopez Canyon and Kagel Canyon.

GEOLOGY - Underlain by Modelo, Towsley and/or Pico Formations on the south limb of the Merrick (or Little Tujunga) Syncline. Quaternary terrace deposits near southeastern Boundary of the property. Thin Holocene alluvium in canyon bottoms. Beds dip away from the alluvium of San Fernando Valley. Also, the San Fernando Fault (a reverse fault) lies between the landfill and the San Fernando Valley alluvium.

HYDROGEOLOGY - Ground water is found in the thin Holocene alluvium and in fractures in the underlying bedrock. It is seasonal and may not be found in summer. Elevations of the ground water decrease to the north, but no single ground water surface occurs beneath the landfill.

GENERAL OPERATION - Began accepting refuse in 1975. Closed to the public. Accepts only nonhazardous solid waste fill of municipal origin on 392-acre site. Canyons A and B (presently active) are not lined. Disposal Area C (not yet significantly active) will be lined and equipped with subdrains, as well as leachate collection and removal systems.

GAS CONTROL SYSTEM - Recommended, but not installed as of July 1, 1989.

VADOSE ZONE MONITORING - Two lysimeters installed in the canyon below Disposal Area A.

LEACHATE MONITORING - A leachate well was drilled into the deepest part of the trash in Disposal Area B to a depth of 178 feet. No liquid was encountered during the drilling.

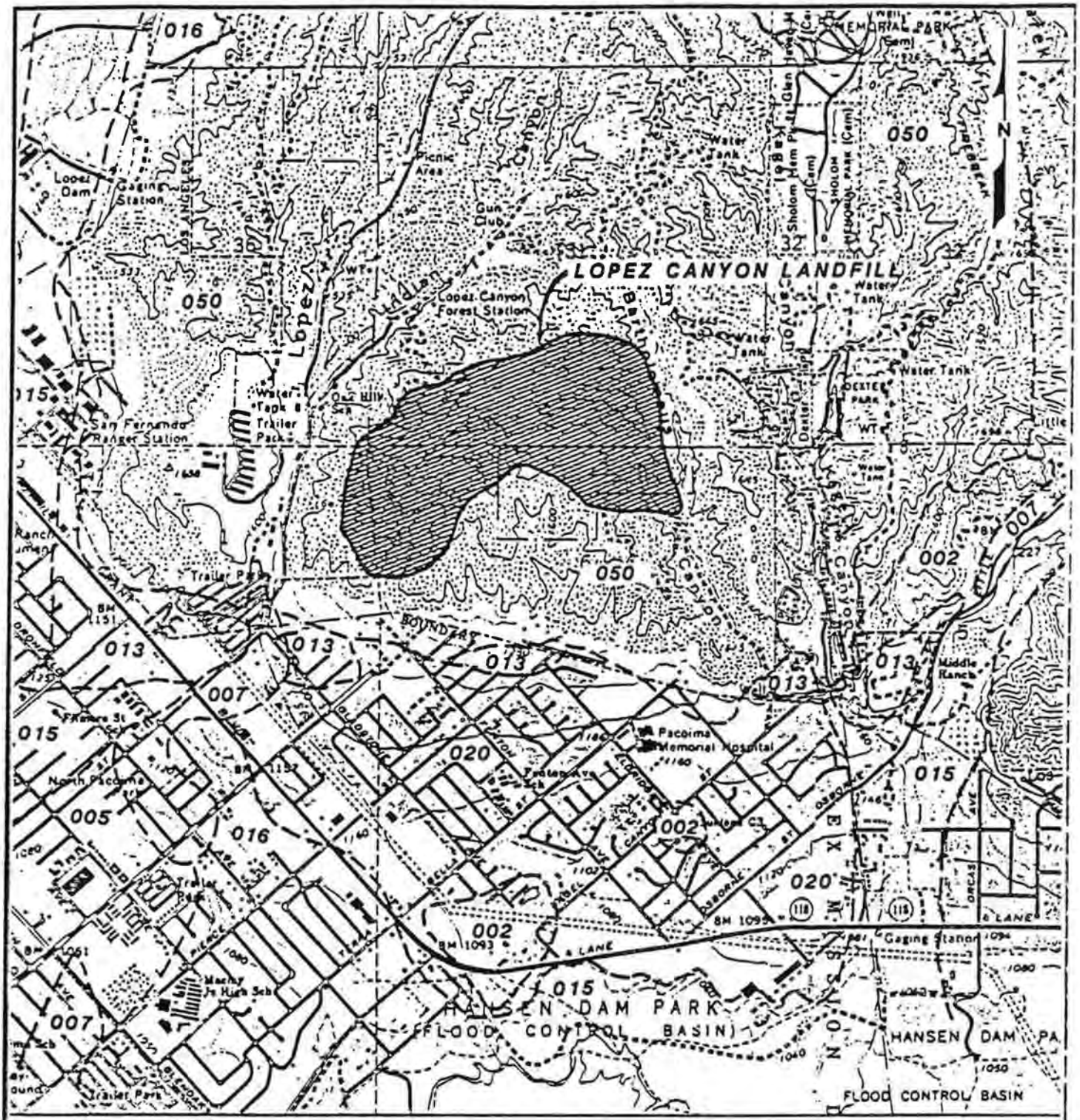
GROUND WATER QUALITY MONITORING - Two upgradient and three downgradient monitoring wells. Only ground water encountered was in a shallow silty sand near the lower debris basin in Disposal Area B. Native water is highly mineralized. The landfill is dry with no evidence of leakage.

