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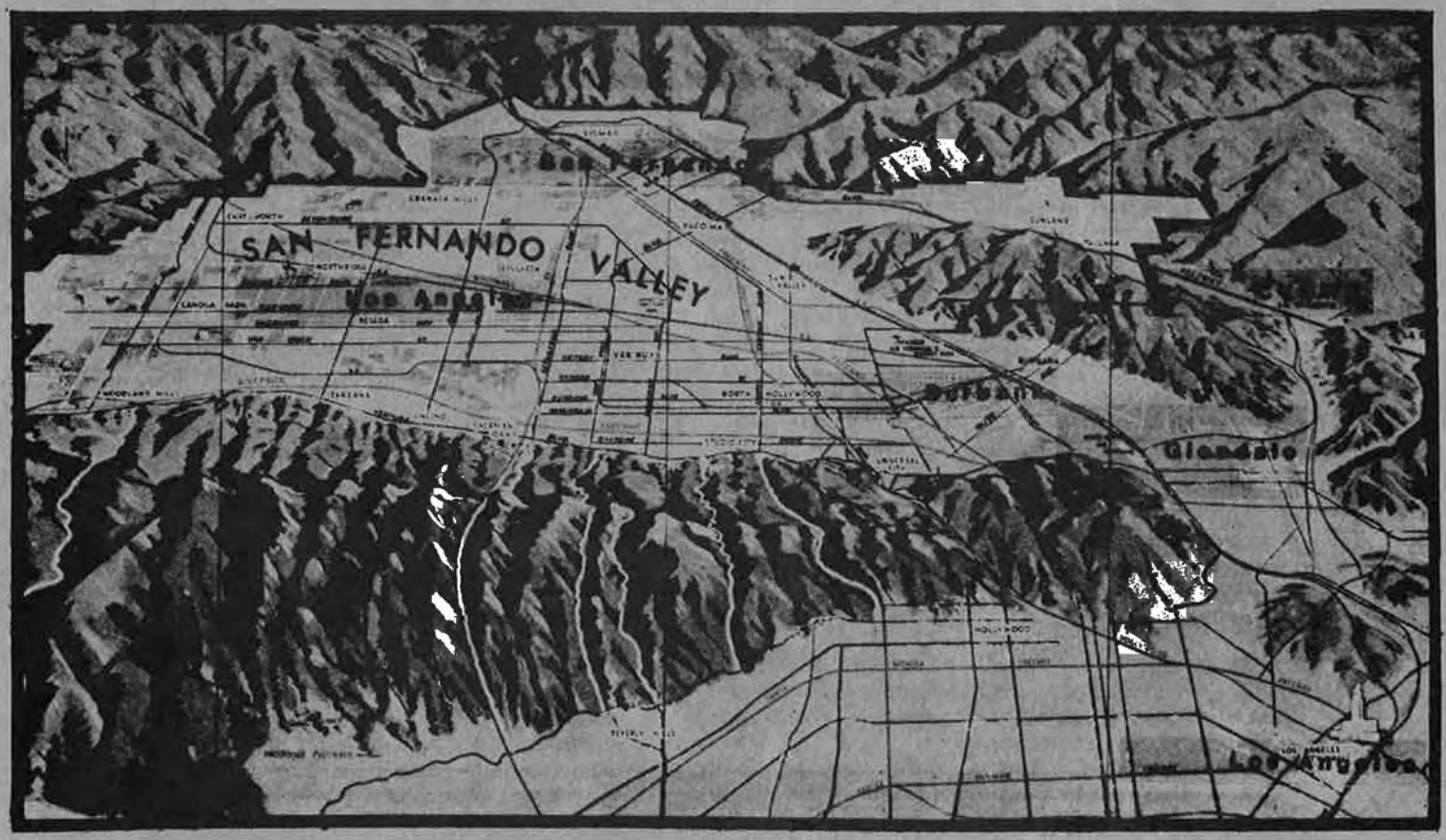
UPPER LOS ANGELES RIVER AREA WATERMASTER

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, 1989 - SEPTEMBER 30, 1990



MAY 1991

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MELVIN L. BLEVINS — WATERMASTER
Office Location — Room 1455
111 North Hope Street
Los Angeles, CA 90012
Telephone (213) 481 6177

MAILING ADDRESS:
ULARA Watermaster
P.O. Box 111, Rm. 1455
Los Angeles, CA 90051

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

OCTOBER 1, 1989 - SEPTEMBER 30, 1990

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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 and was replaced by Judge Sally Disco on May 25, 1990. Subsequently, Judge Jerold A. Krieger replaced Judge Disco on April 11,1991.

This report describes the water rights in each basin, lists the allowable pumping for the water year 1990-91, and indicates the water in storage to the credit of each party as of October 1, 1990. 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, Rockwell, Mobil Oil, Thrifty Oil, Unocal Corporation, and Wickes Co., Inc. Sections 2.5 to 2.7 of the Policies and Procedures were revised and approved on April 17, 1990 (Appendix E).

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, eleven companies are dewatering and reporting to the Watermaster's office (Appendix H).

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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. As a result of these meetings a solution to the problem has been obtained. In Disney's letter of December 13, 1990 they indicated that their use of groundwater would be eliminated within the next three years. Also, the continued use of the Headworks Spreading Grounds was in the process of being implemented.

Under the Judgment, CalMat Co. (Defendant No. 18) was 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 CalMat Co. a 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.

In the previous ULARA Watermaster Report (May 1990), there was some concerned expressed regarding Physical Solution pumpers Toluca Lake and Sportsmen's Lodge. It has been resolved and no further action is required.

The Environmental Protection Agency (EPA) is overseeing a Basin-Wide Remedial Investigation being conducted by the Los Angeles Department of Water & Power (LADWP), to study the groundwater flow patterns and the nature and extent of groundwater contamination within the eastern half of the San Fernando Valley Basin

EPA signed a cooperative agreement with LADWP in July 1987 allowing Los Angeles to spend federal money to define the extent of groundwater contamination in four National Priority List (NPL) or Superfund sites. Fact sheet No. 5 (Appendix I) provides background and the status of the Superfund cleanup studies for the San Fernando Valley.

As part of the San Fernando Valley Superfund project, the EPA completed a report in March of 1991 defining the water rights and water use options in the Valley. The ULARA Watermaster and Staff was involved in the preparation and approval of this report.

In April of 1991, the ULARA Watermaster and parties were informed that the Burbank Operable Unit Consent Decree was signed by the EPA - Region IX, Regional Administrator, and representatives of Lockheed, Weber Aircraft, and the City of Burbank. This will provide financial support for the on-going Superfund studies and cleanup.

LADWP proposes to construct and operate a project referred to as the East Valley Water Reclamation Project (EVWRP). The EVWRP will be located in the northeast portion of the San Fernando Valley. The purpose of the project is to use reclaimed municipal wastewater produced by the Tillman Water Reclamation Plant. Reclaimed water now being discharged into the Los Angeles River will be utilized for groundwater recharge, irrigation, and industrial users. A draft EIR on this project was completed in March 1991. In addition to the EVWRP project, a pilot project to investigate the feasibility of using Los Angeles River (LAR) water, containing reclaimed water from the Tillman Water Reclamation Plant, to recharge the San Fernando Basin is in progress. The LAR water is planned to be spread at the Headworks Spreading Grounds. All the necessary permits from the L. A. Regional Board have been secured, with spreading to commence in May 1991. The pilot project would spread only 1 cubic foot per second (cfs), with extractions to recover the spread water of 1.5 cfs.

In dealing with the amount of stored groundwater, change in groundwater storage and the groundwater contours for the ULARA, a number of new monitoring wells will be required in the near future. These test wells will provide more control on the water levels and underflow conditions, required by the Judgment. In the Superfund work a number of Vertical Profile Borings (VPB - test holes) were installed at various depths. This may require a re-evaluation of the change in groundwater storage now that a better knowledge of the true water table is available.

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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FOR WATER YEAR 1989-90

Report Prepared By:

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

Gene L. Coufal.....Hydrologic Engineer and Assistant Watermaster

Peter Kavounas.....Hydrologic Engineering Associate and Staff

Victor J. Vargas.....Hydrologic Engineering Assistant and Staff

Moseis R. Garcia.....Office Engineering Technician and Staff

Other Watermaster Staff

Ellen G. Enderbrock.....Hydrologic Engineering Assistant

Michael J. Stope.....Hydrologic Engineering Assistant

Anna Marie Gilmore.....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, this case was assigned to Judge Miriam Vogel. On May 25, 1990, Judge Sally Disco replaced Judge Vogel and on April 16, 1991, Judge Jerold A. Krieger replaced Judge Disco. Judge Krieger 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 were assigned equal rights to pump the safe yield of the basin (6,210 acre-feet), after subtracting the overlying pumping of two private parties. Thus, 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 his property and there are no longer any overlying rights to extract and use water on his lands. The only active overlying rights as of 1991 are those of Meurer Engineering.

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 1989-90 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, 1990, are:

City of Burbank

Fred Lantz (President)

Ross Burke (Alternate)

City of Glendale

Michael Hopkins (Vice-President)

Donald Froelich (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 1989-90 water year, the Administrative Committee met on April 17, 1990. The following items were discussed at the April 17 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 1988-89 Watermaster Report.

Summary of 1989-90 Operating Conditions

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

Rainfall on the valley fill area was 49 percent of normal as compared to 55 percent of normal the year before. Surface runoff leaving the valley at Gage F-57C-R for 1989-90 was 167,639 acre-feet. The amount spread by the LACDPW in its spreading basins in 1989-90 was 4,154 acre-feet, a decrease from 11,084 acre-feet spread in 1988-89. Total precipitation falling on the San Fernando Valley and its tributary hill and mountain areas was estimated to be 261,844 acre-feet for the 1989-90 water year. Of this total, approximately 62,146 acre-feet flowed from the valley as storm runoff and rising ground water, leaving 199,738 acre-feet which was consumed or recharged within the area (76 percent of the total).

Ground water extractions decreased in the Sylmar, Verdugo, and San Fernando Basins and increased in the Eagle Rock Basin during 1989-90. Total ULARA extractions amounted to 96,689 acre-feet. 3,451 acre-feet represents non-consumptive use pumping (see Table 13). Extractions used within ULARA decreased by 862 acre-feet from last year.

For ULARA, gross imports decreased by 19,658 acre-feet, while imports used within ULARA also decreased by 15,116 acre-feet. Exports of Owens River water decreased. The total amount delivered to water users within ULARA decreased by 18,410 acre-feet, or 5 percent.

Sewage export was estimated at 175,000 acre-feet in 1989-90, a decrease of 3 percent. Total reclaimed water used in ULARA (cooling towers, irrigation, etc.) decreased 2,433 acre-feet. The total water reclaimed decreased from 78,898 acre-feet to 75,824 acre-feet, a decrease of almost 4 percent. Most of the reclaimed water is discharged to the Los Angeles River.

A total of 4,154 acre-feet of native water was spread during 1989-90 (no Owens River water spread).This represents a decrease of 6,930 acre-feet from last year.

Ground water storage in the San Fernando, Sylmar, and Verdugo Basins decreased by an estimated 23600 acre-feet , 340 acre-feet and 5698 acre-feet respectively during 1989-90, as compared with 1988-89.

Summary of Allowable Pumping for 1990-91

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, 1990.

TABLE 1

UPPER LOS ANGELES RIVER AREA
SUMMARY OF OPERATING CONDITIONS
1988-89 AND 1989-90

Item	Water Year 1988-89	Water Year 1989-90
1. Active pumpers	23	25
2. Inactive pumpers (within valley fill)	2	2
3. Valley rainfall, in inches	9.12	8.20
4. Spreading operations, in acre-feet(a)		
a. LACDPW	11,084	4,154
b. Los Angeles, City of	0	0
5. Extractions, in acre-feet	142,559	96,689
a. Used in ULARA	17,305	16,443
6. Gross imports, in acre-feet		
a. MWD water	89,578	489,937
b. Owens River water(b)	565,524	145,507
Total	655,102	635,444
7. Exports in acre-feet		
a. Owens River water	290,737	75,489
b. MWD water	---	210,706 (e)
c. Groundwater by Los Angeles	125,010	80,041
Total	415,747	366,236
8. Imports used in ULARA, in acre-feet	364,365	349,249
9. Reclaimed water, in acre-feet	78,898	75,824
a. Used in ULARA	6,627	4,195
10. Total delivered water used in ULARA in acre-feet	388,297	369,887
11. Sewer export, in acre-feet (c)	180,000 (d)	175,000 (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 customers in the 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 flow.

(e) MWD water now entering ULARA Basin through two new connections, LA 35-T and LA-25, that blends Aqueduct water with MWD water throughout the Basin.

TABLE 2

SUMMARY OF ALLOWABLE PUMPING FOR ENSUING YEAR 1990-91

(In Acre-Feet)

	Extractions			Stored Water Credit (a)
	Native	Import Credit	Total	
San Fernando Basin				
Los Angeles	43,660	46,167	89,827	172,008
Burbank	--	4,611	4,611	45,777
Glendale	--	5,339	5,339	30,469
Sylmar Basin				
Los Angeles	3105	--	3,383	278
San Fernando	3105	--	3,680	575
Verdugo Basin				
Crescenta	--	--	3,294	--
Glendale	--	--	3,856	--

(a) As of October 1, 1990.

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 1989-90 water year experienced below average rainfall. The valley floor received 8.20 inches of rain, whereas the mountains received approximately 10.38 inches. The weighted average of both valley and mountain areas was 9.55 inches, a decrease of 2.09 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 the same as those which were used to develop the 100-year average rainfall as 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	(1881-1981) 100-Year Mean	1988-89 Precipitation	1989-90 Precipitation	1989-90 Percent of 100-Year Mean
11D	Upper Franklin Canyon Reservoir	18.50	10.42	8.56	46
13C(b)	Hollywood-Blix	16.63	9.05	7.76	47
14C(b)	Roscoe-Merrill	14.98	5.35	7.28	49
15A(b)	Van Nuys	15.30	7.43	8.49	55
17	Sepulveda Canyon-Mulholland Highway	19.82	11.50	11.20	57
21B(b)	Woodland Hills	14.60	8.64	7.36	50
23B-E(b)	Chatsworth Reservoir	15.19	7.41	6.13	40
25C(b)	Northridge-LADWP	15.16	8.85	7.60	50
33A-E	Pacoima Dam	19.64	13.17	9.80	50
46D	Big Tujunga Dam (c)	33.01 *	23.60 *	13.63	41
53D	Colby's Ranch	29.04	15.50	11.10	38
54C	Loomis Ranch-Alder Creek	18.62	12.39	9.05	49
210B	Brand Park	18.13	10.60	11.50	63
251C(b)	La Cresenta	23.31	15.36	12.43	53
259D	Chatsworth-Twin Lakes	18.70	7.80	6.30	34
293E(b)	Los Angeles Reservoir	17.32	12.22	8.26	48
1190	Pacoima Canyon-North Park Ranger Station	23.06	13.61	12.95	56

Weighted average for valley stations - 8.20 inches (1989-90)
Weighted average for mountain stations - 10.38 inches (1989-90)

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

(b) Valley Stations

(c) Substituted for Station 47D due to incomplete rain data.

* 100-Year Mean and Precipitation data for station 47D

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 record runoff from the main hydrologic areas in ULARA.

Table 4 summarizes the monthly runoff for these gaging stations and compares the 1988-89 water year with the 1989-90 year. The larger runoff in 1988-89 reflects higher rainfall than 1989-90 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 from 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 the outflow from Hansen Dam which is not spread. These records also include (flow through) 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 the watershed to the northeast. Runoff below this point flows to Hansen Dam.

Station 118B-R registers all releases from Pacoima Dam. Runoff below this point can be diverted to Lopez and Pacoima spreading grounds or flows 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 1989-90 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	1988-89(b)	7249	10448	37277	10165	13577	10505	6992	7032	6488	8133	8982	9995	136,843
Los Angeles River	1989-90(c)	15811	16647	10584	22520	28501	9755	15306	13600	8085	7746	9618	9466	167,639
F-252-R	1988-89	189	786	2092	307	1484	512	179	200	85	102	124	388	6,448
Verdugo	1989-90	197	390	156	1247	1284	90	203	315	47	71	48	72	4,120
E-285-R	1988-89	714	969	1590	712	1218	942	542	488	502	383	515	494	9,069
Burbank Storm Drain	1989-90	436	523	448	910	1334	679	633	589	497	452	451	306	7,258
F-300-R	1988-89	4896	5444	15635	5805	9884	6642	4380	4292	4338	4590	4411	4642	74,959
L.A. River Tujunga Ave.	1989-90	4917	4975	4195	9331	11623	4460	4952	5402	4016	4441	5080	4297	67,689
F-168-R	1988-89	206	117	155	157	288	2187	415	354	51	113	34	0	4,077
Big Tujunga Dam	1989-90	29	69	50	354	409	211	1960	35	27	0	0	0	3,144
118B-R	1988-89	0	0	36	152	1063	580	181	0	0	0	0	0	2,012
Pacoima Dam	1989-90	4	0	0	60	0	0	0	611	0	0	0	0	675

(a) See Plate 5 for gaging station location.

(b) Station F-57C-R was partially estimated for water year 1988-89.

(c) Corps of Engineers Data, County of Los Angeles Data not complete.

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	79,587	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)
1989-90	6,335	76,789	55,811	167,639 (e)
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
1989-90	1,182	0	2,938	4,120

(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, which does not affect ULARA Basin outflow.

(d) Estimated.

(e) Used Corps of Engineers data, County of Los Angeles data not complete.

TABLE 5a

1989 - 90

EVALUATION OF BASE FLOW @ GAGE F-57

	AC - FT												
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
1. TOTAL FLOW @ GAGE F-57	15811	16647	10584	22520	28501	9755	15306	13600	8085	7746	9618	9466	167639
2. STORM FLOW @ GAGE F-57	2825	4257	0	15035	20848	1054	7058	3395	0	0	1339	0	55811
3. BASE FLOW @ GAGE F-57 (1.-2.)	12986	12390	10584	7485	7653	8701	8248	10205	8085	7746	8279	9466	111828
4. WASTE DISCHARGE													
a. BURBANK WESTERN WASH @ F-285	367	457	448	567	543	644	426	438	497	452	394	306	5539
b. LA - GLENDALE W. R. P.	1798	1501	1665	1541	1547	1779	1712	1722	1215	1237	1256	1234	18207
c. TILLMAN W. R. P.	3910	3701	3872	3872	3463	3805	3756	3796	3618	3729	3910	3784	45216
d. WASTE DISCHARGE ABOVE RUBBER DAM ASSUMED (1CFS)	61	59	61	61	57	61	59	61	59	61	61	59	720
e. DISNEY DISCHARGE	153	162	112	135	76	117	184	178	155	240	134	384	2030
f. INDUSTRIAL WASTE R. D. TO F-57 ASSUMED (7CFS)	430	416	430	430	403	430	416	430	416	430	430	416	5077
g. TOTAL (a+b+c+d+e+f)	6719	6296	6588	6606	6089	6836	6553	6625	5960	6149	6185	6183	76789
5. BASE FLOW LESS WASTE DISCHARGE** (3.-4g.)	6267	6094	3996	879	1564	1865	1695	3580	2125	1597	2094	3283	35039
6. TOTAL RISING WATER @ GAGE F-57*													
a. BASE FLOW @ F-300	306	397	323	434	438	390	315	257	398	712	670	513	5153
b. BASE FLOW @ F-252	113	139	156	205	84	79	110	60	47	71	46	72	1182
c. PERCOLATION ***	0	0	0	0	0	0	0	0	0	0	0	0	0
d. TOTAL (a+b-c)	419	536	479	639	522	469	425	317	445	783	716	585	6335

ITEM (6a) REAL BASE FLOW IS TOTAL BASE FLOW - ITEM 4c.