SURFACE WATER AND SUBDRAIN SAMPLING - Site runoff is collected, then routed into storm drains. Acetone and toluene in runoff are believed due to a reaction between landfill gas and the runoff water. The gas control system is expected to reduce the formation of these substances.

REPORTS

SWAT Report (Rank 2) - June 22, 1988 - Law Environmental
SWAT Supplement - July 1, 1989 - Law Environmental

REGIONAL BOARD - Approved report on 2/8/90.



EXPLANATION

002	ALTAMONT CLAY LOAM
005	HANFORD FINE SANDY LOAM
007	HANFORD GRAVELLY SANDY LOAM
013	RAMONA LOAM
015	TUJUNGA FINE SANDY LOAM
016	YOLO LOAM
020	YOLO SANDY LOAM
050	UPPER LOS ANGELES RIVER SOIL (MOUNTAIN SOIL)

BASEMAP FROM U.S. GEOLOGICAL SURVEY 7½ MINUTE SAN FERNANDO (1972) AND SUNLAND (1972) QUADRANGLES.

SOIL TYPE MAP FROM LACFCD HYDROLOGY

SCALE: 1" = 2000'

SOIL TYPE MAP

Figure 10

Project No. 58-6425-11

LAW ENVIRONMENTAL INC.

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - Penrose and Newberry Landfills (closed); Strathern Pit.

OWNER - Los Angeles By-Products Company

LOCATION - Sun Valley District. North of Strathern Street on both sides of Tujunga Avenue.

GEOLOGY - Holocene and Late Pleistocene alluvium of the Tujunga alluvial cone. Southwest side of the Verdugo Fault.

GROUND WATER FLOW PATTERN - Formerly to the south, but now to the southwest because of pumping in the Rinaldi-Toluca well field.

GENERAL OPERATIONS - Penrose started accepting trash in 1960. Open to the public until March 1985. Dry nonhazardous waste (15 million cubic yards). Filled to 45 feet above grade. Settles 2 or more feet per year. Site is vacant except for an extraction/power generating plant. Newberry was open to the public from about 1948 to May 1955. Filled to level of surrounding streets with dry nonhazardous trash. Still settling. Low spots refilled with dirt. Two auto dismantlers and ready-mix plant on site.

GAS CONTROL SYSTEMS - Newberry has none. Penrose started operation in early 1980's.

VADOSE ZONE MONITORING - Pressure-vacuum lysimeters were installed in the Penrose and Newberry landfills and in the bottom of the Strathern Pit. Couldn't get a sample from any of these.