* TOTAL RISING WATER @ F-57 GAGE = F-300 BASE FLOW + GAGE F-252 BASE FLOW - NARROWS PERCOLATION

** THE EXCESS OF (5) - (6) IS CONSIDERED PRECIPITATION AND IS DUMPED BACK INTO STORM FLOW @ GAGE F-57

*** DUE TO HIGH GROUNDWATER, PERCOLATION IS CONSIDERED ZERO.

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. A pilot program is underway to see if these diversions can be re-initiated.

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 increases in impermeable areas.

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 thence flows out of the basin and to the ocean.

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, which contains treated municipal watsewaters. Table 6 summarizes the spreading operations for the 1989-90 water year.

Ground Water Table Elevations

During the 1989-90 water year, the Watermaster collected and processed data to determine prevailing ground water conditions during the spring and fall of 1990. Plates 7 and 8 show ground water contours for these two seasons. Changes in water surface elevation from the fall of 1989 to the fall of 1990 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 1989-90 (2,029 acre-feet Table 6) as compared with 1988-89 (7,625 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 part of the treated water into the ULARA Basin. A tabulation of operating water reclamation plants is shown on Table 7. Their locations are shown on Plate 2. There is presently under study the East Valley Water Reclamation Project (EVWRP) which envisions the use of up to 50,000 AF/YR of reclaimed water from the Tillman Plant for landscaping and other non-potable uses, as well as for groundwater recharge

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. During the drought conditions of 1989-90, the Regional Board expressed concern about increasing chlorides in effluent from the water reclamation plants. An investigation revealed two causes for this (1) increasing chlorides in delivered water, especially from the State Water Project and (2) decreasing delution related to voluntary and mandatory water conservation.

TABLE 6

1989-90
SPREADING OPERATIONS
(In Acre-Feet)

Month	Native Water Spread by Los Angeles County Department of Public Works						Water Spread by City of Los Angeles Department of Water & Power			Total San Fernando Basin Spreading
	Spreading Basins						Spreading Basins			
				Pacoima			Tujunga			
	Branford	Hansen	Lopez	Native	Owens River	MWD	Native	Owens River	Headworks	
Oct.	14	0	0	1	0	0	0	0	0	15
Nov.	24	0	0	0	0	0	0	0	0	24
Dec.	0	169	0	0	0	0	0	0	0	169
Jan.	101	112	0	307	0	0	0	0	0	520
Feb.	142	404	0	553	0	0	0	0	0	1099
Mar.	11	576	0	10	0	0	0	0	0	597
Apr.	6	359	0	414	0	0	0	0	0	779
May	29	163	90	44	0	378 (a)	0	0	0	704
June	0	59	0	1	0	0	0	0	0	60
July	0	91	0	0	0	0	0	0	0	91
Aug.	0	32	0	0	0	0	0	0	0	32
Sept.	0	64	0	0	0	0	0	0	0	64
Totals	327	2,029	90	1,330	0	378	0	0	0	4,154

(a) City of Burbank spreading of MWD water in the Pacoima Spreading Grounds.

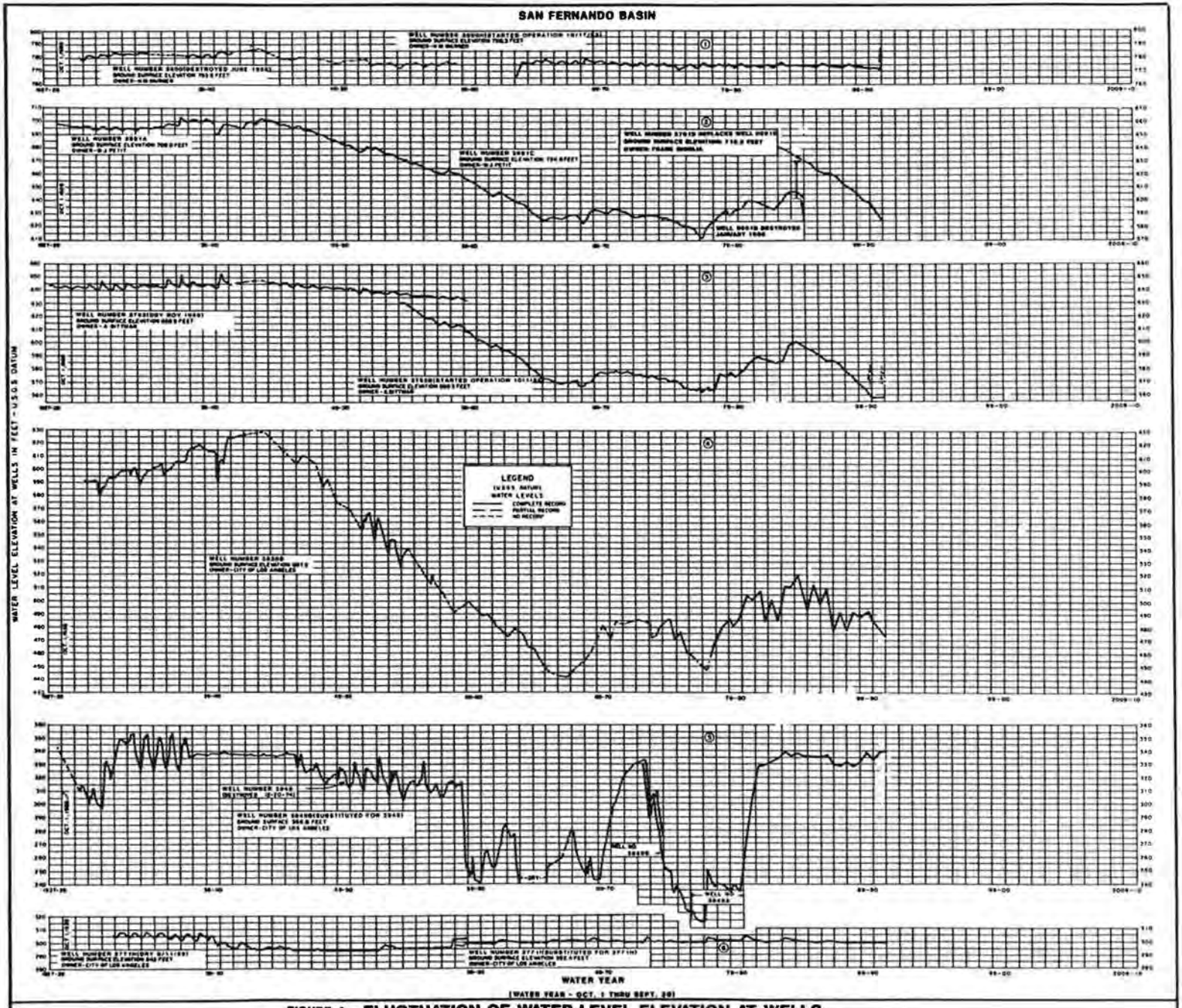


FIGURE 1 - FLUCTUATION OF WATER LEVEL ELEVATION AT WELLS IN THE SAN FERNANDO BASIN

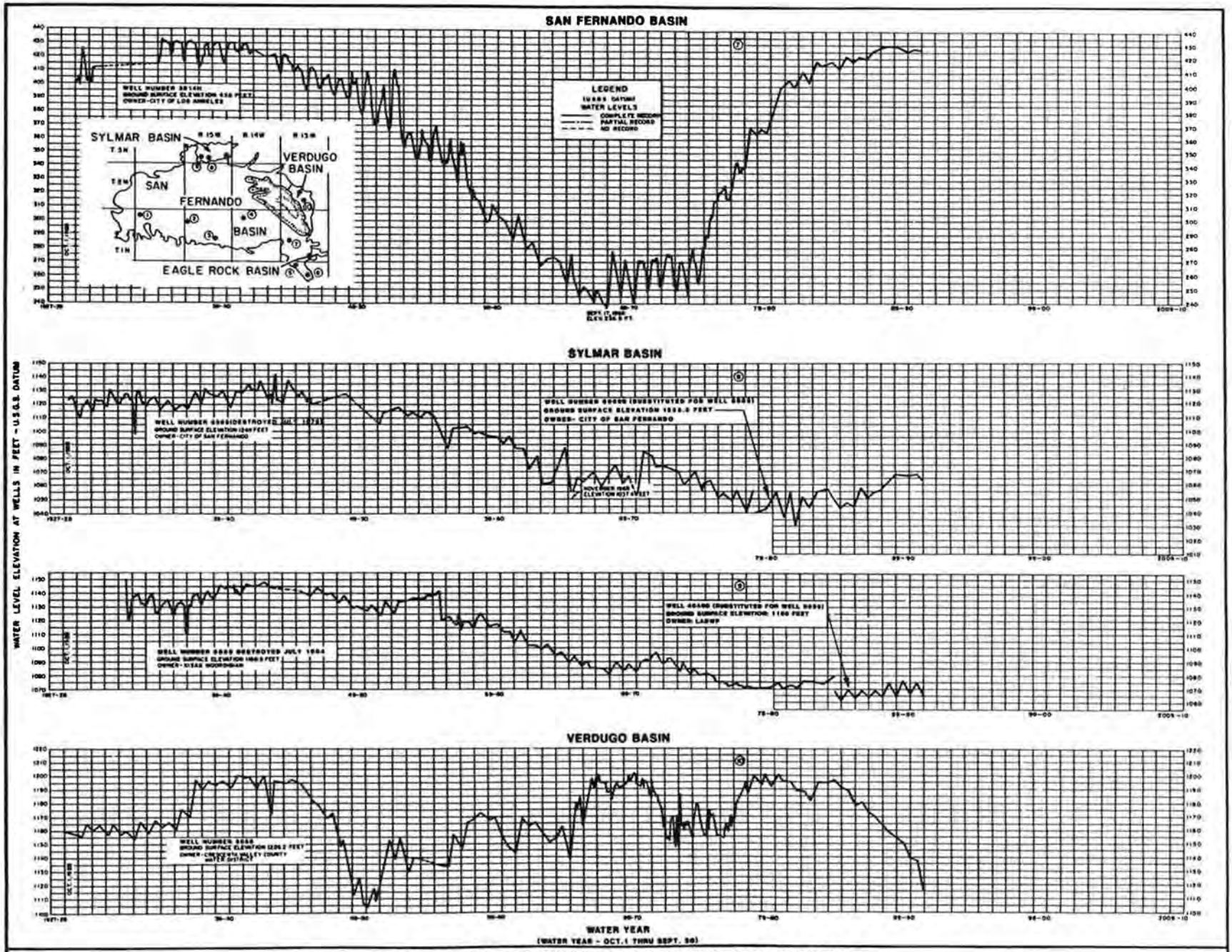


FIGURE 2 - **FLUCTUATION OF WATER LEVEL ELEVATION AT WELLS IN THE SAN FERNANDO, SYLMAR AND VERDUGO BASINS**

TABLE 7

WATER RECLAMATION PLANTS, 1989-90
(In Acre-Feet)

Plant	Treated	Used in ULARA	Discharged to Los Angeles River
San Fernando Basin			
City of Burbank	4,280	656 (a)	3,916
Los Angeles-Glendale	21,824	1,713 (b)	18,207
Donald C. Tillman	47,539	615 (c)	45,261
Indian Hills Mobile Homes(d)	20	20 (e)	0
Rocketdyne (Santa Susana Field Laboratory)	35	25	0
The Independent Order of Foresters(f)	12	12 (e)	0
Las Virgenes Municipal Water District(g)	2,114	1,153	0
Total	75,824	4,194	67,384

(a) Total water delivered (585 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; 71 AF used by Cal/Trans for freeway landscape irrigation.

(b) Total water delivered (327 AF) to the phosphate plant in Glendale for cooling water includes 50 percent evaporation and the rest to the Los Angeles River; 1,381 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, part of treated 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	89-90	846	7.6	63	23	87	4.1	-	-	204	77	1.1	0.38	-	551	251
Los Angeles Aqueduct Filtration Plant Effluent	89-90	549	8.4	30	12	68	4.2	-	-	47	84	4.0	0.20	-	321	124
Los Angeles Aqueduct Filtration Plant Influent	89-90	524	8.2	28	12	63	4.1	-	-	42	76	2.7	0.31	-	315	117
State Water Project at Joseph Jensen Filtration Plant (Influent)	89-90	636	7.9	26	17	74	3.8	-	-	51	110	2.5	0.12	-	350	132
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 (c) (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) (a)	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) (b)	11/15/88	760	6.8	72	28	35	3.2	0.08	177	92	63	66.4	0.08	-	490	298

(a) Substituted for Pollock No. 6
(b) Substituted for CVCWD No. 14
(c) Substituted for No. Hollywood No. 19

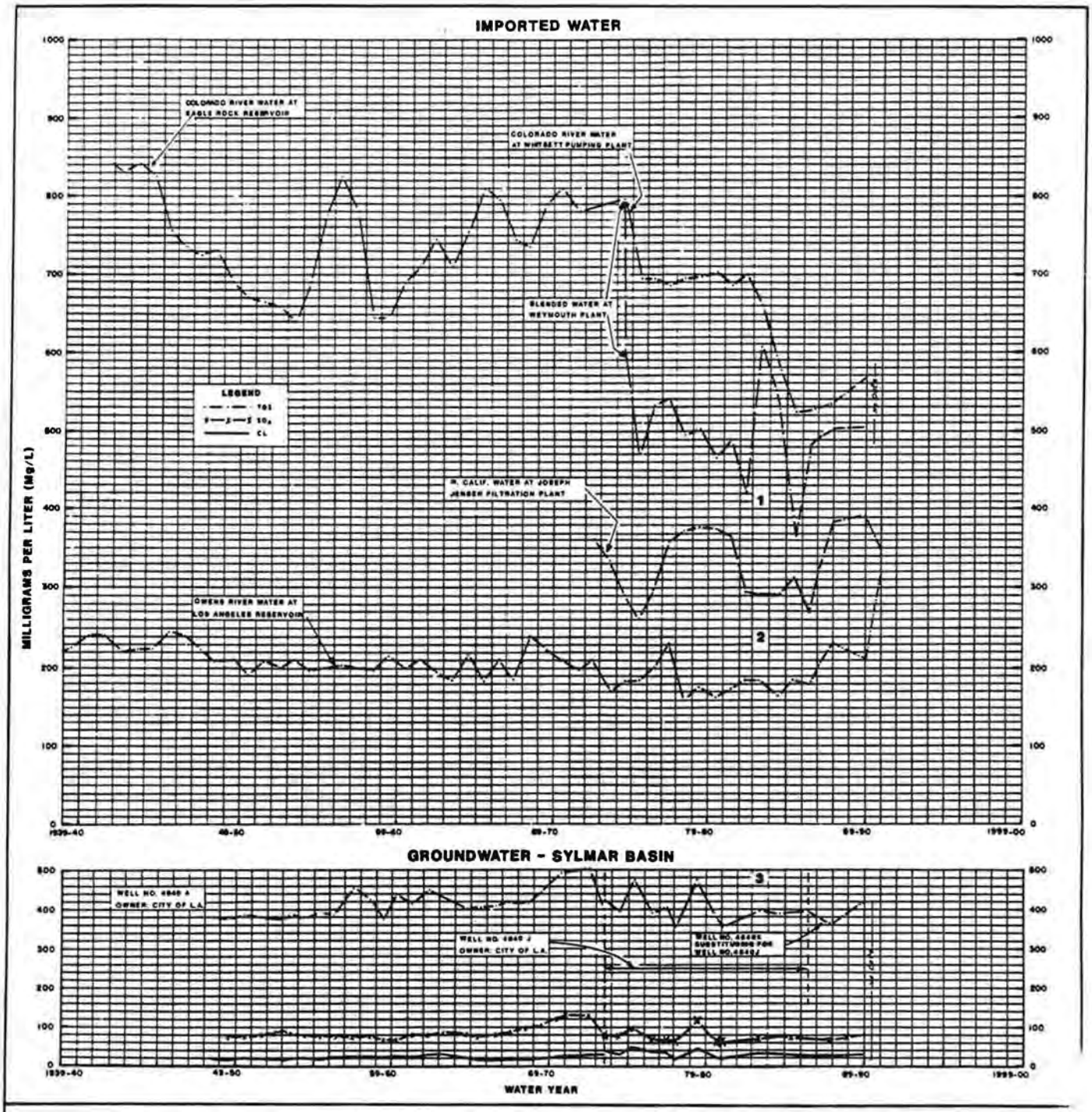


Figure 3 - MINERAL CONSTITUENTS OF WATER SOURCES IN THE ULARA

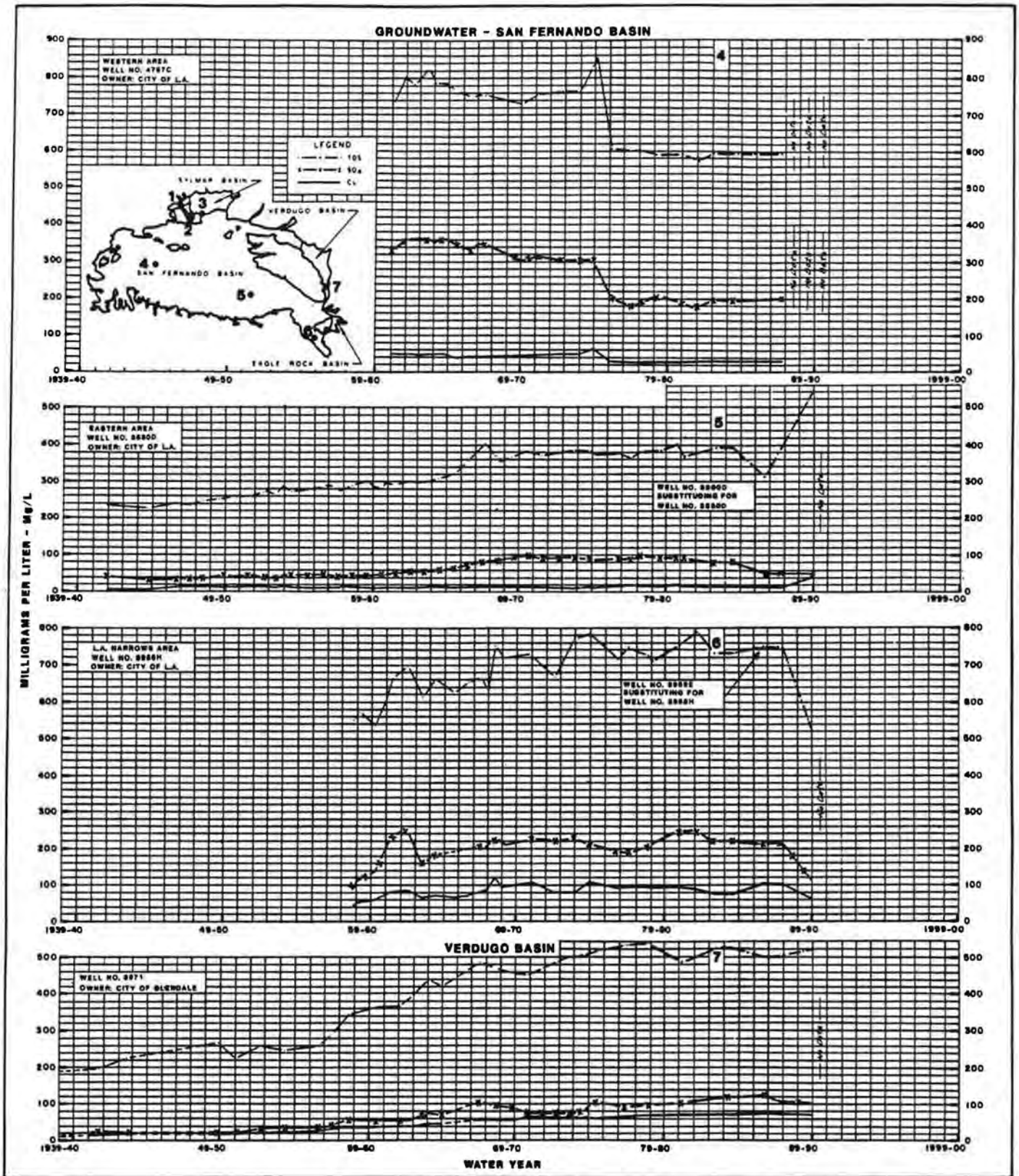


Figure 3(cont.) - MINERAL CONSTITUENTS OF WATER SOURES IN THE ULARA

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 1989-90 was 321 mg/l, which was 19 percent greater than the 269 mg/l for 1988-89. The large increase was due to the blending of Owens River-Mono Basin water with Northern California water.

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 597 mg/l for 1989-90, an increase of 6 percent from last year 1988-89.

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 1989-90 was 342 mg/l, an decrease of 13 percent over last year 1988-89 due to changes in the quality of MWD source waters. Drought conditions in northern California have appreciable increases in chlorides.

D. Colorado River and Northern California water were first blended at the Weymouth Plant location in May 1975. In the 1989-90 period, TDS had an average value of 528 mg/l which was a 4 percent increase from 1988-89. 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 1989-90), 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 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 throughout the Verdugo Basin and in various portions of the S.F. Basin,where there are 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 1989-90, 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. New fire permit application forms for Underground Storage Tanks (UST) and Atmospheric Above Ground Storage Tanks (AST) systems have been prepared. During the year meetings were held on the AST systems and Risk Management Prevention Plans at Los Angeles Department of Water and Power's (LADWP) General Office Building. At these meetings, state mandated programs and requirements for compliance were discussed.

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 (Plate 11). During the year 1988-90, the second sewer construction project (GID-7) was completed and will be connected to the city wastewater system in the near future. Construction of two additional sewer projects (GID-2 and GID-20)are near completion. Contracts for the construction of two additional GIDS are planned to be awarded soon. Design programs for the construction of 12 more GID projects are now in process.

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. Addition sewer hook-up notifications were sent to property owners who have access but are not connected to the sewer system. Property owner compliance during the year has been progressing at a satisfactory rate.

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 - 4 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 during the water year 1989-90. Table 9a summarizes the number of ULARA wells that are contaminated at various levels above the Maximum Contaminant Levels (MCLs) of 5 ppb for TCE and 5 ppb for PCE.

Water Treatment

1. Advanced Oxidation Process

   The construction of the North Hollywood Advanced Oxidation Process (AOP) Plant by R. L. Hartley Company is in progress. The source of polluted water is a deep zone tapped by North Hollywood Wells #11 and #28. The plant is designed to demonstrate that volatile organic compounds can be removed from groundwater by employing the oxone and hydrogen peroxide treatment method. The project capital cost is estimated at $2.5 million. The start-up of the treatment unit is scheduled for the second quarter of 1991.

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

   The North Hollywood Aeration Facility was dedicated on March 30, 1989. During the nine months following the dedication, the facility was operated on a pilot basis to fine tune operational procedures and make improvements to the plant equipment. Frequent testing of groundwater quality, before and after treatment, was conducted during this period.. 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.Routine full-time, 24-hour operation and maintenance of the facility began January 1, 1990. The quality of well water available for treatment has been reduced by the decline in the groundwater table due to the prolonged drought in the San Fernando Valley. Monthly reports on water quality performance are provided to the Department of Health Services.

TABLE 9

ULARA LANDFILLS UNDER SWAT INVESTIGATION

(reported to Interagency Coordinating Committee)

Name	Rank	Status	Owner	Location	SWAT Report Completed	Final SWAT Submitted	Phase II SWAT Required	Under Review (Reg. BD.)	Approved by Reg. BD.	Further Groundwater Moniyoring
Bradley West	1	Open	Valley Reclamation Co.	Sun Valley, Southeast of Sheldon Street	6/87	11/90		X		a
Sheldon-Arleta	1	Closed	City of Los Angeles Bureau of Sanitation	Sun Valley District Near Hollywood & Golden State Freeways.	5/87	5/87			2/90	b
Scholl Canyon	1	Open	City of Glendale	San Rafael Hills, 1 mile West of Rose Bowl.	7/87	4/88			8/90	a
Scholl Canyon	2	Closed	City of Glendale	San Rafael Hills, 1 mile West of Rose Bowl.	7/87	1/91		X		c
Bradley East	2	Closed	Valley Reclamation Co.	Southeast of Sheldon St.	6/87	11/90		X		c
Sunshine Cyn.	2	Open	Browning - Ferris Industries	Southeast Santa Susana Mtns West of Golden State Fwy.	7/88	7/89		X		a
Gregg Pit/Bentz	2	Closed	Cal Mat Company	Between Pendleton Street and Tujunga Ave.	7/89	7/89			2/90	b
Branford	2	Closed	City of Los Angeles Bureau of Sanitation	Sun Valley District Northwest of Tujunga Wash	7/88	10/90		X		c
Cal Mat (Sun Valley #3)	2	Closed	Cal Mat Properties	Sun Valley District Northeast of Glenoaks Blvd.	7/88	11/90		X		c
Lopez Canyon	2	Open	City of Los Angeles Bureau of Sanitation	North of Hansen Dam Between Lopez and Kagel Cyn.	6/88	6/88	X			a
Toyon Canyon	2	Closed	City of Los Angeles Bureau of Sanitation	Griffith Park	6/88	3/89			4/91	b
Tuxford Pit	2	Closed	Los Angeles By-Products Co.	Sun Valley District Southwest of Golden State Freeway and Tujunga Ave.	6/88	12/90		X		c
Penrose	2	Closed	Los Angeles By-Products Co.	N. of Strathern St., Tujunga Ave.	6/88	7/89			9/89	b
Newberry	3	Closed	Los Angeles By-Products Co.	N. of Strathern St., Tujunga Ave.	6/88	7/89			9/89	b
Hewitt Pit	2	Closed	Cal Mat Properties	North Hollywood District Hollywood Fwy., Laurel Canyon Blvd.	6/88	7/89		X		c
Cal Mat (old) Bradley Land-fill Complex	3	Closed	Valley Reclamation Co.	Sun Valley District Sheldon St., San Fernando	7/88	7/89		X		c
Pendleton St.	4	Open	Department of Water & Power	Sun Valley intersection Pendelton St., Glenoaks Blvd	7/90	Due 7/91				

(a) All open landfills are required to have groundwater monitoring under Chapter 15. Monitoring results are submitted to the Regional Board quarterly.

(b) Closed landfills with groundwater monitoring required under Chapter 15. Monitoring results are submitted to the Regional Board periodically.

(c) Subject to SWAT requirements. Further monitoring may be required under Chapter 15.

TABLE 9a

1989-90
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	0	0	3	5	2	18	0	6	0	24
20-100	7	2	3	6	0	3	1	22	4	1	0	27
> 100	6	0	0	0	0	0	0	6	3	2	0	11
Total	21	2	3	6	3	8	3	46	7	9	0	62
PCE Levels (ppb)												
4-20	8	0	2	3	0	1	2	16	0	3	2	21
20-100	1	0	1	1	0	0	0	3	4	0	0	7
> 100	0	0	0	0	0	0	0	0	3	0	0	3
Total	9	0	3	4	0	1	2	19	7	3	2	31

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 of chemical results. Where data were not available for 1989-90, data from the most recent water year were used to compile this table.

(b) MCL Maximum Contaminant Level

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 continues in full-time operation.

Remedial Investigation (RI) - San Fernando Groundwater Basin

Forty three vertical profile boreholes (VPB's) were installed, sampled, and analyzed as part of the Superfund program. Dedicated pumps have been installed in 14 VPB's in the North Hollywood area where higher concentrations of TCE/PCE exist.

To monitor vertical extent of volatile organics contamination at the National Priority List (NPL) sites, cluster wells were also installed. These cluster wells are constructed in close groups to different depths, sampling of groundwater at up to four water bearing zones. VPB's have been 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

Work on the Burbank Operable Unit (BOU) is proceeding,including the completion of the Explanation of Significant Differences (ESD) Final Fact Sheet. The BOU is planned to treat 12,000 gallons per minute ,gpm, of contaminated groundwater using air stripping technology. 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, Lockheed,and Burbank have completed negotiations relating to groundwater cleanup and have signed an agreement for a Consent Decree.

The EPA has started the first phase of the Remedial Investigation/Feasibility Study OU/FS for Glendale Operable Unit project.

Groundwater Quality Investigations

During the year 1989-90, 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. A work plan was submitted to RWQCB regarding the installation of a new extraction well and two new monitoring wells. The extraction well has been installed and is being tested in the system.

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. Aquifer test conducted in the area indicated that the permeability is adequate for the injection of the treated groundwater.

The Phase IV Hydrological Assessment Report was submitted to the RWQCB. Additional groundwater characterization work to determine the vertical distribution of the contamination is in progress, including cluster well offsite to the south.

Rockwell-Rocketdyne

Observation wells were installed upgradient and downgradient of the Canoga Park facility to delineate groundwater contamination in the area. A National Pollutant Discharge Elimination Systems (NPDES) permit for the discharge of treated water to the storm drain system at the Canoga Park site has been approved by RWQCB. Quarterly monitoring is continuing at this site. 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)

Three new off-site monitoring wells were installed. A soil gas in-situ volatilization pilot test was conducted on site after a permit from Southern California Air Quality Management District was obtained.

Bendix Corporation (North Hollywood area)

A comprehensive site assessment has been performed at the site. Bendix was named as a PRP by the EPA.

Hughes Aircraft Co. (Canoga Park Area)

Three off-site downgradient cluster wells and three on-site wells have been installed and continue to be monitored. The remedial investigation report is being prepared for submittal to the RQWCB.

Wickes (Van Luit) (Narrows Area)

Leaking storage tanks have been removed, as well as contaminated soil from beneath a screen-wash room. Two plumes of volatile organic contaminants - one on-site origin and another of off-site origin have been delineated. The groundwater remediation plan includes three extraction wells, treatment by chemical oxidation, and return to groundwater via a percolation trench.

Taylor Yard (Narrows Area)

In preparation for a sale of some of these properties, a site investigation has been made. Extensive areas of contaminated soils were found. Volatile organics in groundwater monitoring wells onsite have been attributed to upgradient sources.

Leaking Underground Tank Investigations - During 1989-90, 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, Rockwell-Rocketdyne, May Co. North Ridge Fashion Plaza (N.R.F.P.), Unocal, and Mobil Oil. 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 1989-90:

	Amount of Water Pumped		Method of Disposal
Party	Clean-up	Devl./Test.	
Philips Component a/	43.48	0.00	Recharge
Lockheed b/	1,107.65	0.00	Storm Drain
Los Angeles, City of	1,147.84	0.00	Aeration Tower
3M-Pharmaceutical c/	10.24	0.02	Storm Drain
Rockwell	0.05	0.00	Storm Drain
May Co. N. R. F. P.	2.03	0.00	Storm Drain
Total	2,311.29	0.02	

a/ Formerly known as Centralab
b/ Lockheed is a party to the Judgment entered on January 26, 1979.
c/ Formerly known as Riker Labs

Other Activities - The LADWP has nearly completed construction of the 12 Tujunga (TJ) production well field in the Sun Valley area of the San Fernando Valley. See list of new Tujunga wells in Appendix C.

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 1989-90 water year, the total amount delivered to water users in ULARA was 369,833 acre-feet. Of this total, 16,443 acre-feet was ground water, 349,196 acre-feet was imported water, and 4,194 acre-feet was reclaimed water. Refer to Figure 5 for a monthly breakdown. The ULARA basins contain 694 wells, of which 121 are active and 573 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 1989-90, 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. 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 1989-90 water year, and Plate 6 shows the approximate location of the well fields which pumped this water. A total of 86,895 acre-feet was pumped from the San Fernando Basin. Of this total, 111,950 acre-feet constitutes extraction rights by parties in the San Fernando Basin (see Table 15, 1989-90) and 3,451 acre-feet is pumping for nonconsumptive use (see Table 13).

A total of 5,389 acre-feet was pumped from the Sylmar Basin and 4,232 acre-feet from the Verdugo Basin. The respective safe yield values for the San Fernando Basins are 99,777 (native safe yield of 43,660 and an import return of 56,117), 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, which allows poorer quality Verdugo Basin ground water to be blended with MWD water. 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 1990-91. Table 15 shows San Fernando Basin stored water as of October 1, 1989 and October 1, 1990. All rights are based on the City of Los Angeles vs. City of San Fernando, et al., Judgment, dated January 26, 1979.

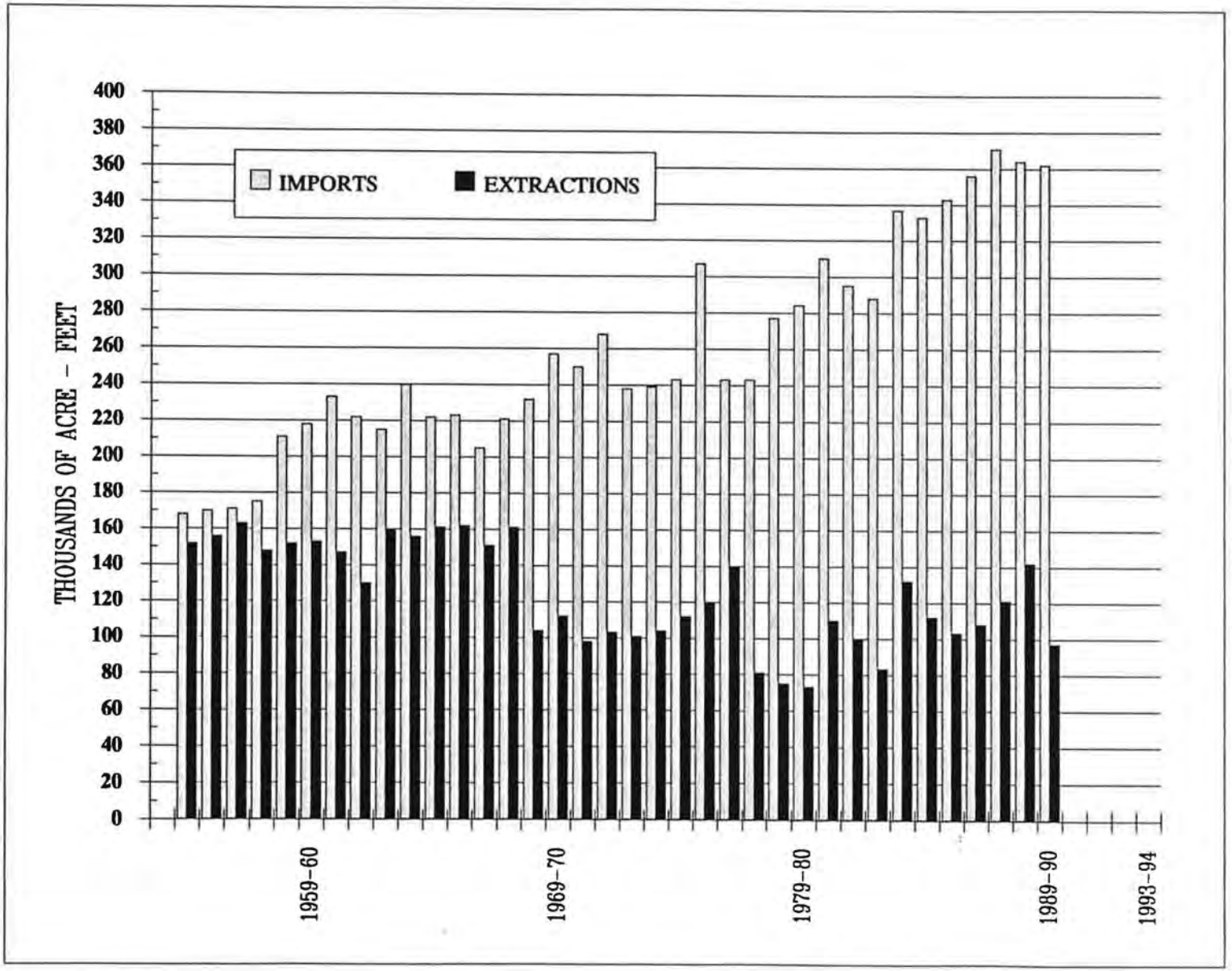
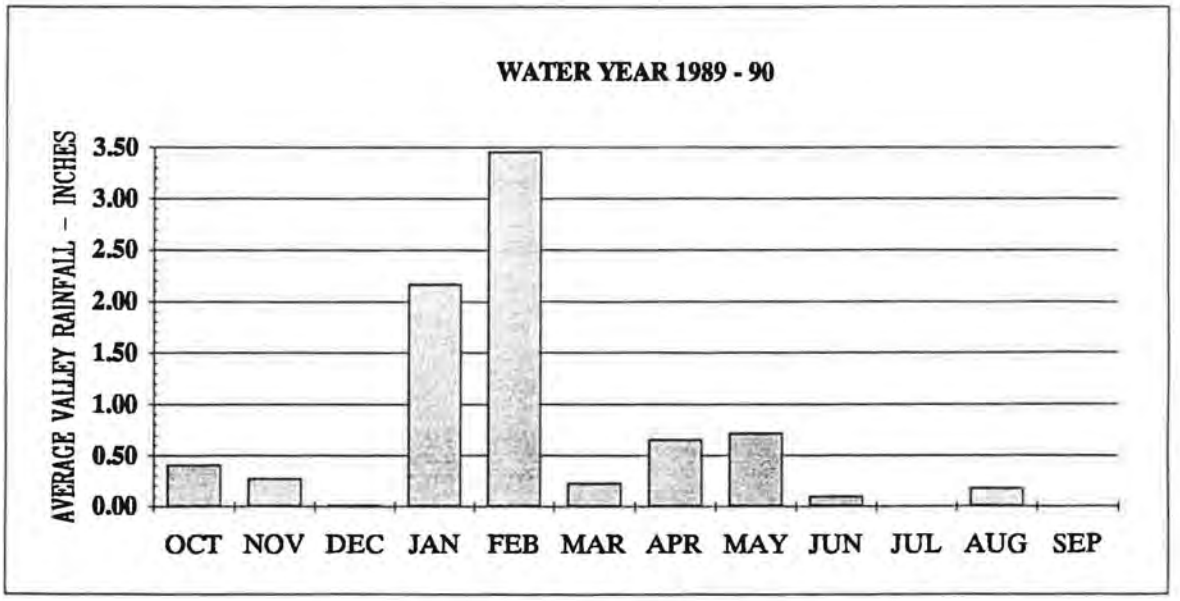