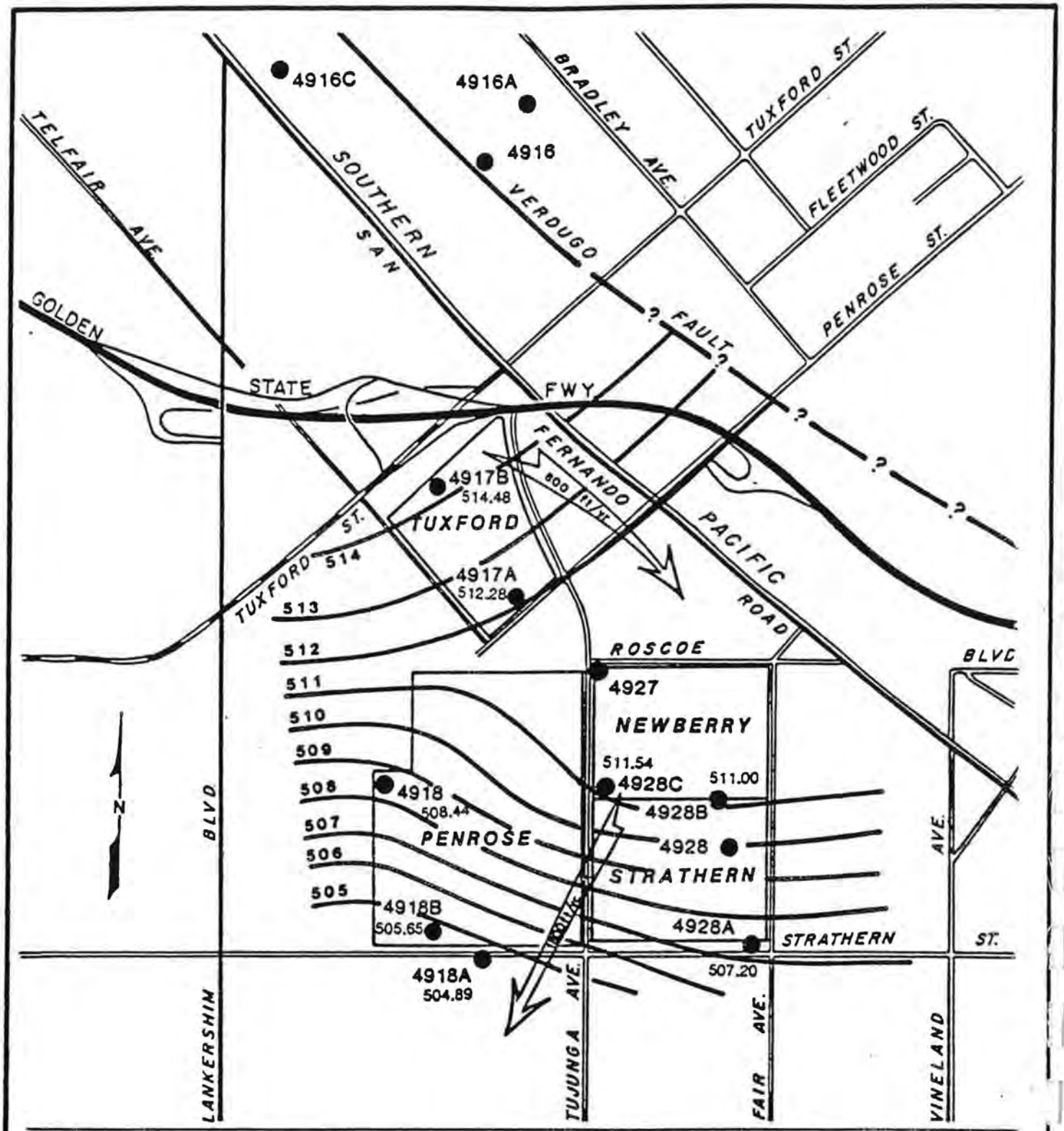
LEACHATE MONITORING - Penrose - Replacement gas well showed 8-30% (25% average) moisture in trash samples. No leachate was found. Newberry - In leachate test hole, moisture was 9.8-20.8%. No liquid leachate was found.

GROUND WATER QUALITY MONITORING - Five wells have been monitored since 1985. Two new SWAT wells were drilled. Pump with packer samples uppermost 20 feet of saturated zone. SWAT monitoring started in April 1988. Rise and fall of TCE concentrations seems to be related to regional plumes moving through the area. High nitrates in upgradient wells. High levels of carbon dioxide in wells may be related to the period of time when the Penrose gas collection system was undergoing improvements. General speaking, these landfills are not affecting ground water quality.