Figure 4 - GROUNDWATER EXTRACTIONS AND USE OF IMPORTED WATER IN UPPER LOS ANGELES RIVER AREA



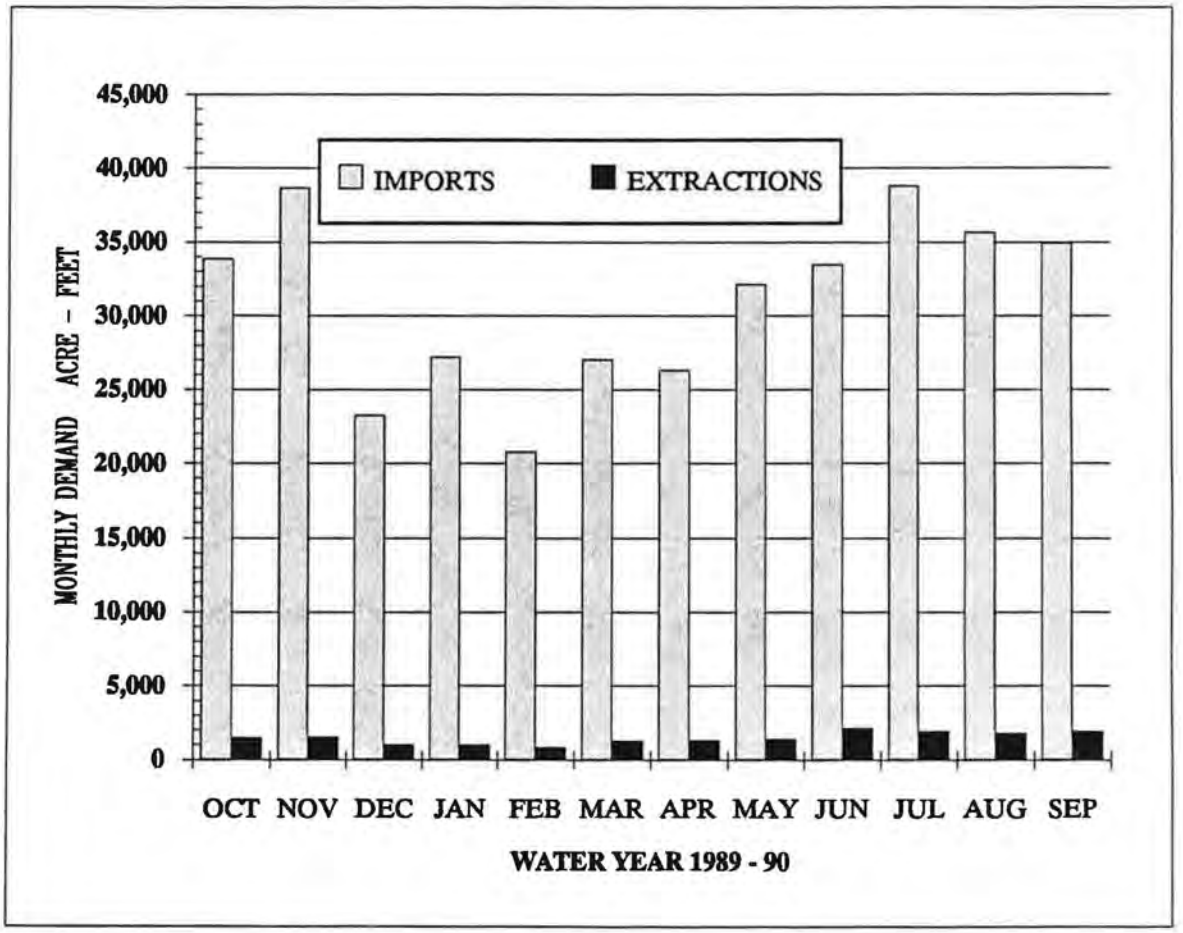


Figure 5 - MONTHLY WATER DEMAND AND AVERAGE RAINFALL IN UPPER LOS ANGELES RIVER AREA

TABLE 10

ULARA - NONTRIBUTARY WATERS,
IMPORTS AND EXPORTS

(In Acre-Feet)

Souce and Agency	1988-89	1989-90
Imports		
MWD water(a)		
Burbank, City of	22,936	22,397
Crescenta Valley County Water District	2,619	1,809
Glendale, City of	28,407	28,620
Los Angeles, City of	13,232	423,440
La Canada Irrigation District	1,145	1,328
Las Virgenes Municipal Water District (nonparty)	19,598	7,008 (c)
San Fernando, City of	1,641	1,007
	89,578	485,609
Owens River water		
Los Angeles, City of	565,524 (b)	145,508 (b)
Total	655,102	631,117
Exports		
Owens River water		
Los Angeles, City of	290,737	75,489
MWD water		
Los Angeles, City of	----	210,706
Net Imports	364,365	344,922

(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.

(c) Re-evaluation in 1989-90 indicated that large volumes of MWD water were not actually used in ULARA.

---- Not applicable.

Sylmar Basin Allowable Extractions

Table 16 shows Sylmar Basin stored water as of October 1, 1989 and October 1, 1990. 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 was estimated in the Report of Referee as about 3,200,000 acre-feet, of which a regulatory storage capacity of 350,000 acre-feet is required by the judgment. As of Fall 1954, 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 1989-90 was estimated as -23,600 acre-feet, and the cumulative change in storage from 1954-55 through 1989-90 was -277,870 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 1989-90 was 17.20 inches, compared to a long-term average of 16.48 inches of rainfall. From 1968-69 to 1989-90, the basin gained approximately 168,050 acre-feet of stored water. Through spreading and in-lieu replenishment** activities, 248,254 acre-feet were stored. Thus, the net storage has decreased 80,204 acre-feet. Refer to Table 11 for the annual precipitation and change in storage.

Sylmar Basin. The change in storage for 1989-90 was -340 acre-feet, and the cumulative change in storage from 1954-55 through 1989-90 was -22,664 acre-feet.

Verdugo Basin. The change in storage for 1989-90 was -5,698 acre-feet, and the cumulative change in storage from 1954-55 through 1989-90 was +7,435 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	222200
1988-89	9.12	-30550	191650
1989-90	8.20	-23600	168050
22-yr. average	16.76		

Notes:

(1) 100-year (1881-1981) mean precipitation = 16.48 inches.

(2) Stored water through spreading and in-lieu pumping = 248,254 AF.

(3) Change in storage = +168,050 AF - 248,254 AF = -80,204 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.

TABLE 12A

1989-90
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	16 (a)	1,500	79,949	0	5,433 (b)	86,898
Used on valley fill	0 (c)	(c)	686	2514	(c)	(c)
Imports						
MWD water	22,397	28,620	411,170 (d)	1,007	7,008 (e)	470,202
Owens River water	--	--	142,707 (d)	--	0	142,707
Ground water from Sylmar Basin	--	--	2,626	2,514	0	5,140
Ground water from Verdugo Basin	--	577	--	--	--	577
Reclaimed water	656 (f)	327 (g)	2,001 (h)	--	1,220	4,204
Exports						
Ground water:						
to Verdugo Basin	--	0	0	--	0	0
out of ULARA	--		80,041	--	0	80,041
Owens River water:						
to Eagle Rock Basin	--	--	0	--	--	0
to Verdugo Basin	--	--	27	--	--	27
to Sylmar Basin	--	--	202	--	--	202
out of ULARA	--	--	75,489	--	0	75,489
MWD:						
to Verdugo Basin	--	4,328	74	--	--	4,402
to Sylmar Basin	--	--	411	--	--	411
out of ULARA	--	--	210,706	--	--	210,706
Total net delivered water	23,053	26,696 (i)	271,503	3,521	13,661	338,434
Water delivered to hill and mountain area						
Ground water	(c)	(c)	0	0	0	(c)
Owens River water	--	--	11,713	--	0	11,713
MWD water	(c)	(c)	37,835	0	7,008 (e)	(c)
Verdugo Basin water	--	(c)	--	--	--	(c)
Water outflow						
Surface	--	--	--	--	--	136,843 (j)
Subsurface	--	--	--	--	--	421
Sewers	11,618	19,380	71,000 (k)	2,074	--	104,072
Reclaimed	3,916	9,104	54,320	--	--	67,340

(a) Water pumped for water quality testing only.

(b) See Table 13 for parties included.

(c) These values are no longer required to be calculated as per Judgment.

(d) Includes Owens River or MWD water exported to Eagle Rock and Sylmar Basins and exported out of ULARA.

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

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

(g) 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.

(h) 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.

(i) Total delivered water to the City of Glendale was 31,776 AF. Verdugo Basin metered sales times 105 percent equaled 5,080 AF. Therfore, the San Fernando Basin delivered water was 26,696 AF (31,776 AF minus 5,080 AF). Refer to Section 5.2.1.3 of Judgment

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

(k) Estimated, extrapulated from historic data.

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

TABLE 12B

1989-90
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	2,626	2,763	1	5390
Used on valley fill	0	249	0	249
Imports				
MWD water	7,516	0	--	7,516
Owens River water	2,558	53 (b)	--	2,611
Exports				
Ground water: to San Fernando Basin	2,626	2,514	0	5,140
Water delivered to hill and mountain area				
MWD water	411			411
Owens River water	149	--	--	149
Water outflow				
Subsurface: to San Fernando Basin	460 (a)	--	--	--
Sewers	830 (c)	205	0	1,035

(a) Base period average of 460 AF (Sylmar Notch & Pacoima Notch).

(b) Temporary connection.

(c) Estimated, extrapulated from historic data.

TABLE 12C

1989-90
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	2,903	1,329	0	0	4,232
Used on valley fill	2,827	(a)	0	0	(a)
Imports					
MWD water	1,809	4,328	1,328	575	8,040
Owens River water	--	--	--	190	190
Groundwater from:					
San Fernando Basin	--	--	--	--	--
Reclaimed water	--	--	--	--	--
Exports					
Groundwater to:					
San Fernando Basin	--	577	--	--	577
Water delivered to hill and mountain areas					
MWD water	47	(a)	0	74	121
Owens River water	--	--	--	27	27
Groundwater from:					
Verdugo Basin	76	(a)	--	0	76
San Fernando Basin	--	0	--	0	0
Water outflow					
Subsurface:					
to Monk Hill Basin	--	--	--	--	300 (b)
to San Fernando Basin	--	--	--	--	70
Sewage	1,593	1,154	0	190 (c)	2,937

(a) Not required.
(b) Based on 29-year average (1929-57).
(c) Estimated, extrapulated from historic data.

TABLE 12D

1989-90
SUMMARY OF WATER SUPPLY AND DISPOSAL
EAGLE ROCK BASIN
(In Acre-Feet)

Water Source and Use	City of Los Angeles	Deep Rock(a) Water Company	Sparkletts Drinking(a) Water Corporation	Total
Extractions				
Total quantity	0	0	172	172
Used on valley fill	0	0	0	0
Imports				
Owens river water	0	—	—	0
MWD water	4,179	—	—	4,179
Groundwater	0	0	0	0
Exports				
Groundwater	0	0	172	172
Water delivered to hill and mountain areas				
MWD water	2,291	—	—	2,291
Owens river water	0	—	—	0
Water outflow				
Surface(a)	—	—	—	0
Subsurface(b)	—	—	—	(b)
Sewers	1,940 (c)	0	0	1,940

(a) Deep Rock Water Company and Sparkletts Drinking Water Corporation are allowed to pump under a stipulated agrrement with the City of Los Angeles; extract limited to 500 AF/year, and export given amount.

(b) Estimated in Supplement No. 2 to Report of Referee for dry years 1960-61. Currently, considered insignificant.

(c) Estimated, 5 year trend.

TABLE 13

1989-90
PUMPING BY NONCONSUMPTIVE USE, PHYSICAL SOLUTION,
AND PARTIES WITHOUT RIGHTS
SAN FERNANDO BASIN

(In Acre-Feet)

I. Nonconsumptive Use Parties		
1. CalMat Co.	1,390	
2. Livingston-Graham Co.	12	
3. Sears, Roebuck and Company	10	
4. Sportsmen's Lodge, Inc.	0	
5. Toluca Lake Property Owners Assn.	9	
6. Walt Disney Productions	2,030	
7. Total	3,451	
II. Physical Solution Parties		
1. Environmentals Inc.	70	
2. First Financial Plaza Site	27	
3. Forest Lawn Cemetery Assn.	402	
4. Lockheed	1,108	
5. MAY Co.-North Ridge Fashion Plaza	2	
6. Sportsmen's Lodge, Inc.	1	
7. 3M-Pharmaceutical	10	
8. Toluca Lake Property Owners Assn.	30	
9. Trillium Corporation	6	
10. Valhalla Memorial Park	293	
11. Valley Reclamation Company	17	
12. Total	1,966	
III. Parties Without Rights		
1. Harper, Cecilia De Mille	15	(a)
2. Mena, John and Barbara	1	
3. Total	16	
IV. Total Pumping by Private Parties	5,433	

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

(a) Presently under investigation.

TABLE 14

1990-91
SAN FERNANDO BASIN EXTRACTION RIGHTS
(In Acre-Feet)

Item	Cities of		
	Burbank (1)	Glendale (2)	Los Angeles (3)
1. Delivered water 1989-90	23,053	26,696	271,503
2. Deivered to hill & mountain 1989-90	(a)	(a)	49,548
3. Delivered to valley fill 1989-90	(a)	(a)	221,955
4. Percent Recharge	20.0%	20.0%	20.8%
5. Return water extraction right 1990-91	4,611	5,339	46,167
6. Native safe yield	0	0	43,660
7. Total exraction right 1990-91	4,611	5,339	89,827

Items 1 = Table 12A, Total net delivered water
Item 2 = Table 12A, Groundwater, Owens river, and MWD water delivered to hill & mountain area.
Item 3 = Item 1 minus Item 2
Item 4 = Section 5.2.1.3, page 17 of Judgment
Item 5, cols. (1) & (2) = Item 1 x Item 4
cols. (3) = Item 3 x Item 4
Item 6 = Section 4.2.4, page 11 of Judgment
Item 7 = Item 5 + Item 6

TABLE 15

STORED WATER
SAN FERNANDO BASIN
(In Acre-Feet)

	Cities of		
	Burbank (1)	Glendale (2)	Los Angeles (3)
1988-89			
1. Stored water as of Oct. 1, 1988	38,498	23,621	182,650
2. Delivered water 1987-88	23,712	25,927	243,762
3. Return water extraction right 1988-89	4,742	5,185	50,702
4. Native safe yield	0	0	43,660
5. Total extraction right for 1988-89	4,742	5,185	94,362
6. Extractions for year	29 (a)	1,315	126,641
7. Physical solution extractions	1,213	484	84
8. Spread water	0	0	0
9. Stored water as of Oct. 1, 1989	42,027	27,007	150,287
1989-90			
10. Delivered water 1988-89	23,863	27,169	279,243
11. Return water extraction right 1989-90	4,773	5,434	58,083
12. Native safe yield	0	0	43,660
13. Total extraction right for 1989-90	4,773	5,434	101,743
14. Extractions for year	16 (a)	1,500	79,929
15. Physical solution extractions	1,401	472	93
16. Spread water	378	0	0
17. Stored water as of Oct. 1, 1990*	45,777	30,469	172,008

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 + Valley Reclamation + May Co. NRFP + 3M-Pharmaceutical + Trillium Corp. pumping. Only consumptive use portion charged to Los Angeles.

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 1989-90. Credit given in 1990-91.

(a) Water pumped for water quality testing only.

TABLE 16

STORED WATER AND
1990-91 EXTRACTION RIGHTS
SYLMAR BASIN
(In Acre-Feet)

	Cities of		
	San Fernando (1)	Los Angeles (2)	All Others (3)
1988-89			
1. Stored water as of Oct. 1, 1988	0	(47) (b)	--
2. Safe yield	3,105	3,105	--
3. Total extraction right 1988-89	2,765 (c)	3,058	(a)
4. Extraction for year	2,199	3,259	0.6
5. Stored water as of Oct. 1, 1989	566	(201) (b)	--
1989-90			
6. Stored water as of Oct. 1, 1989	566	(201) (b)	--
7. Safe yield	3,105	3,105	--
8. Total extraction right 1989-90	3,338 (c)	2,904	(a)
9. Extraction for year	2,763	2,626	0.6
10. Stored water as of Oct. 1, 1990	575	278	--
1990-91			
11. Stored water as of Oct. 1, 1990	575	278	--
12. Safe yield	3,105	3,105	--
13. Total extraction right 1990-91	3,680	3,383	(a)

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

(a) Entitled to reasonable overlying pumping by Meurer Engineering only.

(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 - 1/2 pumping by Meurer Enigineering.
Item 8 = Items 6 + 7
Item 10 = Items 8 - 9 - 1/2 pumping by Meurer Enigineering.
Item 13 = Items 11 + 12

APPENDIX A

GROUNDWATER EXTRACTIONS

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							San Fernando Basin							
City of Burbank														
3841C	6A	0.00	0.00	1.06	0.76	0.23	0.37	0.23	0.18	0.00	0.21	0.32	0.44	3.80
3882P	7	0.28	0.00	0.56	0.27	0.08	0.07	0.32	0.33	0.54	0.25	0.01	0.50	3.21
3851E	12	0.00	0.00	0.28	0.62	0.22	0.37	0.19	0.16	0.00	0.17	0.25	0.23	2.49
3851K	13A	0.00	0.00	0.50	0.59	0.18	0.31	0.14	0.14	0.00	0.16	0.30	0.31	2.63
3882T	15	0.08	0.00	0.34	0.16	0.08	0.06	0.22	0.23	0.42	0.20	0.19	0.20	2.18
3841G	18	0.00	0.00	0.32	0.40	0.13	0.23	0.12	0.10	0.00	0.10	0.19	0.22	1.81
Party Total		0.36	0.00	3.06	2.80	0.92	1.41	1.22	1.14	0.96	1.09	1.26	1.90	16.12
CalMat Co.														
4916A	2	7.11	107.43	94.85	82.80	84.00	118.24	113.69	76.69	108.50	86.59	81.09	47.75	1008.74
4916	3	8.29	0.00	74.63	0.00	0.00	23.08	15.52	16.48	178.83	25.72	23.60	14.98	381.13
Party Total		15.40	107.43	169.48	82.80	84.00	141.32	129.21	93.17	287.33	112.31	104.69	62.73	1389.87
Enviromentals Inc.														
3934A	M050A	5.08	5.99	6.09	7.56	5.83	6.31	4.69	4.85	4.42	6.15	7.70	5.30	69.97
First Financial Plaza Site														
N/A	F.F.P.S.	2.07	1.90	2.21	2.19	2.37	2.68	2.35	2.78	2.29	2.19	2.16	1.78	26.97

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							San Fernando Basin							
Forest Lawn Cemetery Assn.														
3947A	2	4.24	11.32	1.49	1.41	5.04	19.55	1.33	24.39	15.89	23.38	28.61	32.70	169.35
3947B	3	3.68	8.89	2.15	1.18	1.09	0.00	0.00	0.28	27.91	19.77	24.16	27.39	116.50
3947C	4	2.49	9.23	1.20	1.12	1.07	0.00	0.00	14.00	12.74	18.75	23.40	27.34	111.34
3858K	7	1.08	2.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.00	4.36
Party Total		11.49	31.89	4.84	3.71	7.20	19.55	1.33	38.67	56.54	62.73	76.17	87.43	401.55
City of Glendale														
3924N	STPT 1	59.74	55.26	6.46	25.15	22.40	1.77	6.73	1.81	3.70	3.49	7.65	5.70	199.86
3924R	STPT 2	4.21	1.22	0.16	0.26	0.11	0.00	0.00	0.04	2.22	0.59	0.31	0.00	9.12
GVENT	GVENT	192.12	176.47	114.47	92.38	58.31	117.85	79.79	80.10	114.78	98.51	89.30	77.34	1291.42
Party Total		256.07	232.95	121.09	117.79	80.82	119.62	86.52	81.95	120.70	102.59	97.26	83.04	1500.40
Harper, Cecelia De Mille														
4940A	NORTH	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	15.00
Livingston-Graham, Inc.														
4916B	SnVal	0.59	0.86	0.80	0.95	0.91	1.15	0.67	1.21	0.87	1.34	1.45	1.12	11.92

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners	Extractions (Ac-FT)												
Well No. Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
San Fernando Basin													
Lockheed													
3861C B175-E1	8.65	68.49	88.91	136.47	118.47	130.69	94.64	85.92	87.03	87.76	113.88	86.74	1107.65
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	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
3821I E-2A	175.37	156.77	67.77	1.35	0.00	0.00	0.00	0.00	141.64	212.21	201.79	0.00	956.90
3831G E-3	3.17	0.00	0.69	0.00	0.00	0.41	0.00	0.00	142.86	161.32	173.42	179.23	661.10
3821F E-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
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	187.93	153.01	166.35	164.90	157.99	830.18
3811F E-10	243.09	236.73	94.63	0.00	0.00	0.80	0.00	245.92	207.39	231.31	226.06	214.23	1700.16
E Total	421.63	393.50	163.09	1.35	0.00	1.21	0.00	433.85	644.90	771.19	766.17	551.45	4148.34
Headworks (H)													
3893L 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

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	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	249.38	10.70	0.00	0.00	260.08
3780	NH-4	0.00	4.87	0.02	0.00	0.44	0.00	0.00	0.32	82.42	85.91	109.62	104.59	388.19
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	0.00	4.11	0.05	0.39	0.00	0.00	0.00	0.41	93.78	98.67	87.26	120.00	404.67
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	0.00	0.07	0.05	0.48	0.00	0.00	0.46	0.00	23.51	82.14	69.81	112.42	288.94
3820D	NH-16	8.04	0.00	0.14	0.00	0.00	0.00	0.00	268.57	251.17	8.20	181.50	247.98	965.60
3820C	NH-17	9.18	0.80	0.00	1.40	1.35	0.00	0.00	200.21	283.38	9.21	205.51	281.29	992.33
3820B	NH-18	0.00	1.03	0.12	0.00	1.77	0.00	0.00	352.55	290.68	140.89	98.46	80.65	966.15
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

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						San Fernando Basin								
North Hollywood (NH)														
3830C	NH-20	8.33	1.81	1.33	0.00	1.93	0.00	0.00	273.42	256.27	8.17	0.00	0.00	551.26
3830B	NH-21	111.32	104.20	104.34	56.38	0.62	0.00	0.00	0.00	22.11	3.42	82.97	122.93	608.29
3790C	NH-22	7.25	0.99	0.12	0.00	0.00	0.85	0.00	251.54	202.23	230.60	225.62	215.61	1134.81
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	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
3790F	NH-25	0.00	5.00	0.07	0.00	0.62	0.00	0.00	0.00	135.54	157.23	155.14	149.73	603.33
3790E	NH-26	0.00	8.98	1.33	0.00	0.00	0.83	0.00	0.00	152.99	200.12	35.47	0.00	399.72
3820F	NH-27	0.00	0.00	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.19
3810K	NH-28	0.00	0.00	0.00	0.00	0.00	0.00	17.15	0.00	0.00	0.00	0.00	0.00	17.15
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	1.38	0.00	0.00	0.73	0.00	0.00	0.00	232.23	6.27	0.00	0.00	240.61
3810T	NH-31	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
3770C	NH-32	0.00	7.97	7.07	0.00	0.00	0.00	0.00	273.26	217.56	255.53	251.59	239.03	1252.01
3780C	NH-33	0.00	4.57	4.48	0.00	0.00	0.64	0.00	168.37	128.19	119.28	99.93	132.83	658.29
3790G	NH-34	0.00	6.20	0.05	0.00	0.16	0.00	0.00	0.00	104.73	285.31	271.44	256.59	924.48
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	6.91	0.67	0.07	0.00	0.89	0.00	0.00	239.30	109.05	0.00	0.00	0.00	356.89
3790J	NH-37	9.14	10.08	0.51	0.00	1.12	0.00	0.00	332.76	319.06	325.71	319.29	309.62	1627.29

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	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	1.68	0.28	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.96
3810P	NH-40	405.03	390.87	409.30	24.86	0.00	2.00	0.00	0.00	369.68	388.46	382.76	364.28	2737.24
3810Q	NH-41	0.00	0.00	1.45	0.00	0.00	1.52	0.00	3.10	0.00	0.00	0.00	0.00	6.07
3810R	NH-42	0.00	0.00	1.42	145.13	0.00	0.90	0.00	2.66	253.54	7.78	0.00	0.00	411.43
3790K	NH-43A	0.00	9.23	0.12	1.19	0.00	0.00	0.00	294.70	277.41	285.26	277.23	271.12	1416.26
3790L	NH-44	0.00	11.20	0.12	1.65	0.00	0.00	0.00	381.18	342.54	339.51	334.00	323.85	1734.05
3790M	NH-45	0.00	13.25	0.12	1.86	0.00	0.00	0.00	444.29	419.91	425.23	418.14	407.46	2130.26
NH Total		565.20	588.96	533.75	233.34	11.63	6.74	17.61	3486.64	4817.36	3473.60	3605.74	3739.98	21080.55
Crystal Springs (CS)														
3904J	CS-52(#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
3904J	CS-52(#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
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
Pollock (P)														
3959E	P-4	233.33	225.62	86.80	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	546.44
3958H	P-6	0.00	0.00	0.96	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.56
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		233.33	225.62	87.76	0.69	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	548.00

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							San Fernando Basin							
Rinaldi-Toluca (RT)														
4909E	RT-1	0.00	0.00	0.00	0.00	0.18	0.00	0.00	230.40	166.16	458.06	453.81	428.61	1737.22
4898A	RT-2	532.03	515.09	531.94	273.79	0.00	0.00	0.00	532.65	504.00	499.18	478.81	460.43	4327.92
4898B	RT-3	535.70	520.92	537.45	312.97	0.00	0.00	0.00	537.56	506.25	517.45	506.09	496.56	4470.95
4898C	RT-4	16.09	16.07	0.25	0.00	0.00	0.00	0.00	567.08	520.00	548.17	537.08	525.53	2730.27
4898D	RT-5	572.66	556.39	575.65	335.31	0.00	0.00	0.00	572.64	537.19	546.70	538.25	523.72	4758.51
4898E	RT-6	15.59	15.01	0.09	0.00	0.00	0.00	0.00	533.47	501.43	509.99	496.58	259.67	2331.83
	RT-7	536.37	522.07	539.77	314.65	0.00	0.00	0.00	535.79	504.48	518.83	509.23	497.39	4478.58
	RT-8	16.69	15.84	0.25	0.00	0.00	0.00	0.00	558.73	528.81	528.49	506.16	495.85	2650.82
	RT-9	12.60	11.87	0.16	0.00	0.00	0.00	0.00	420.43	399.29	389.42	367.04	360.24	1961.05
4909G	RT-10	521.01	506.82	528.77	309.05	0.00	0.00	0.00	550.39	518.62	530.28	531.73	512.06	4508.73
4909K	RT-11	16.64	0.00	2.43	0.00	0.00	0.00	0.00	514.37	464.44	481.91	476.29	456.45	2412.53
4909H	RT-12	15.52	0.00	2.50	0.00	0.00	0.00	0.00	527.53	495.02	478.95	480.72	460.59	2460.83
4909J	RT-13	508.34	497.36	515.09	264.17	0.00	0.00	0.00	520.99	470.64	487.03	478.42	463.52	4205.56
	RT-14	16.21	0.00	282.03	1.65	0.00	0.00	0.00	503.49	450.19	454.85	323.90	492.84	2525.16
	RT-15	529.11	513.11	144.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1187.06
RT Total		3844.56	3690.55	3661.22	1811.59	0.18	0.00	0.00	7105.52	6566.52	6949.31	6684.11	6433.46	46747.02

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners	Extractions (Ac-FT)												
Well No. Designation	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	0.37	5.79	5.33	0.80	0.96	0.00	0.00	0.00	45.48	229.00	227.25	215.06	730.04
3863P V-2	58.24	93.34	35.84	0.00	0.80	0.00	0.00	0.00	188.39	182.32	30.14	0.00	589.07
3863J V-4	4.45	0.00	0.00	0.78	0.00	0.00	0.00	0.00	166.44	4.02	0.00	0.00	175.69
3863L V-11	7.48	1.42	0.00	0.00	1.26	0.00	0.00	0.00	228.54	5.53	0.00	0.00	244.23
3853G V-13	24.82	25.00	11.23	0.14	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	61.21
3854F V-22	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
3844R V-24	182.90	174.86	121.95	0.00	0.96	0.00	0.00	191.76	176.42	179.06	178.12	170.13	1376.16
V Total	278.26	300.41	174.35	1.72	3.98	0.00	0.00	191.76	805.29	599.93	435.51	385.19	3176.40
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	6.75	6.89	0.07	0.00	1.38	0.00	0.00	316.30	269.84	7.90	0.00	0.00	609.13
3821E W-5	8.82	0.00	0.09	2.02	0.00	0.00	0.92	296.83	250.30	226.45	0.00	0.00	785.43
3831J W-6A	0.53	0.00	0.02	1.12	0.00	0.00	0.00	0.00	139.85	327.57	325.65	315.04	1109.78

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							San Fernando Basin							
Whitnall (W)														
3832K	W-7	0.00	0.00	54.98	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.42
3832L	W-8	2.36	3.15	0.05	0.00	0.60	0.00	0.00	0.00	118.99	136.32	141.53	137.44	540.44
3832M	W-9	0.00	0.00	0.67	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.69
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		18.46	10.04	55.88	3.58	1.98	0.02	0.92	613.13	778.98	698.24	467.18	452.48	3100.89
Aeration (A)														
3800E	A-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
3810U	A-2	0.00	0.00	12.21	22.84	25.14	27.78	29.34	18.80	0.00	0.00	16.07	0.00	152.18
3810V	A-3	0.00	0.00	8.08	3.99	0.25	2.73	4.57	5.05	16.87	12.26	0.00	0.00	53.80
3810W	A-4	0.00	0.00	35.26	2.11	0.11	3.05	2.59	0.00	6.15	19.26	9.23	0.07	77.83
3820H	A-5	0.00	0.00	13.75	7.85	0.05	0.09	0.00	7.16	18.09	15.45	7.58	0.00	70.02
3821J	A-6	0.00	0.00	17.42	33.77	29.94	27.73	29.09	31.77	32.74	21.95	18.18	8.86	251.45
3830P	A-7	0.00	0.00	19.65	36.36	31.29	34.14	34.27	43.09	26.01	5.46	0.00	1.06	231.33
3831K	A-8	0.00	0.00	34.62	37.79	36.66	30.49	16.57	42.98	40.73	41.02	20.68	9.69	311.23
A Total		0.00	0.00	140.99	144.71	123.44	126.01	116.43	148.85	140.59	115.40	71.74	19.68	1147.84
City of Los Angeles Total		5361.44	5209.08	4817.04	2196.98	141.81	133.98	134.96	11979.75	13753.64	12607.67	12030.45	11582.24	79949.04

1989–1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners	Extractions (Ac-FT)												
Well No. Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
San Fernando Basin													
May Co.–North Ridge Fashion Plaza													
— —	—	—	—	—	—	—	—	1.30	0.53	0.20	0.00	0.00	2.03
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	0.77	0.42	0.32	0.12	0.16	0.46	0.23	0.36	1.54	1.83	2.23	1.50	9.94
Sportmen's Lodge, Inc.													
3785A 1	0.07	0.10	0.05	0.02	0.05	0.06	0.07	0.06	0.00	0.00	0.00	0.06	0.54
3M–Pharmaceuticals													
— —	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.86	0.86	0.86	0.86	10.24
Toluca Lake Property Owners Assn.													
3845F 3845F	5.37	2.71	3.68	2.15	1.11	2.40	1.27	3.29	4.04	4.53	4.17	4.05	38.77
Trillium Corp.													
— 1	—	—	—	—	—	—	—	—	—	—	1.16	1.11	2.27
— 2	—	—	—	—	—	—	—	—	—	—	1.76	1.81	3.57
Party Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.92	2.92	5.84
Valhalla Memorial Park													
3840K 4	25.67	13.97	3.36	2.79	0.27	3.40	15.22	40.14	63.70	35.57	50.48	38.45	293.02
Valley Reclamation Co.													
4916D	4.08	3.53	2.16	2.03	1.78	1.98	0.66	0.31	0.00	0.00	0.00	0.00	16.53

— Prior to start of pumping.

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners	Extractions (Ac-FT)												
Well No. Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
						San Fernando Basin							
Walt Disney Productions													
3874E EAST	59.48	61.21	41.63	51.53	33.75	49.69	70.62	70.85	93.46	158.39	94.46	183.69	968.76
3874F WEST	93.76	101.17	70.26	83.19	42.58	67.11	113.00	106.74	61.18	81.76	40.11	200.41	1061.27
Party Total	153.24	162.38	111.89	134.72	76.33	116.80	183.62	177.59	154.64	240.15	134.57	384.10	2030.03
Basin Total	5852.45	5843.80	5337.08	2695.18	524.13	683.91	658.76	12514.59	14540.34	13268.22	12631.50	12345.47	86895.43

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							Sylmar Basin							
City of Los Angeles														
Plant	Mission	394.33	368.12	2.69	0.00	0.00	91.78	0.00	89.81	437.63	429.76	415.18	396.21	2625.51
Meurer Engineering Co.														
5998	3	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.60
City of San Fernando														
5969D	2A	0.19	0.52	19.25	103.33	101.25	110.77	122.05	154.42	130.13	182.18	162.52	163.96	1250.57
5959	3	0.38	0.32	21.37	28.57	6.90	21.18	195.97	117.67	151.97	130.30	128.86	129.29	932.78
5969	4	0.06	0.07	8.75	15.36	16.52	16.54	0.00	14.96	32.13	26.85	26.16	22.73	180.13
5968	7A	0.13	0.18	7.24	18.17	35.76	56.90	48.78	36.32	45.75	54.93	52.59	42.93	399.68
Party Total		0.76	1.09	56.61	165.43	160.43	205.39	366.80	323.37	359.98	394.26	370.13	358.91	2763.16
Basin Total		395.14	369.26	59.35	165.48	160.48	297.22	366.85	413.23	797.66	824.07	785.36	755.17	5389.27

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							Verdugo Basin							
Crescenta Valley County														
5058B	1	37.58	37.78	35.38	25.60	24.79	0.51	0.06	0.00	0.40	0.32	0.05	3.42	165.89
5058H	5	0.00	0.00	0.00	0.00	1.16	36.47	41.17	76.30	61.21	102.79	55.89	23.26	398.25
5058	6	14.80	19.01	12.65	7.94	4.49	17.74	15.91	12.24	2.45	1.28	0.87	0.00	109.38
5047B	7	0.00	0.00	0.00	0.23	3.47	12.82	4.13	1.14	0.45	0.28	13.01	19.60	55.13
5069J	8	37.69	0.00	0.00	0.00	62.43	71.61	47.71	46.81	43.66	44.81	42.60	33.61	430.93
5047D	9	0.00	0.00	0.00	0.00	4.18	14.06	22.46	15.62	13.88	4.88	11.69	2.59	89.36
5058D	10	83.98	82.14	74.33	73.88	70.54	77.40	70.48	69.57	44.16	50.80	33.61	45.88	776.77
5058E	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.18	35.91	49.76	90.85
5058J	12	19.96	47.56	37.39	25.53	0.00	0.00	0.00	0.00	50.47	49.65	47.48	39.50	317.54
5069F	14	42.44	42.66	39.40	32.73	36.81	40.40	34.70	30.87	38.06	36.29	22.21	24.82	421.39
	PICK	4.11	3.95	4.08	4.05	3.66	4.18	3.94	4.00	3.85	3.90	3.85	3.71	47.28
Party Total		240.56	233.10	203.23	169.96	211.53	275.19	240.56	256.55	258.59	300.18	267.17	246.15	2902.77
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	41.68	50.58	50.08	142.34
3970	GL-6	95.14	88.39	86.24	7.98	0.00	74.88	105.88	88.39	33.15	7.06	0.00	23.02	610.13
-	MM-1	90.63	82.19	79.92	75.47	66.84	39.65	47.63	49.63	44.68	0.04	0.00	0.00	576.68
Party Total		185.77	170.58	166.16	83.45	66.84	114.53	153.51	138.02	77.83	48.78	50.58	73.10	1329.15
Basin Total		426.33	403.68	369.39	253.41	278.37	389.72	394.07	394.57	336.42	348.96	317.75	319.25	4231.92

1989-1990 WATER YEAR GROUND WATER EXTRACTIONS

LACDPW Owners		Extractions (Ac-FT)												
Well No.	Designation	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	TOTAL
							Eagle Rock Basin							
Sparkletts Drinking Water														
3987A	1	6.00	5.24	5.01	5.33	4.83	5.58	5.35	6.13	5.84	0.45	0.00	2.41	52.17
3987B	2	4.51	4.00	3.85	4.15	3.68	4.26	3.95	1.44	4.83	9.31	6.25	4.65	54.88
3987F	3	4.63	4.15	4.12	4.48	3.93	4.50	4.14	4.80	4.30	8.37	10.43	7.26	65.11
Party Total		15.14	13.39	12.98	13.96	12.44	14.34	13.44	12.37	14.97	18.13	16.68	14.32	172.16
Basin Total		15.14	13.39	12.98	13.96	12.44	14.34	13.44	12.37	14.97	18.13	16.68	14.32	172.16
ULARA Total		6689.06	6630.13	5778.80	3128.03	975.42	1385.19	1433.12	13334.76	15689.39	14459.38	13751.29	13434.21	96688.78

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 PACOIMA-CREEK FLUME BELOW PACOIMA DAM for Water-Year 19 89 19 90

Station No. F118BR

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

Gage Read CONTINUOUS

Rating Table No. 44-1

DAY	OCTOBER			NOVEMBER			DECEMBER			JANUARY			FEBRUARY			MARCH		
	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge
1	0.0		0	0.0		0	0.0		0	0		0	0		0	0		0
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10	0.0		0															
11	H		2.1															
12	0.0		0															
13										0		0						
14										14		25.7						
15										0.12		1.4						
16										0.07		0.9						
17										0.01		0.8						
18										0.01		0.6						
19										0.01		0.6						
20										0.01		0.6						
21										0		0						
22																		
23																		
24																		
25																		
26																		
27																		
28													0		0			
29				0.0		0												
30	0.0		0				0.0		0	0		0				0		0
31																		
1			2.1		0.0			0			31.3			0			0	
2			0.06		0.0			0			4.0			0			0	
3			4.2		0.0			0			20.1			0			0	
4			2.1		0.0			0			25.7			0			0	
5			0		0.0			0			0			0			0	

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	1
2																			2
3																			3
4																			4
5																			5
6																			6
7																			7
8																			8
9																			9
10																			10
11																			11
12																			12
13																			13
14																			14
15																			15
16																			16
17																			17
18																			18
19																			19
20				0		0													20
21				0.48		34.6													21
22				0.31		23.3													22
23				0.33		27.4													23
24				0.19		15.3													24
25				0		0													25
26																			26
27																			27
28				0		0													28
29				0.71		54.2													29
30	0		0	1.14		93.5	0		0									0	30
31				0.77		59.6													31
1						307.9			0			0						0	1
2						9.4			0			0						0	2
3						6.11			0			0						0	3
4						93.5			0			0						1	4
5						0			0			0						0	5

Maximum stage 2.84 feet at 1133 on 10-11-89 Discharge 318 Second-feet

Minimum stage 0 feet on Various Times Various DAYS Discharge 0 Second-feet

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

REMARKS

YEARLY TOTALS

1	340.
2	0.45
3	675.
4	93.
5	0

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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 1989 1990

Station No. F-168-R

Drainage Area 82.3 Square Miles (ROD Observer)

Gage Read 15 MIN.