REPORTS

SWAT (Rank 2) - June 29, 1988 - Law Environmental
Supplement - July 1, 1989 - Law Environmental

REGIONAL BOARD - Approved report on 9/22/89.



4918 ● WELL LOCATION AND NUMBER

508.44 WATER ELEVATION (feet above sea level)

508 LINE OF EQUAL GROUND WATER ELEVATION (feet above sea level)

GROUND WATER FLOW DIRECTION AND VELOCITY (feet per year)

BASE MAP FROM U.S. GEOLOGICAL SURVEY 7.5 MINUTE BURBANK AND VAN NUYS QUADRANGLES, 1972.

0 1000 2000
FEET

GROUND WATER ELEVATIONS
FEBRUARY 1989

FIGURE 1

LAW ENVIRONMENTAL, INC.

PROJECT No. 38-1420 DATE 6/7/89 PROJ. MGR. A.C. DFTR. M.G.

STATUS AS OF MAY 1990

NAME - Sheldon-Arleta Landfill

OWNER - City of Los Angeles Bureau of Sanitation

LOCATION - Sun Valley District. Near Hollywood and Golden State Freeways. Just to east and southeast of Tujunga Spreading Grounds.

GEOLOGY - Holocene and Late Pleistocene alluvium southwest of the Verdugo Fault. Old gravel pit.

GROUND WATER FLOW DIRECTION - Southeasterly to south-southeasterly, depending on spreading in the Tujunga Spreading Grounds.

GENERAL OPERATION - Started accepting trash (low moisture, nonhazardous) as of February 1962. Only inert materials allowed below Elevation 700. Filled by July 1974, at which time about 6 million tons of trash had been deposited. Partial clay barriers to prevent inundation of trash by water spread at the Tujunga Spreading Grounds.

MINIMUM ELEVATION OF TRASH - 700

RANGE OF ELEVATIONS OF THE WATER TABLE -

GAS CONTROL SYSTEM - In 1967, about 5 years after the start of operation, methane was detected in an adjoining residential area, and raised the concern about explosions. In mid-1969, the first gas extraction system was installed, consisting of 3 wells in native soil. In 1971, eighteen 25-foot wells were installed, with the collected gas burned and discharged to the atmosphere. In 1973, a 100-foot well was installed. In 1974-76, the original 3 wells and the landfill gas was delivered to the Vallley Steam Plant. In 1980, eighteen 100-foot wells were drilled to replace the earlier 25-foot holes.

VADOSE ZONE MONITORING - Only 2 of 25 soil samples showed moisture above 25%. Additional sampling will be done after spreading.