Rating Table No. 78-01

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	1.90		0	2.22		2.06	2.20		1.86	2.11		.57	2.14	-.24	0	2.13		0	1
2	"		"	2.21		1.96	2.20		1.86	2.01		.11	"	"	"	2.13		0	2
3				2.21		1.93	2.20		1.80	2.00		.10				2.13		0	3
4				2.21		1.97	2.20		1.80	2.00		.10				2.13		0	4
5				2.21		1.94	2.20		1.80	2.00		.10				2.12		0	5
6				2.21		1.93	2.17		1.22	2.00		.10				2.12		0	6
7				2.21		1.93	2.11		.57	2.00		.10				2.12		0	7
8				2.21		1.93	2.11		.57	2.00		.10				2.27		1.2	8
9				2.17		1.17	2.10		.51	2.00		.10				2.55		6.93	9
10				2.11		.57	2.10		.50	2.00		.10				2.55		6.80	10
11				2.11		.54	2.13		.74	2.00		.10	"	"	"	2.55		6.30	11
12				2.10		.51	2.17		1.23	2.22		2.09	2.14	-.34	0	2.84		15.1	12
13				2.10		.50	2.15		1.00	2.34		3.42	2.64	-.11	8.69	3.00		21.6	13
14				2.10		.50	2.10		.50	2.29		3.21	2.82	-.10	14.7	2.96		19.3	14
15				2.10		.50	2.10		.50	2.82		18.9	2.82	-.10	14.7	2.91		17.1	15
16				2.10		.50	2.10		.50	3.47		60.2	2.72	-.10	11.3	2.62		7.65	16
17				2.11		.55	2.10		.50	3.26		43.4	2.44	-.16	3.15	2.34		.48	17
18				2.11		.57	2.10		.50	2.49		7.55	2.21	-.31	22.1	2.26		.56	18
19				2.11		.57	2.10		.50	2.33		3.89	3.38	-.12	43.4	2.25		.53	19
20				2.11		.57	2.10		.50	2.32		3.79	3.22		41.4	2.25		.43	20
21				2.11		.57	2.11		.55	2.32		3.79	3.01		28.7	2.24		.34	21
22				2.11		.54	2.11		.57	2.31		3.67	2.77		2.89	2.20		.31	22
23				2.11		.57	2.11		.57	2.22		2.11	2.20		2.35	2.21		.27	23
24	"		"	2.11		.57	2.11		.57	2.27		2.88	2.26		2.77	2.24		.23	24
25	1.90		0	2.11		.57	2.11		.57	2.26		2.77	2.25		2.59	2.24		.19	25
26	2.15		.93	2.22		1.77	2.11		.57	2.26		2.69	2.25		2.52	2.21		.19	26
27	2.34		2.03	2.20		1.85	2.11		.57	2.26		2.69	2.25		2.52	2.24		.16	27
28	2.25		2.59	2.20		1.83	2.11		.57	2.26		2.69	2.25		2.52	2.21		.14	28
29	2.25		2.46	2.20		1.90	2.11		.57	2.26		2.69				2.24		.14	29
30	2.24		2.30	2.20		1.90	2.11		.57	2.26		2.74				2.24		.12	30
31	2.22		2.15				2.11		.57	2.27		2.86				2.26		.10	31
1			12.51			34.5			25.0			178.62			20.63			101.2	1
2			.46			1.2			.90			5.76			7.3			3.4	2
3			29.0			69.0			50			354.0			409.0			211.0	3
4			2.09			2.06			1.86			60.2			43.4			21.6	4
5			0			.50			.50			.10			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	2.15	+.25	0	2.12	+.23	0	2.47		7.16	0		0	0		0	1.90		0	1
2	2.17	+.27	0	)	(	(	2.31		3.69	"		"	"		"	"		"	2
3	2.19	+.29	0	)	(	(	2.24		2.36										3
4	2.20	+.30	0	)	(	(	2.27	+.15	.61										4
5	2.22	+.32	0	(	(	(	2.18	+.24	0										5
6	2.23	+.33	0	(	(	(	"	"	"										6
7	2.25	+.35	0	2.13	+.23	0													7
8	2.27	+.37	0	2.12	+.22	0													8
9	2.42	+.37	0	"	"	"													9
10	2.30	+.40	0																10
11	2.12	+.43	3.51																11
12	2.95	+.08	20.7																12
13	2.95	+.09	20.3																13
14	2.95	+.10	19.9																14
15	2.95	+.11	19.5																15
16	2.29	+.12	9.74																16
17	2.28	+.12	1.03																17
18	2.24	+.12	.54																18
19	2.26	+.14	.69	"	"	"													19
20	2.26	+.15	.54	2.12	+.22	0													20
21	2.25	+.16	.43	2.11	+.21	0													21
22	2.25	+.16	.43	"	"	"													22
23	2.25	+.17	.36																23
24	2.24	+.18	.28																24
25	2.24	+.19	.23																25
26	2.24	+.19	.21	"	"	"													26
27	2.23	+.20	.17	2.11	+.21	0													27
28	2.23	+.21	.15	2.25	+.01	2.34													28
29	2.23	+.22	.12	2.24		2.44	"	"	"	"		"	"		"	"		"	29
30	2.23	+.23	.10	2.35		1.93	2.11	+.21	0	"		"	"		"	1.90		0	30
31				2.51		2.35				0		0	0		0				31
1			98.9			17.9			15.72			0			0			0	1
2			3.4			.6			.5			0			0			0	2
3			1960			35.0			27.4			0			0			0	3
4			20.7			9.3			7.16			0			0			0	4
5			0			0			0			0			0			0	5

REMARKS:

1 - Total CFS
2 - Average Daily Flow in CFS
3 - Total Inches Flow in A.F.
4 - Maximum Average Daily Flow in CFS

YEARL TOTAL

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

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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 89 19 90
Drainage Area: 26.8 Square Miles
Observer: R. Velez
Gage Read: Every 15 minutes
Rating Table No.: 47-1 V

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	0.23	-.05	2.2	0.23	-.06	2.1	0.26	-.07	2.8	0.29	-.07	9.5	0.26	-.06	2.7	0.22	-.06	1.7	1
2	0.22	"	2.0	0.22	"	1.8	0.25	↑	3.6	0.40	"	54.7	.25	↑	2.6	0.21	↑	1.5	2
3	0.22	"	2.1			1.7	0.26	"	2.6	0.23	"	1.7	.23	"	2.0	0.21	"	1.5	3
4	0.23	"	2.1				0.26	"	2.7	0.23	"	2.1	.16	"	90.9	0.29	"	2.7	4
5	0.22	"	2.0				0.27	"	2.8	0.27	"	4.4	0.21	"	2.3	0.22	"	1.7	5
6	(	"	2.0				(	"	3.1	0.33	-.06	10.9	0.21	"	1.4	0.21	"	1.5	6
7		"	2.1	0.24	-.07	2.2		"	3.1	0.32	↑	9.5	0.19	"	1.0		"	1.5	7
8		"	2.0	0.25	-.07	2.3		"	3.6	0.31	"	8.5	0.20	"	1.3		"		8
9	0.21	"	1.8	0.23	-.06	2.1	0.24	"	2.1	0.28	"	5.5	0.21	"	1.6		"		9
10	0.21	-.05	1.7	0.24	-.06	2.3	(	"	2.3	0.26	"	3.4		"	1.5	0.21	"	1.5	10
11	0.24	-.06	2.8	0.24	-.07	2.0		"	1.9	0.26	"	3.1		"	1.5	0.28	"	4.5	11
12	0.22	"	1.9	0.25	"	2.3		"	2.0	0.29	"	8.5		"	1.6	0.27	"	4.0	12
13	0.21	"	1.5	0.25	"	2.3	0.23	"	1.7	0.70	"	212.		"	1.6	0.22	"	1.7	13
14	0.22	"	1.7	0.26	"	2.5	0.23	"	1.7	0.46	"	23.5	0.21	"	1.5	0.19	"	1.1	14
15	0.23	"	1.7	0.25	"	2.4	0.25	"	2.8	0.27	"	4.2	0.20	"	1.3	0.19	"	1.0	15
16	0.21	"	1.5	(	"	2.3	0.25	"	2.3	0.50	"	130.	0.25	"	16.8		"		16
17	0.21	"	1.5		"	2.3	0.26	"	2.4	0.39	"	42.6	0.99	"	47.4.		"		17
18	0.22	"	1.7		"	2.3	0.25	"	2.3	0.24	"	2.2	0.39	"	23.0		"		18
19	(	"	1.7		"	2.3	0.25	"	2.4	0.21	"	1.5	0.25	"	2.7		"		19
20		-.06	1.7	0.25	"	2.4	0.27	"	3.0	0.21	"	1.5	0.20	"	1.7		"		20
21	0.29	"	7.7	0.26	-.07	2.5	0.27	"	3.3	0.22	"	1.7	0.23	"	1.9		"		21
22	0.37	"	29.0	0.26	-.06	3.0	0.26	"	2.6	0.24	"	2.2	0.22	"	1.8		"		22
23	0.30	"	8.2	0.24	-.05	2.5	(	"	2.7	(	"	2.3	0.21	"	1.6		"		23
24	0.24	"	2.3		-.05	2.5		"	2.5		"		0.23	"	1.9		"		24
25	0.25	"	3.6		-.04	2.8		"	3.0		"		0.22	"	1.7		"		25
26	0.23	-.04	1.9	0.44	-.03	113.0		"	2.5		"			"	1.7		"		26
27	0.22	"	1.6	0.24	-.03	4.1	0.25	"	2.4		"	2.3		"	1.7		"		27
28	0.23	"	2.0	0.26	-.02	7.0	(	"	2.3	0.25	"	2.5	0.22	-.06	1.9		"		28
29	0.21	"	1.5	0.26	-.01	8.3		"	2.2	0.25	"	2.5				0.19	"	1.0	29
30	0.21	"	1.5	0.25	0	8.3		↓	2.5	0.29	↓	9.7				0.20	"	1.2	30
31	0.23	-.04	2.1				0.26	-.07		0.30	-.06	9.2				0.21	-.06	1.6	31
	99.3.			196.6			78.6			638.7			647.2			45.2			
	3.2			6.6			2.5			20.3			23.1			1.5			
	197			390			156.0			1247.0			1284			89.7			
	29			113			3.6			212.0			474			4.5			
	1.5			1.7			1.7			1.5			1.0			1.0			

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	0.21	-.06	1.5	0.21	-.06	1.4	0.20	-.06	1.2	0.20	-.06	1.4	.19	-.06	1.0	0.18	-.06	.7	1
2	0.21	↑	1.5	0.19		1.0	0.20	↑	1.2	0.20	↑	1.1	.18	↑	0.8	0.19	↑	1.0	2
3	0.21	"	1.5	0.18		.8	0.20	"	1.2	0.19	"	1.0	.17	"	0.5	0.20	"	1.2	3
4	0.31	"	12.0	↑		.7	0.19	"	1.1	0.20	"	1.2	.17	"	0.5	0.20	"	1.2	4
5	0.25	"	2.6	↓		.7	0.18	"	0.8	0.22	"	1.7	.18	"	0.6	0.19	"	1.0	5
6	0.24	"	2.2	0.18		.7	0.19	"	1.0	0.20	"	1.2	.18	"	0.7	0.19	"	1.0	6
7	0.23	"	2.0	0.26		1.1	0.18	"	0.7	0.29	"	2.2	.21	"	1.6	0.20	"	1.2	7
8		"		0.22		1.6	0.20	"	1.2	0.23	"	2.0	.19	"	1.1	0.20	"	1.2	8
9		"		0.21		1.6	0.20	"	1.2	0.21	"	1.5	.18	"	0.8	0.20	"	1.2	9
10		"		↓		1.5	0.22	"	1.6	0.21	"	1.5	↑	"	0.7	0.21	"	1.9	10
11	0.23	"	2.0				0.21	"	1.6	0.19	"	1.1		"		0.22	"	1.7	11
12	0.22	"	1.8				0.18	"	0.7		"	.9		"		0.22	"	1.6	12
13		"	1.7				0.17	"	.6		"	1.0		"		0.20	"	1.3	13
14		"	1.7				0.19	"	1.0	0.19	"	1.1	.18	"	0.7	0.21	"	1.9	14
15	0.22	"	1.7				0.18	"	0.6	0.21	"	1.5	.19	"	1.0	0.20	"	1.2	15
16	0.30	"	19.8	↓		1.5	0.16	"	0.4	0.21	"	1.4	.20	"	1.2	0.19	"	1.0	16
17	0.34	"	24.0	0.21		1.4	0.15	"	0.1	0.20	"	1.3	↑	"	↑	↑	"	↑	17
18	0.25	"	3.2	0.19		1.0	0.16	"	0.2	0.19	"	1.1		"			"		18
19	0.22	"	1.8	0.18		.7	0.15	"	0.1	0.19	"	1.1	.20	"	1.2		"		19
20	0.23	"	1.9	0.18		.6	0.15	"		0.19	"	1.0	.19	"	1.0	0.19	"	1.0	20
21	0.22	"	1.8	0.14		.7		"		0.20	"	1.1	.19	"	1.0	0.20	"	1.1	21
22	0.22	"	1.7	0.08		+		"		0.19	"	0.9	.18	"	0.7	0.21	"	1.4	22
23	0.27	"	8.8	0.07		+		"			"		.18	"	0.7		"	1.5	23
24	0.23	"	2.1	0.08		+	0.15	"	0.1		"		.18	"	0.6		"	1.5	24
25	0.22	"	1.6	0.08		+	0.20	"	1.2		"		.17	"	0.9	0.21	"	1.9	25
26	0.21	"	1.9	0.08		+	0.18	"	0.7	0.19	"	0.9	.18	"	0.6	0.20	"	1.2	26
27	0.21	"	1.1	0.08		+	0.19	"	1.0	0.18	"	0.8	.17	"	0.5		"		27
28	0.20	"	1.2	0.49		1.3a	0.20	"	1.2	0.18	"	0.7		"			"		28
29	0.19	"	1.0	0.23		2.1	0.20	"	1.3	0.18	"	0.7		"			"		29
30	0.21	-.06	1.5	0.21		1.5	0.21	-.06	1.5	0.19	"	0.9		"		0.20	-.06	1.2	30
31				0.20	-.06	1.4				0.18	-.06	0.8	.17	-.06	0.5				31
	102.4			158.9			23.9			35.8			24.4			36.2			
	3.4			5.1			0.77			1.2			0.79			1.2			
	203.			315			47.4			71.0			48.4			71.8			
	24.0			130			1.6			2.2			1.6			1.7			
	1.0			+			0.1			0.7			0.4			0.7			

YEARLY TOTALS

1	2077.2
2	5.7
3	4120
4	474
5	+

Maximum stage 1.78 feet at 0945 on 2-17-90 Discharge 1820 Second-feet.
Minimum stage 0.02 feet at 1400 on 3-23-90 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

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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 1989 1990
Station No.: E285-R
Drainage Area: 25 Square Miles (A HAMMER Observer)
Gage Read: 15 MIN PUNCH TAPE
Rating Table No.: 59-1 ✓

DAY	OCTOBER			NOVEMBER			DECEMBER			JANUARY			FEBRUARY			MARCH		
	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge	Gage Height	Adj.	Discharge
1	0.12	-.03	7.2	0.13	-.04	6.9	0.13	-.01	7.1	0.12	-.03	7.0	0.14	-.03	8.6	0.13	-.03	8.2
2	0.13	-.03	7.7	0.12	(	6.4	0.13	(	7.4	0.18	(	24.2	0.14	(	8.5	0.14	↗	9.0
3	0.12	-.03	6.6	0.14	(	7.4	0.14	(	8.1	0.13	(	7.7	0.13	(	7.7	0.14	(	8.6
4	0.11	-.04	5.4	0.14	(	7.4	(	(	7.9	0.13	(	7.6	0.27	(	71.3	0.16	(	11.5
5	0.12	(	6.5	0.14	(	9.0	(	(	8.3	0.13	(	7.5	0.16	(	11.0	0.15	(	10.2
6	0.14	(	7.6	0.15	(	9.5	0.14	(	7.8	0.12	(	7.1	0.15	(	10.2	0.15	(	10.0
7	0.13	(	7.6	0.16	(	9.7	0.13	(	7.2	0.13	(	7.9	(	(	18.0	0.15	(	9.8
8	0.13	-.04	7.2	0.15	(	9.2	(	(	7.2	(	(	8.1	(	(	9.7	0.14	(	9.4
9	0.13	-.05	6.4	(	(	9.0	(	-.04	7.3	(	(	8.0	(	(	10.4	0.14	(	9.4
10	(	(	6.0	(	(	89	(	-.03	8.2	(	(	8.2	(	(	10.1	0.14	(	9.6
11	(	(	5.9	(	(	9.2	(	(	8.2	0.13	(	8.1	(	(	9.7	0.16	(	11.1
12	0.17	(	6.0	(	(	9.2	(	(	7.5	0.14	(	9.0	0.15	(	18.3	0.25	(	24.9
13	0.13	(	6.5	0.15	(	89	(	(	7.7	0.31	(	62.6	0.16	(	11.4	0.16	(	10.9
14	0.15	(	8.3	0.14	(	8.5	(	(	7.9	0.24	(	32.3	0.18	(	13.9	0.15	(	10.3
15	0.16	(	8.9	0.14	(	7.9	(	(	8.1	0.15	(	10.3	0.16	(	11.3	0.15	(	10.5
16	0.14	(	7.1	0.13	(	7.2	(	(	8.3	0.29	(	58.5	0.26	(	60.2	0.15	(	10.5
17	0.13	(	5.7	0.13	(	7.4	(	(	8.7	0.27	(	33.6	0.65	(	253	0.15	(	10.3
18	0.12	(	5.2	0.13	(	6.7	(	(	8.2	0.16	(	11.1	0.32	(	56.3	0.14	(	9.0
19	0.12	(	5.2	0.12	(	6.4	(	(	7.8	0.15	(	10.3	0.15	(	10.8	0.14	(	9.2
20	0.12	(	5.1	0.12	(	5.8	0.13	(	7.5	0.15	(	10.2	0.15	(	9.9	0.15	(	9.8
21	0.14	-.05	9.4	0.11	(	5.6	0.12	(	6.8	0.15	(	10.4	0.13	(	8.5	0.16	(	11.3
22	0.19	-.04	23.0	0.12	(	5.9	0.12	(	6.8	0.16	(	11.4	0.13	(	8.0	0.17	(	13.4
23	0.13	(	6.5	0.13	(	6.8	0.11	(	6.2	0.15	(	10.7	0.13	(	8.1	0.18	(	13.5
24	0.12	(	6.2	0.13	(	7.2	0.11	(	6.4	0.14	(	9.3	0.14	(	8.9	0.17	(	13.0
25	0.12	(	5.9	0.13	(	7.1	0.11	(	6.3	0.14	(	9.2	0.14	(	8.6	0.17	(	13.1
26	0.10	(	4.7	0.21	(	40.4	0.12	(	6.6	0.15	(	10.2	0.13	(	8.3	0.17	(	13.4
27	0.11	(	5.4	0.13	(	7.5	0.12	(	6.6	0.15	(	10.0	0.14	(	9.1	0.17	(	13.0
28	0.12	(	6.1	0.14	(	8.0	0.11	(	6.2	0.15	(	9.8	0.14	.03	8.7	0.17	(	12.9
29	0.12	(	6.2	0.14	(	7.9	0.10	(	5.6	0.16	(	11.1	(	(	(	0.16	(	11.5
30	0.13	(	6.8	0.14	-.01	7.9	0.11	(	6.2	0.18	(	19.0	(	(	(	0.13	↓	7.6
31	0.14	-.01	7.5	(	(	(	0.11	-.03	6.0	0.14	-.03	8.5	(	(	(	0.13	-.03	7.4
1	219.8			263.8			225.9			458.9			672.4			542.3		
2	7.1			8.8			7.3			14.8			24.0			11.0		
3	436			523			448			910			1334			679		
4	25			40.4			8.3			62.6			253			24.9		
5	4.7			5.6			5.6			7.8			7.7			7.4		

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	0.12	-.03	7.5	0.13	-.03	7.3	0.15	-.03	10.0	0.12	-.03	7.1	0.13	-.03	7.6	0.14	-.06	6.0	1
2	0.12	↗	6.9	0.12	↑	7.0	0.15	↑	8.9	0.13		8.0	↑	↑	7.6	0.14	↑	6.0	2
3	0.12		6.6	0.11		6.9	0.14		8.7	0.13		7.9			7.9	0.13		5.5	3
4	0.32		91.0	0.11		5.7	0.14		9.0	0.13		7.9	↓	↓	7.9	0.12		4.6	4
5	0.12		6.5	0.12		6.5	0.14		8.9	0.13		8.0	0.13	-.03	7.9	0.11		4.2	5
6	0.12		6.4	0.11		6.1	0.14		9.6	0.12		6.6	0.20	-.05	30.2	0.12		4.6	6
7	0.12		6.6	0.11		6.3	0.15		10.1	0.13		7.6	0.45	.32	12.6	0.14		6.0	7
8	0.12		6.5	0.11		6.3	0.15		9.9	0.13		7.9	0.32	.73	6.7	0.12		4.5	8
9	0.12		6.8	0.13		7.7	0.15		10.1	0.13		7.9	0.25	-.16	6.7	0.13		5.4	9
10	0.12		6.6	0.13		7.1	0.15		9.9	0.13		7.9	0.21	-.13	6.2	↓		5.3	10
11	0.12		7.1	0.12		7.2	0.15		9.8	0.13		7.9	0.18	-.10	6.0			5.3	11
12	0.12		7.1	0.13		7.4	0.13		7.9	0.13		7.6	0.17	-.09	↑			5.3	12
13	0.12		6.6	0.13		7.3	0.12		6.9	0.13		7.5	0.16	-.08				5.3	13
14	0.12		6.5	0.13		7.3	0.12		7.0	0.12		7.3	0.16	-.08		↓		5.3	14
15	0.12		6.9	0.12		7.2	0.12		7.0	0.13		7.4	0.15	-.07		0.13		5.1	15
16	0.12		6.9	0.12		7.2	0.13		7.9				↑	↑		0.12		5.0	16
17	0.13		7.2	0.12		7.2	0.13		8.0	0.13		7.8				0.12		4.9	17
18	0.13		7.3	0.12		6.4	0.13		8.2	0.12		7.2				0.13		5.0	18
19	0.13		8.2	0.12		6.8	0.14		8.9	0.12		6.7				↑		5.3	19
20	0.13		8.1	0.12		7.0	0.14		8.9	0.12		6.7						5.3	20
21	0.13		7.9	0.12		7.1	0.12		8.6	0.12		6.7	↓	↓				5.3	21
22	0.14		8.8	0.12		7.0	0.12		8.5	0.12		6.8	0.15	-.07		↓		5.3	22
23	0.19		15.0	0.12		6.5	0.11		8.2	0.12		7.1	0.14	-.06		0.13		5.1	23
24	0.17		7.2	0.11		6.1	0.13		7.5	0.12		6.8	0.14	-.06		0.12		4.7	24
25	0.17		6.7	0.12		7.3	0.13		7.6	0.12		6.7	0.14	-.06		0.11		4.1	25
26	0.12		6.4	0.11		6.1	0.13		7.9	0.12		10.7	0.15	-.07		0.12		4.9	26
27	0.12		7.2	0.12		6.8	0.13		7.9	0.12		6.7	0.14	-.06		0.13		5.3	27
28	0.13		8.3	0.44		83.4	0.13		7.7	0.12		6.7				0.12		5.3	28
29	0.13	↓	8.3	0.15		9.7	0.10	↓	8.7	0.12		7.0				↓	↓	5.3	29
30	0.13	-.03	7.4	0.15	↓	10.0	0.14	-.03	9.0	0.13		7.7	↓	↓	6.0	0.13	-.06	5.3	30
31	(	(	(	0.15	-.03	10.2	(	(	(	0.13	-.03	7.7	0.14	-.06	6.1	(	(	(	31
1	319.1			297.1			250.5			227.7			227.4			134.5			1
2	10.6			9.6			8.4			7.3			7.3			5.2			2
3	633			584			497			452			451			306			3
4	66.2			83.4			10.1			8.0			30.2			6.0			4
5	6.4			5.7			6.2			6.6			6.0			4.1			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	3659.	1
2	10.0	2
3	7251	3
4	253	4
5	4.1	5

Maximum stage 1.77 feet at 0745 on 2-4-90 Discharge 1,410 Second-feet.
Minimum stage 0.08 feet at 0945 on 10-18-90 Discharge 2.8 Second-feet.

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GAGING STATION SUMMARY

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

Station Location and Description: L.A. River @ Tujunga Ave.
Station No.: F300-R
for Water-Year 1987-1990
Drainage Area: 401.0 Square Miles
Observer: R. Velez
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	2.06	-.03	64.9	2.05	+.03	67.8	1.95	+.08	64.3	2.01	+.07	67.7	2.80	+.31	70.0	1.92	+.64	61.8	1
2	2.08	-.02	66.4	2.01	+.04	65.8	2.03	(	69.9	2.73	↑	315	1.92	+.11	64.5	2.03	(	67.2	2
3	2.07	-.01	66.6	2.06	+.04	69.5	2.07		72.1	1.93		63.2	2.04	+.11	72.5	2.01		65.8	3
4	2.07	-.01	66.7	2.06	+.03	68.8	2.12		76.0	1.92		65.3	3.00	+.07	567	2.05		68.5	4
5	2.11	0	69.5	2.05	+.04	68.6	1.88		62.1	1.94		64.0	2.13	(	76.7	2.04		67.8	5
6	2.15	(	72.2	2.03	+.05	68.0	2.02		69.2	1.99		67.0	1.98	(	66.3	2.05	(	68.4	6
7	2.14	(	71.6	2.01	+.04	66.8	1.97	+.07	65.2	2.04		70.2	1.96	(	65.7	2.13	(	74.9	7
8	2.09	+.01	68.7	2.02	+.05	67.7	1.96	↑	65.1	2.02		68.9	1.94	(	63.5	2.08	+.04	70.4	8
9	2.11	(	70.1	1.99	+.04	66.3	1.98		66.6	2.00		67.4	1.96	(	65.1	2.05	+.05	69.8	9
10	2.09	(	69.3	2.04	(	68.4	2.00		67.4	1.96		64.7	1.98	(	65.9	2.02	(	67.5	10
11	2.08	(	68.8	2.02	(	68.1	2.07		71.9	1.86	↓	61.5	1.99	(	66.5	2.48	(	151	11
12	2.09	+.01	68.6	2.03	+.07	69.1	2.03		69.3	2.06	+.07	86.1	2.00	(	67.5	2.38	(	128	12
13	2.09	+.02	69.7	2.02	(	68.8	1.99		66.9	4.06	+.04	1,410	2.03	(	69.0	2.18	(	78.8	13
14	2.14	(	73.2	2.00	(	67.2	2.00		67.1	3.41	+.05	654	2.10	(	73.8	2.05	(	69.3	14
15	2.10	(	70.4	2.03	+.08	69.7	2.02		68.6	2.43	+.10	102.	2.07	+.01	72.0	1.99	(	65.6	15
16	2.07	(	68.5	1.96	(	65.6	2.04		69.8	2.61	+.04	236.0	2.42	+.06	328.	1.99	(	65.6	16
17	2.09	(	69.8	1.98	(	66.9	2.00		67.5	2.52	+.10	170.0	4.80	+.61	2910.	1.99	(	65.3	17
18	2.08	(	69.1	2.04	(	70.4	2.01		68.8	2.00	+.11	69.6	3.33	+.04	353.	2.00	(	65.8	18
19	2.08	(	69.5	2.02	(	69.1	2.05		70.3	1.95	↑	66.5	2.37	(	93.2	2.01	(	67.0	19
20	2.14	(	73.3	2.03	(	69.6	2.01		67.8	2.05		73.0	2.14	(	74.4	2.00	(	66.2	20
21	2.34	(	84.7	2.03	(	69.9	2.09		72.2	1.97		67.8	2.17	(	76.5	2.08	(	71.5	21
22	2.86	(	90.2	2.07	(	72.7	2.06		71.4	1.96		67.4	2.07	(	69.5	2.02	(	67.3	22
23	2.44	(	97.6	2.05	(	71.0	2.01		69.9	1.97		68.7	2.05	(	68.4	2.03	+.05	67.9	23
24	2.08	(	69.1	2.08	(	73.4	1.97		65.1	1.86		63.1	2.01	(	66.2	2.00	+.06	67.0	24
25	2.06	(	68.0	2.05	(	71.3	1.96		64.5	1.95		66.7	2.02	(	66.4	1.92	(	62.9	25
26	2.01	(	64.9	1.99	(	50.4	1.97		65.7	1.99		69.1	2.02	(	66.7	1.99	(	66.5	26
27	2.00	(	64.2	2.15	(	78.2	1.98		66.1	1.96		67.6	2.13	(	74.3	2.04	(	68.6	27
28	2.05	(	67.3	1.95	(	67.3	2.12		75.4	2.04		73.3	2.04	+.04	67.8	2.00	(	67.0	28
29	2.06	(	67.9	2.05	(	72.1	2.00		67.4	2.04		72.6				2.00	(	66.7	29
30	2.02	(	65.3	2.00	+.08	67.8	1.94	↓	64.0	2.30	↓	158.0				2.02	(	68.4	30
31	2.02	+.02	65.2				1.96	+.07	66.2	2.23	+.11	91.4				2.05	+.06	70.1	31
1	2504.2			2508.7			2115.2			4,704.4			5839.8			2248.8			1
2	80.8			83.6			68.2			152			209.			72.5			2
3	4,917			4975			11195.0			9331.			11,673			4460			3
4	1102.			504			79.4			1,410.			2910			151			4
5	64.0			66.3			62.1			61.5			63.5			61.8			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	2.01	+.06	67.5	2.01	+.06	67.4	2.01	+.06	67.8	1.98	+.16	71.6	1.94	+.22	72.9	2.00	+.17	74.0	1
2	2.00	(	66.6	1.95	(	63.7	1.96	+.07	64.7	1.99	+.16	72.3	1.97	+.22	74.9	1.96	+.17	71.2	2
3	2.88	(	66.4	1.96		64.0	1.93	+.07	65.2	1.94	+.17	70.1	1.99	+.22	76.8	2.00	+.18	73.3	3
4	2.84	(	358.	1.97		64.6	1.96	+.07	64.7	1.95	(	70.6	2.00	+.22	77.5	2.00	+.16	73.6	4
5	2.14	(	75.9	2.00		66.3	1.96	+.08	65.6	1.99	(	73.2	2.01	+.21	77.4	2.01	+.16	73.6	5
6	2.13	(	74.8	1.97		64.8	1.95	+.08	64.8	1.98	(	72.4	2.16	+.21	179.	1.98	+.15	71.4	6
7	2.102	(	68.0	1.95		63.6	1.95	+.08	64.9	1.95	(	70.7	2.45	(	224.	2.00	+.15	72.6	7
8	1.98	(	65.6	1.99		66.2	1.96	+.09	66.0	1.95	+.17	70.6	2.01	(	77.5	1.95	+.15	69.4	8
9	2.02	(	68.0	1.99		66.1	1.91	+.09	63.0	1.98	+.18	73.3	1.98	(	75.3	1.96	+.14	69.3	9
10	2.08	(	71.8	1.98		65.7	1.94	+.10	65.4	2.03	(	76.6	1.97	+.21	74.7	2.03	(	73.5	10
11	2.07	(	71.5	2.02		67.9	1.98	+.10	67.8	1.97	(	72.7	2.02	+.25	77.4	1.99	(	71.0	11
12	2.03	(	68.8	1.99		66.0	1.95	+.10	65.8	1.97	(	72.5	2.00	(	75.5	1.96	(	69.1	12
13	1.98	(	65.2	1.97		65.0	1.95	+.11	67.0	1.97	+.18	72.6	1.95	(	72.6	1.93	(	67.3	13
14	1.98	(	65.3	1.98		65.3	1.96	+.11	67.3	1.92	+.19	70.0	1.95	(	72.5	2.00	(	71.6	14
15	1.99	(	66.1	1.98		65.7	1.97	+.11	68.2	1.93	(	70.3	1.98	(	75.0	1.97	(	70.2	15
16	2.51	(	149.	1.96		64.0	1.98	+.12	69.3	1.96	(	72.5	1.95	(	72.3	1.99	(	71.1	16
17	2.33	(	94.1	1.98		65.4	1.99	+.12	69.7	2.00	(	75.6	1.98	+.20	74.4	1.99	(	71.0	17
18	2.03	(	68.8	2.12		74.8	2.04	+.12	73.4	1.91	+.19	70.3	1.94	+.19	71.3	1.99	(	72.7	18
19	2.00	(	67.0	2.02		67.9	1.99	+.13	70.3	1.97	+.20	73.7	1.98	(	73.9	1.98	(	70.6	19
20	2.24	(	75.6	1.98		65.6	1.98	+.13	69.7	1.99	(	75.2	2.01	(	75.8	2.00	(	71.9	20
21	2.02	(	68.0	2.04		69.2	1.96	+.14	69.1	1.96	(	73.6	1.93	(	71.1	2.00	(	71.7	21
22	2.07	(	71.0	1.97		64.7	1.67	+.14	55.6	1.93	(	71.5	2.00	(	74.9	2.00	(	72.1	22
23	2.28	(	114.	1.96		64.5	1.95	+.14	68.8	1.97	+.20	73.9	2.04	+.19	78.0	1.98	(	71.5	23
24	2.13	(	75.7	1.92		62.3	1.92	+.15	67.6	1.96	+.21	73.6	2.00	+.18	74.3	1.99	(	71.3	24
25	1.98	(	65.4	1.93		62.6	1.98	+.15	71.5	1.99	(	75.9	1.98	(	73.2	2.52	(	73.3	25
26	1.96	(	64.4	1.94		63.3	1.97	+.15	72.2	1.62		60.5	1.48		72.9	2.25	(	60.0	26
27	1.98	(	65.4	1.95		64.9	1.94	+.15	68.6	1.95		72.9	1.97		72.9	2.07	(	76.4	27
28	1.98	(	65.5	3.49		750.	1.98	+.16	71.6	1.96		73.8	1.98		73.3	1.89	(	68.1	28
29	1.99	(	66.0	2.08		72.1	1.96	+.16	70.3	1.91	+.21	70.4	1.99	+.18	73.6	2.01	(	72.4	29
30	2.00	+.06	67.0	1.96		65.1	2.00	+.16	73.0	1.92	+.22	72.3	1.99	+.11	73.3	1.99	+.14	71.0	30
31				1.97	+.06	64.8				1.95	+.22	73.7	1.99	+.17	73.1				31
1	2496.4			2723.5			2024.9			2238.9			2561.3			2166.2			1
2	83.2			87.9			67.5			72.2			82.6			72.2			2
3	4952			5402			4016			4441			5080			4297			3
4	358			750			234			96.6			224			90.0			4
5	64.4			62.3			55.6			60.5			71.1			67.3			5

Maximum stage 6.68 +0 feet at 0800 on 2-17-90 Discharge 7296. Second-feet.
Minimum stage 0.34 +0.21 feet at 0845 on 7-26-90 Discharge 8.45 Second-feet.