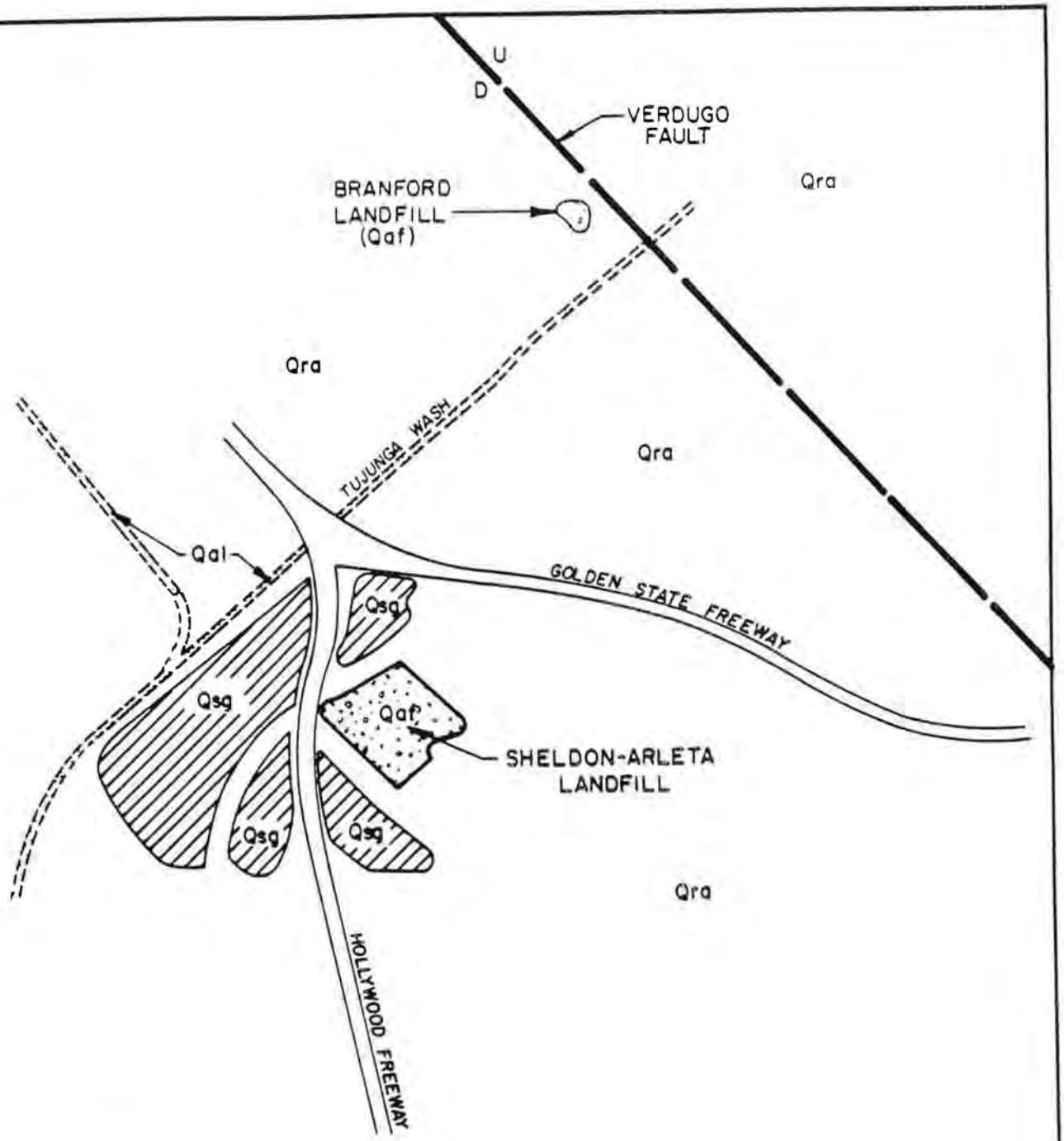
LEACHATE MONITORING - No evidence of leachate buildup within the landfill. Will be sampled again after spreading at the Tujunga Spreading Grounds.

GROUND WATER QUALITY MONITORING - A well drilled downgradient (Wicks Well) showed a sharp increase in bicarbonate hardness and carbon dioxide between 1967-72, then a sharp decrease in 1972 after the gas control began operating effectively. This same "temporary wave" of hardness may have later affected some of the Rinaldi-Toluca production wells.

REPORTS

SWAT Report (Rank 1) - May 7, 1987 - IT Corp.

REGIONAL BOARD - Approved report on 2/9/90.



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LEGEND

Qaf - ARTIFICIAL FILL

Qsg - TUJUNGA SPREADING GROUNDS

Qal - STREAM CHANNEL DEPOSITS

Qra - RECENT ALLUVIUM

U
D
INFERRED FAULT TRACE

REFENCE: SAN FERNANDO VALLEY REFERENCE REPORT OF REFEREE, STATE WATER RIGHTS BOARD, JULY 1962.

FIGURE 2A

GENERALIZED GEOLOGIC MAP
SHELDON-ARLETA LANDFILL AREA

PREPARED FOR

BUREAU OF SANITATION
DEPARTMENT OF PUBLIC WORKS
CITY OF LOS ANGELES

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - Sunshine Canyon Sanitary Landfill

OWNER - Browning-Ferris Industries

LOCATION - Southeast margin of the Santa Susana Mountains, west of the Golden State Freeway.

GEOLOGY - Underlain by the Towsley formation which has been folded along east-west axes into the Pico Anticline and Oat Mtn. Syncline. Unnamed fault ("A") trends southeasterly across the site. Towsley formation is mainly sandstone with lesser amounts of siltstone, mudstone and conglomerate. The interstitial permeability of the Towsley is low as is the secondary hydraulic conductivity of the fracture systems. Surficial deposits consist of alluvium, colluvium, and landslides as much as 50-feet thick.

HYDROGEOLOGY - Sunshine Canyon is separated from the San Fernando Valley by a narrow, rock-walled canyon with thin alluvium. Upstream from this constriction, the alluvium is recharged by slope runoff and direct penetration of rainfall. 24 piezometers were drilled into the alluvium and the Towsley formation. Ground water was found in the alluvium and beneath the lower slopes in the Towsley. Ground water flow follows the axes of the canyons.

GENERAL OPERATION - There is an existing 230-acre Class III landfill which has operated continuously since 1958. The present permit expires in September 1991. Accepts only nonhazardous wastes at 6400 tons per day or about 2.0 million tons per year. Expect an increase to 12,000-14,000 tons per day.

GAS CONTROL SYSTEM - In operation since November 1981. Extracts (9 wells) processes, sells or flares the landfill gas (up to 3.0 million cubic feet per day).

VADOSE ZONE MONITORING - No volatile organics detected in five lysimeter wells.

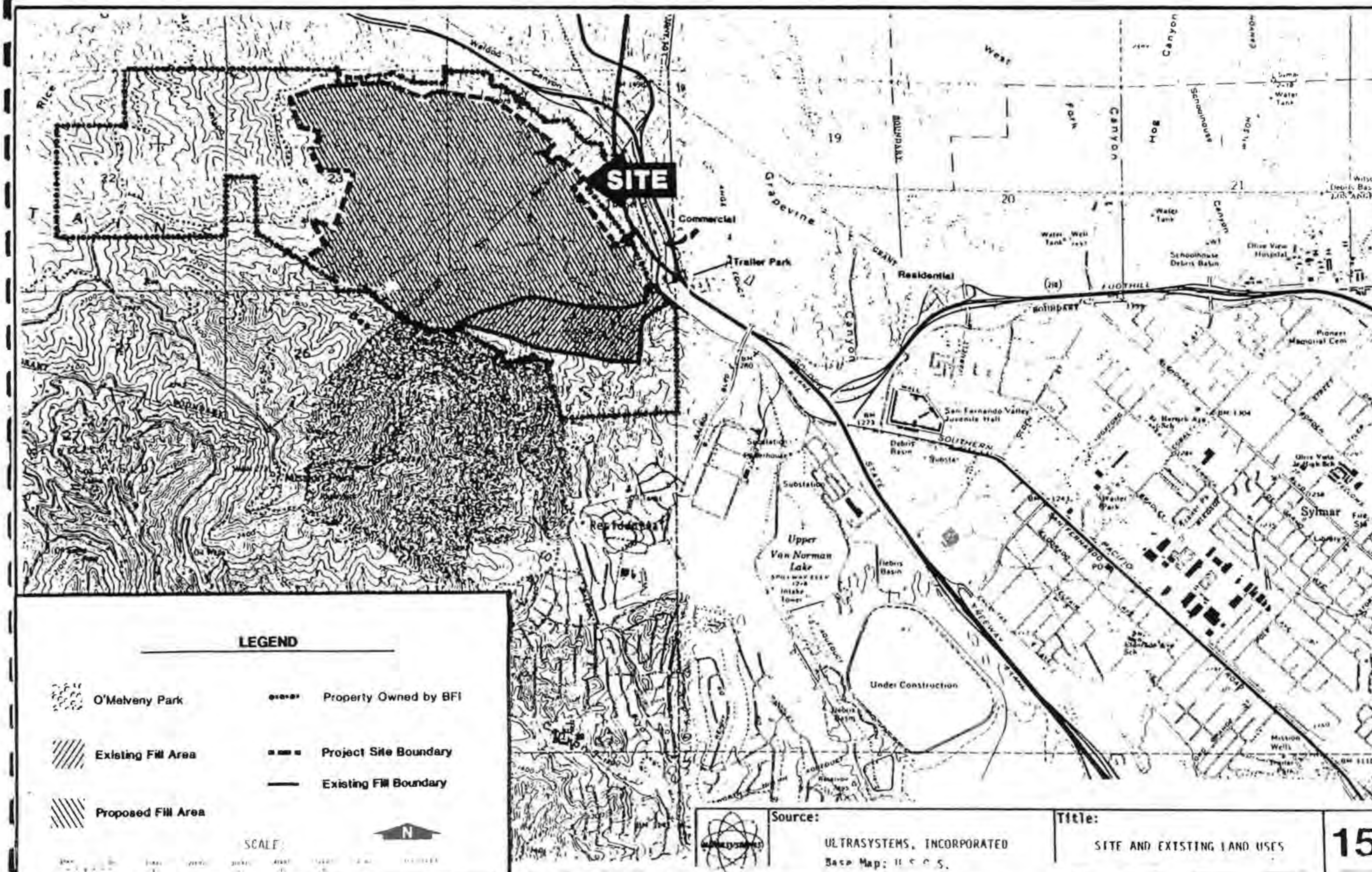
LEACHATE MONITORING - The main concern is the potential for leachate leaving Sunshine Canyon and joining the ground water of the San Fernando Valley.

GROUND WATER QUALITY MONITORING - The native waters of the Towsley formation are of poor quality because of excessive TDS, but rather low in chloride. The appearance of much higher chlorides in downgradient monitoring well MW-1 raises the suspicion of leachate contribution from the landfill, but there are other possible explanations, The sources(s) of these chlorides have yet to be defined.

REPORTS

SWAT Report (Rank 2) - July 1, 1988 - Purcell, Rhoades & Assoc.
SWAT Addendum - July 26, 1989 - Purcell, Rhoades & Assoc.
DEIR - Landfill Extension - April 1989 - Ultrasystems

REGIONAL BOARD -



Source: ULTRASYSTEMS, INCORPORATED
Base Map: U.S.G.S.

Title: SITE AND EXISTING LAND USES

15

STATUS AS OF MAY 1990

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - Tuxford Landfill (Closed)

OWNER - Los Angeles By-Products Company

LOCATION - Sun Valley District. Just south of Golden State Freeway on the west side of Tujunga Avenue

GEOLOGY - On alluvial cone of Tujunga Wash southwest of the Verdugo Fault. Former gravel pit (20 acres).

GROUND WATER FLOW DIRECTION - Southeasterly

GENERAL OPERATIONS - Open to the public. Accepted only dry nonhazardous wastes.

TIME OF OPERATION - Opened on April 21, 1948. Closed temporarily, then re-opened in 1955. Ceased to accept trash on October 1, 1960.

MINIMUM ELEVATION OF TRASH - Original bottom of the gravel pit was about Elevation 710.

ELEVATION RANGE OF WATER TABLE - 514 in February 1989. Possibly as high as 697 in 1948.

GAS CONTROL SYSTEM - Started operation between June 1988 and June 1989. Fill has an impermeable cover (paving).

VADOSE ZONE MONITORING - Two wells drilled to 50 feet. Can't generate enough suction to get a liquid sample.

LEACHATE MONITORING - Five wells drilled to 100 feet. No leachate encountered.

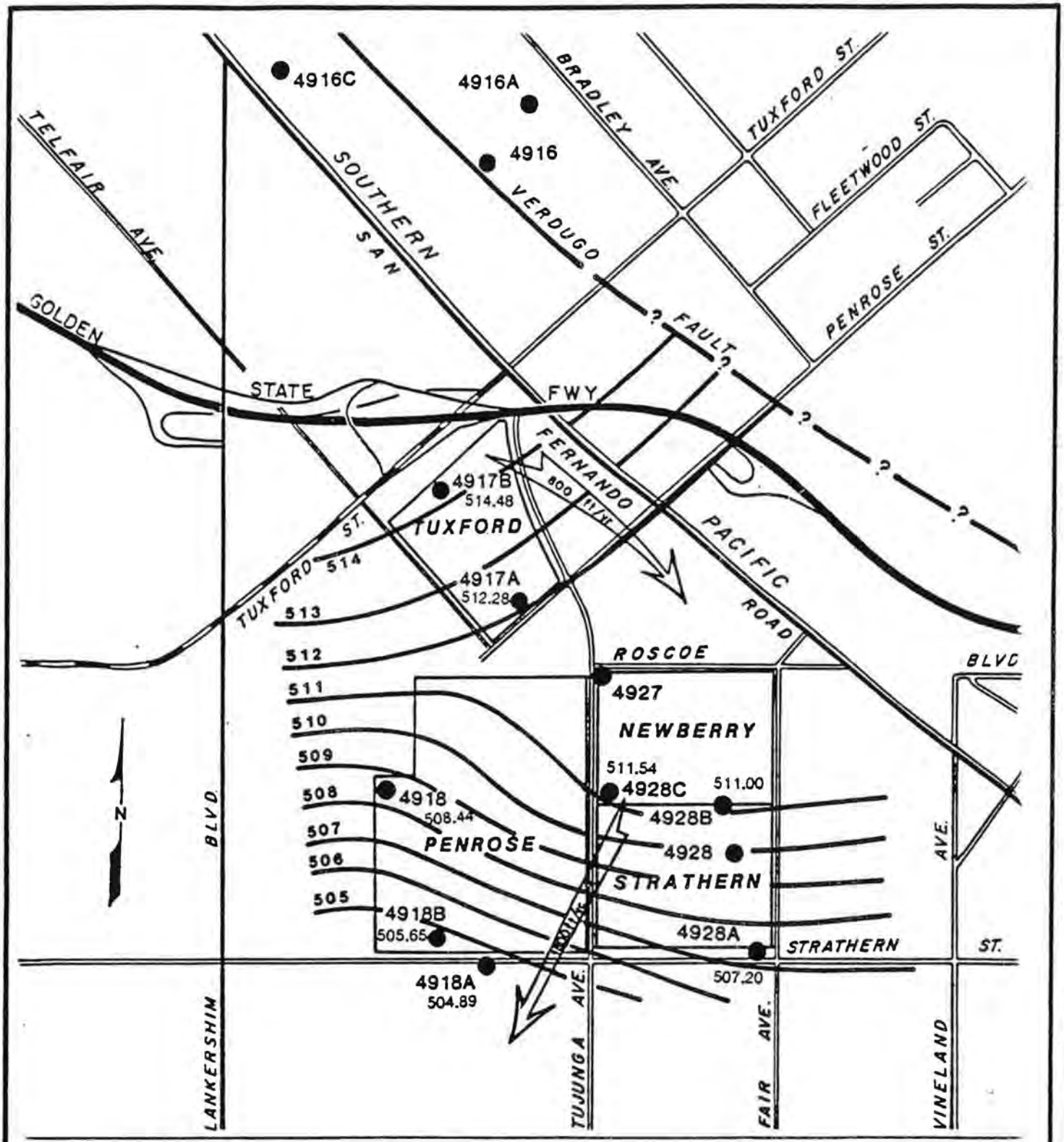
GROUND WATER QUALITY MONITORING - Shares monitoring wells with Penrose/Newberry/Strathern. Sample by a pump with packer. Two wells upgradient and two wells downgradient. VOCs are above action levels -- appear to be coming from upgradient. High nitrates in two upgradient wells (84 and 88 mg/1) are probably related to earlier dairy operations. Landfill does not appear to be generating any hazardous pollutants.

SWAT REPORTS (Rank 2)

June 29, 1989 - Law Environmental

Supplement - July 1, 1989 - Law Environmental

REGIONAL BOARD -



4918 ● WELL LOCATION AND NUMBER

508.44 WATER ELEVATION (feet above sea level)

508 LINE OF EQUAL GROUND WATER ELEVATION (feet above sea level)

GROUND WATER FLOW DIRECTION AND VELOCITY (feet per year)

BASE MAP FROM U.S. GEOLOGICAL SURVEY 7.5 MINUTE BURBANK AND VAN NUYS QUADRANGLES, 1972.

0 1000 2000
FEET

GROUND WATER ELEVATIONS
FEBRUARY 1989

FIGURE 1

LAW ENVIRONMENTAL, INC.

PROJECT No. 58-7420 DATE 6/7/89 PROJ. MGR. A.C. DFTR. M.G.

DIETERICH POST REORDER NO. 128233