HEIGHTS

1 = Read USGS
2 = Average Daily Flow in USGS
3 = Total Daily Flow in A.F.
4 = Maximum Average Daily Flow in USGS
5 = Minimum Average Daily Flow in USGS

	YEARLY TOTALS
1	34131.6
2	93.5
3	67699
4	2910
5	55.6

69

APPENDIX C

WELLS DRILLED AND DESTROYED

Wells Destroyed 1989-90

Party	Well No.	Owner No.	Purpose
Lockheed	*	---	----

WELLS DRILLED 1989-90**

Party	Well No.	Owner No.	Purpose	Party	Well No.	Owner No.	Purpose
LADWP	*	TJ-1	Production	EPA/DWP	*	NH-VPB-01	Rem/Mon
LADWP	*	TJ-2	Production	EPA/DWP	*	NH-VPB-02	Rem/Mon
LADWP	*	TJ-3	Production	EPA/DWP	*	NH-VPB-03	Rem/Mon
LADWP	*	TJ-4	Production	EPA/DWP	*	NH-VPB-04	Rem/Mon
LADWP	*	TJ-5	Production	EPA/DWP	*	NH-VPB-05	Rem/Mon
LADWP	*	TJ-6	Production	EPA/DWP	*	NH-VPB-06	Rem/Mon
LADWP	*	TJ-7	Production	EPA/DWP	*	NH-VPB-07	Rem/Mon
LADWP	*	TJ-8	Production	EPA/DWP	*	NH-VPB-08	Rem/Mon
LADWP	*	TJ-9	Production	EPA/DWP	*	NH-VPB-09	Rem/Mon
LADWP	*	TJ-10	Production	EPA/DWP	*	NH-VPB-10	Rem/Mon
EPA/DWP	*	NH-C01-780	Rem/Mon.	EPA/DWP	*	NH-VPB-11	Rem/Mon
EPA/DWP	*	NH-C01-660	Rem/Mon.	EPA/DWP	*	NH-VPB-12	Rem/Mon
EPA/DWP	*	NH-C01-450	Rem/Mon.	EPA/DWP	*	NH-VPB-13	Rem/Mon
EPA/DWP	*	NH-C01-325	Rem/Mon.	EPA/DWP	*	NH-VPB-14	Rem/Mon
EPA/DWP	*	NH-C02-681	Rem/Mon.	EPA/DWP	*	CS-VPB-01	Rem/Mon
EPA/DWP	*	NH-C02-520	Rem/Mon.	EPA/DWP	*	CS-VPB-02	Rem/Mon
EPA/DWP	*	NH-C02-325	Rem/Mon.	EPA/DWP	*	CS-VPB-03	Rem/Mon
EPA/DWP	*	NH-C02-220	Rem/Mon.	EPA/DWP	*	CS-VPB-04	Rem/Mon
EPA/DWP	*	NH-C02-681	Rem/Mon.	EPA/DWP	*	CS-VPB-05	Rem/Mon
EPA/DWP	*	NH-C03-800	Rem/Mon.	EPA/DWP	*	CS-VPB-06	Rem/Mon
EPA/DWP	*	NH-C03-680	Rem/Mon.	EPA/DWP	*	CS-VPB-07	Rem/Mon
EPA/DWP	*	NH-C03-580	Rem/Mon.	EPA/DWP	*	CS-VPB-08	Rem/Mon
EPA/DWP	*	NH-C03-380	Rem/Mon.	EPA/DWP	*	CS-VPB-09	Rem/Mon
EPA/DWP	*	NH-C04-560	Rem./Mon.	EPA/DWP	*	CS-VPB-10	Rem/Mon
EPA/DWP	*	NH-C04-375	Rem/Mon.	EPA/DWP	*	CS-VPB-11	Rem/Mon
EPA/DWP	*	NH-C04-240	Rem/Mon.	EPA/DWP	*	PO-VPB-01	Rem/Mon
EPA/DWP	*	NH-C05-460	Rem/Mon.	EPA/DWP	*	PO-VPB-02	Rem/Mon
EPA/DWP	*	NH-C05-320	Rem/Mon.	EPA/DWP	*	PO-VPB-03	Rem/Mon
EPA/DWP	*	NH-C06-425	Rem/Mon.	EPA/DWP	*	PO-VPB-04	Rem/Mon
EPA/DWP	*	NH-C06-285	Rem/Mon.	EPA/DWP	*	PO-VPB-05	Rem/Mon
EPA/DWP	*	NH-C06-160	Rem/Mon.	EPA/DWP	*	PO-VPB-06	Rem/Mon
EPA/DWP	*	CS-C01-558	Rem/Mon.	EPA/DWP	*	PO-VPB-07	Rem/Mon
EPA/DWP	*	CS-C01-285	Rem/Mon.	EPA/DWP	*	PO-VPB-08	Rem/Mon
EPA/DWP	*	CS-C01-160	Rem/Mon.	EPA/DWP	*	PO-VPB-09	Rem/Mon
EPA/DWP	*	CS-C02-335	Rem/Mon.	EPA/DWP	*	PO-VPB-10	Rem/Mon
EPA/DWP	*	CS-C02-250	Rem/Mon.	EPA/DWP	*	PO-VPB-11	Rem/Mon
EPA/DWP	*	CS-C02-180	Rem/Mon.	EPA/DWP	*	VD-VPB-01	Rem/Mon
EPA/DWP	*	CS-C02-62	Rem/Mon.	EPA/DWP	*	VD-VPB-02	Rem/Mon
EPA/DWP	*	CS-C03-550	Rem/Mon.	EPA/DWP	*	VD-VPB-03	Rem/Mon
EPA/DWP	*	CS-C03-465	Rem/Mon.	EPA/DWP	*	VD-VPB-04	Rem/Mon
EPA/DWP	*	CS-C03-325	Rem/Mon.	EPA/DWP	*	VD-VPB-05	Rem/Mon
EPA/DWP	*	CS-C03-100	Rem/Mon.	EPA/DWP	*	VD-VPB-06	Rem/Mon
EPA/DWP	*	CS-C04-520	Rem/Mon.	EPA/DWP	*	VD-VPB-07	Rem/Mon
EPA/DWP	*	CS-C04-382	Rem/Mon.	EPA/DWP	*	PO-C01-354	Rem/Mon
EPA/DWP	*	CS-C04-290	Rem/Mon.	EPA/DWP	*	PO-C01-195	Rem/Mon
EPA/DWP	*	CS-C05-290	Rem/Mon.	EPA/DWP	*	PO-C02-205	Rem/Mon
EPA/DWP	*	CS-C05-160	Rem/Mon.	EPA/DWP	*	PO-C02-53	Rem/Mon
EPA/DWP	*	CS-C06-278	Rem/Mon.	EPA/DWP	*	PO-C03-235	Rem/Mon
EPA/DWP	*	CS-C06-185	Rem/Mon.	EPA/DWP	*	PO-C03-182	Rem/Mon

WELLS DRILLED 1989-90 FOR

MAJOR GROUNDWATER POLLUTION INVESTIGATIONS

Party

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

Philips Components - Drilled and tested a new extraction well.

Lockheed - drilled 7 additional wells and destroyed 1 well (for a total of 68 existing wells) for site evaluation, testing, and monitoring - one well is capable of being used as an extraction well. Ten existing multi screened wells were grouted in the lower zones so they can now be used as shallow monitoring wells. Plans for off-site cluster wells south of facility.

3M-Pharmaceutical - Three new wells drilled (for a total of 33 wells) for site evaluation, testing, and monitoring.

Rocketdyne - No 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.
** As of April 1991

APPENDIX D

PLATES

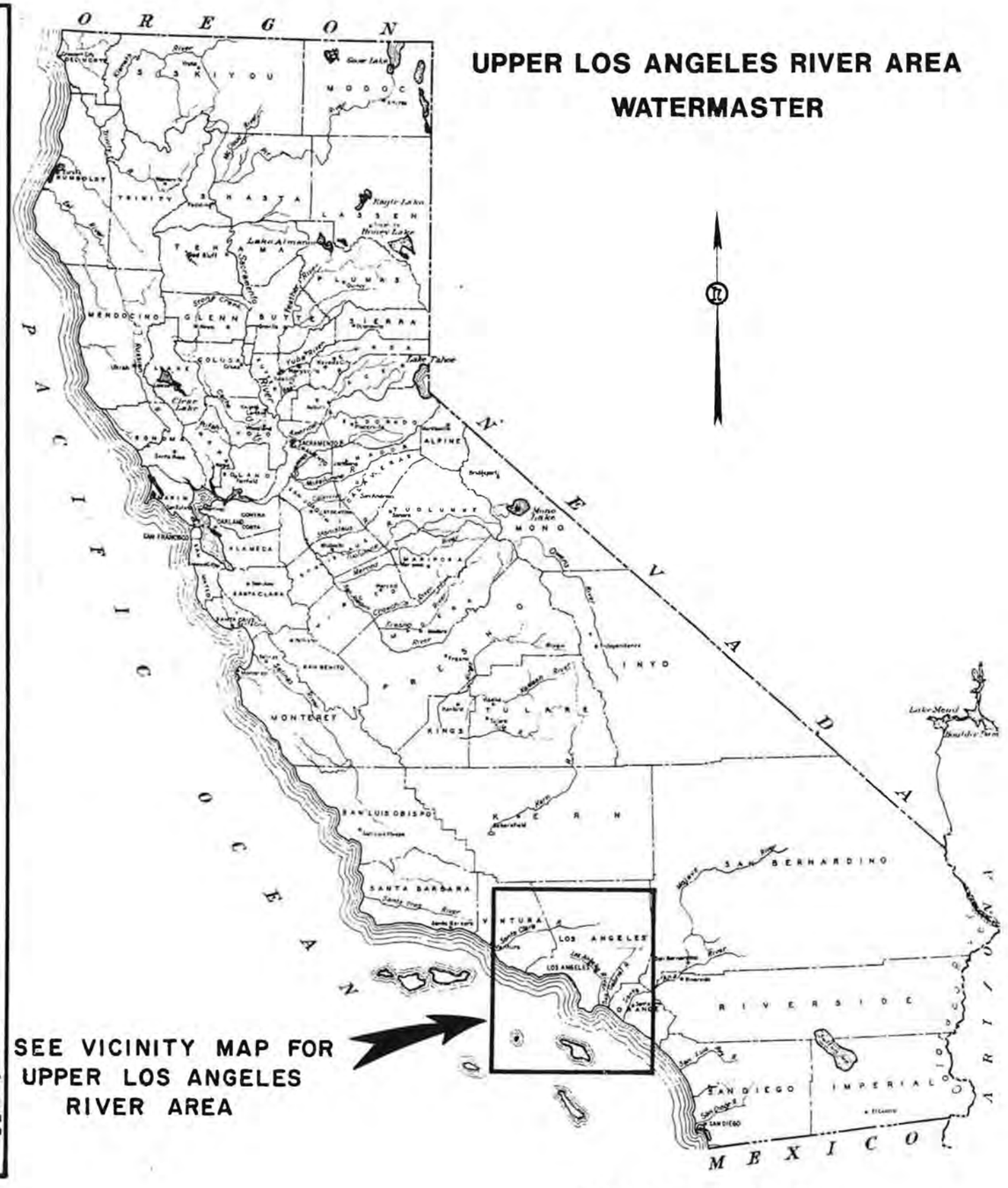
UPPER LOS ANGELES RIVER AREA WATERMASTER

VICINITY MAP

SCALE

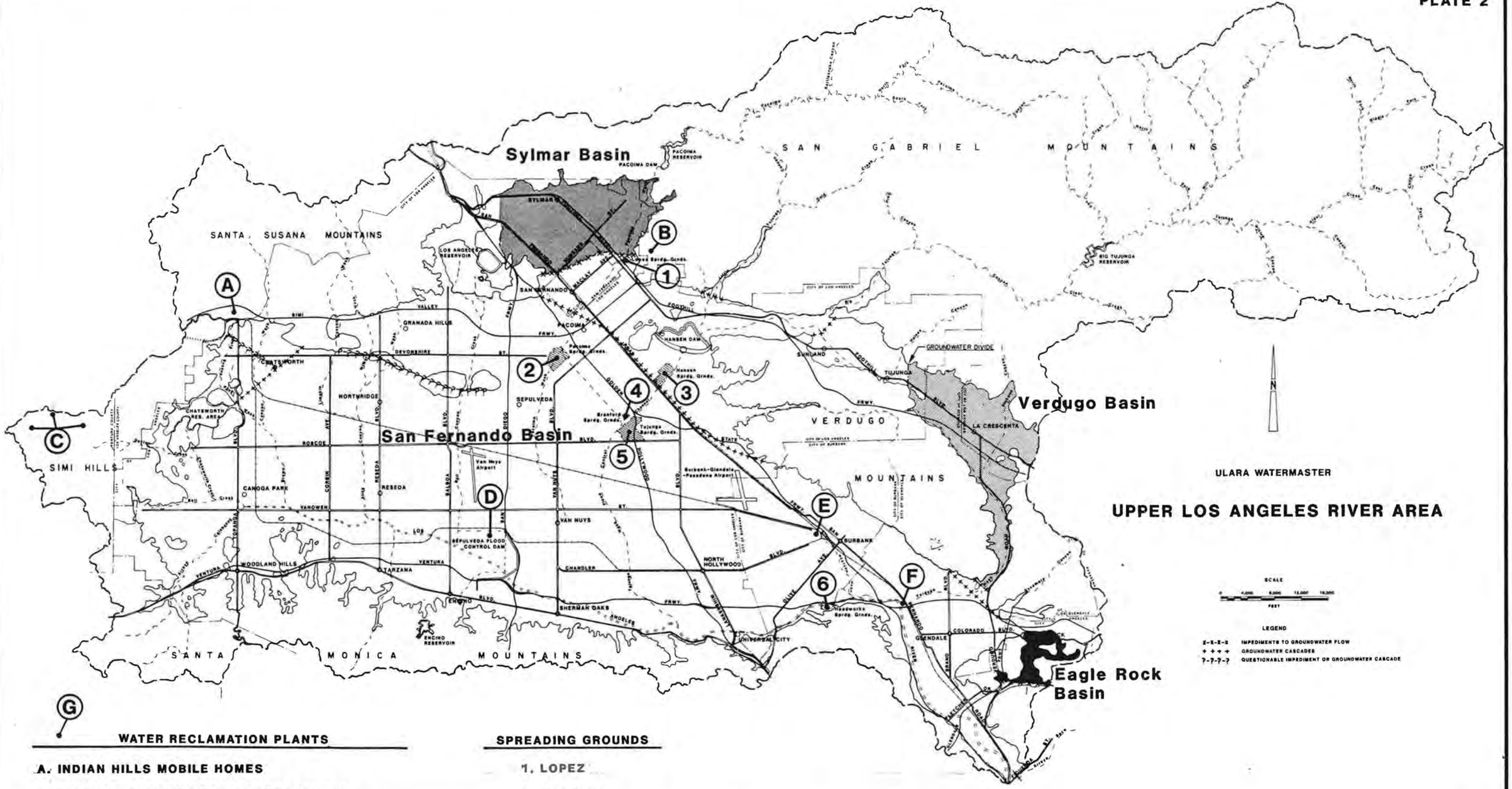
0 5 10 15 Miles

SEE VICINITY MAP FOR UPPER LOS ANGELES RIVER AREA



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 RECLAMATION PLANT

SPREADING GROUNDS

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

MRG 3/89

PLATE 3

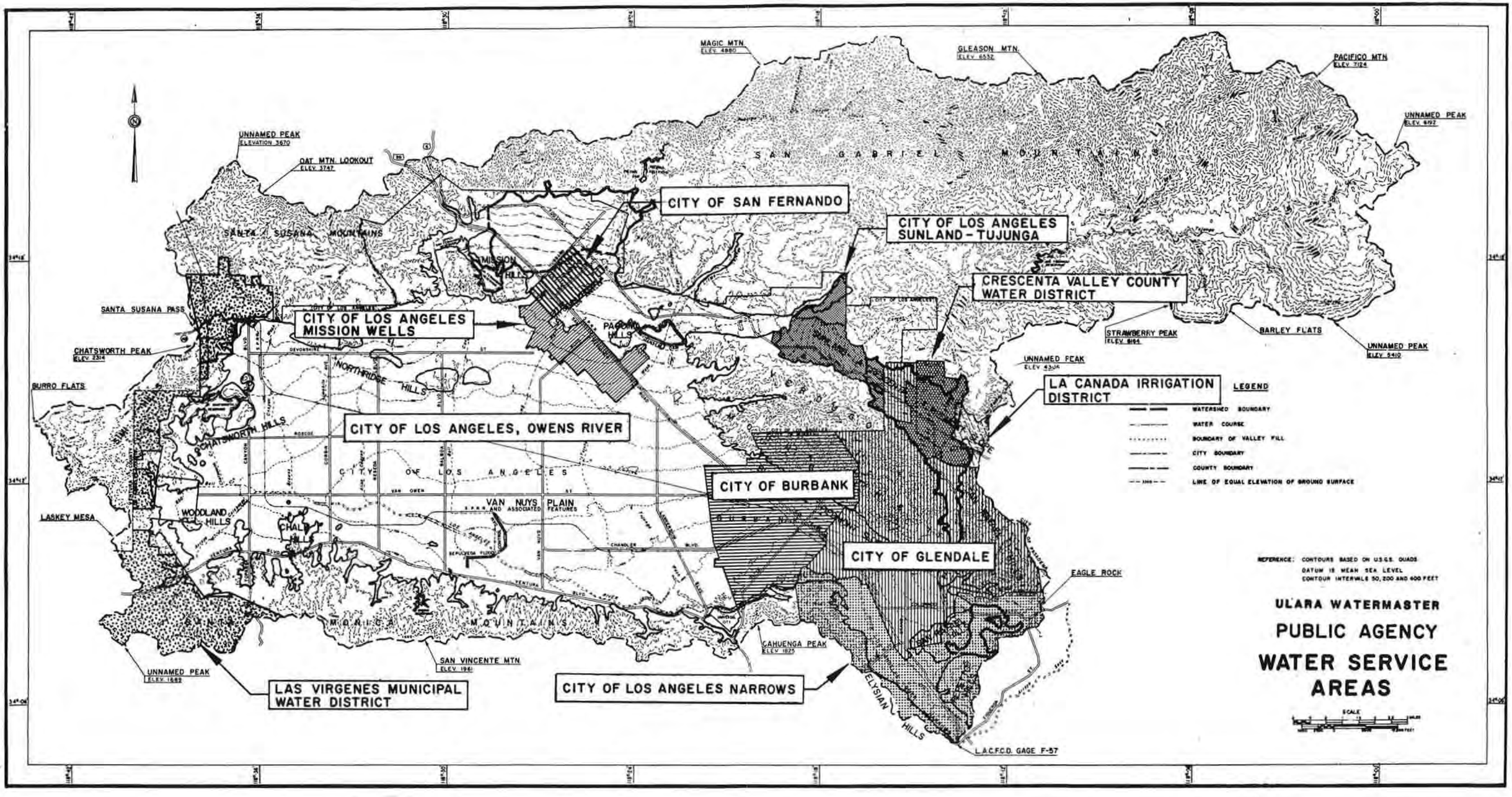
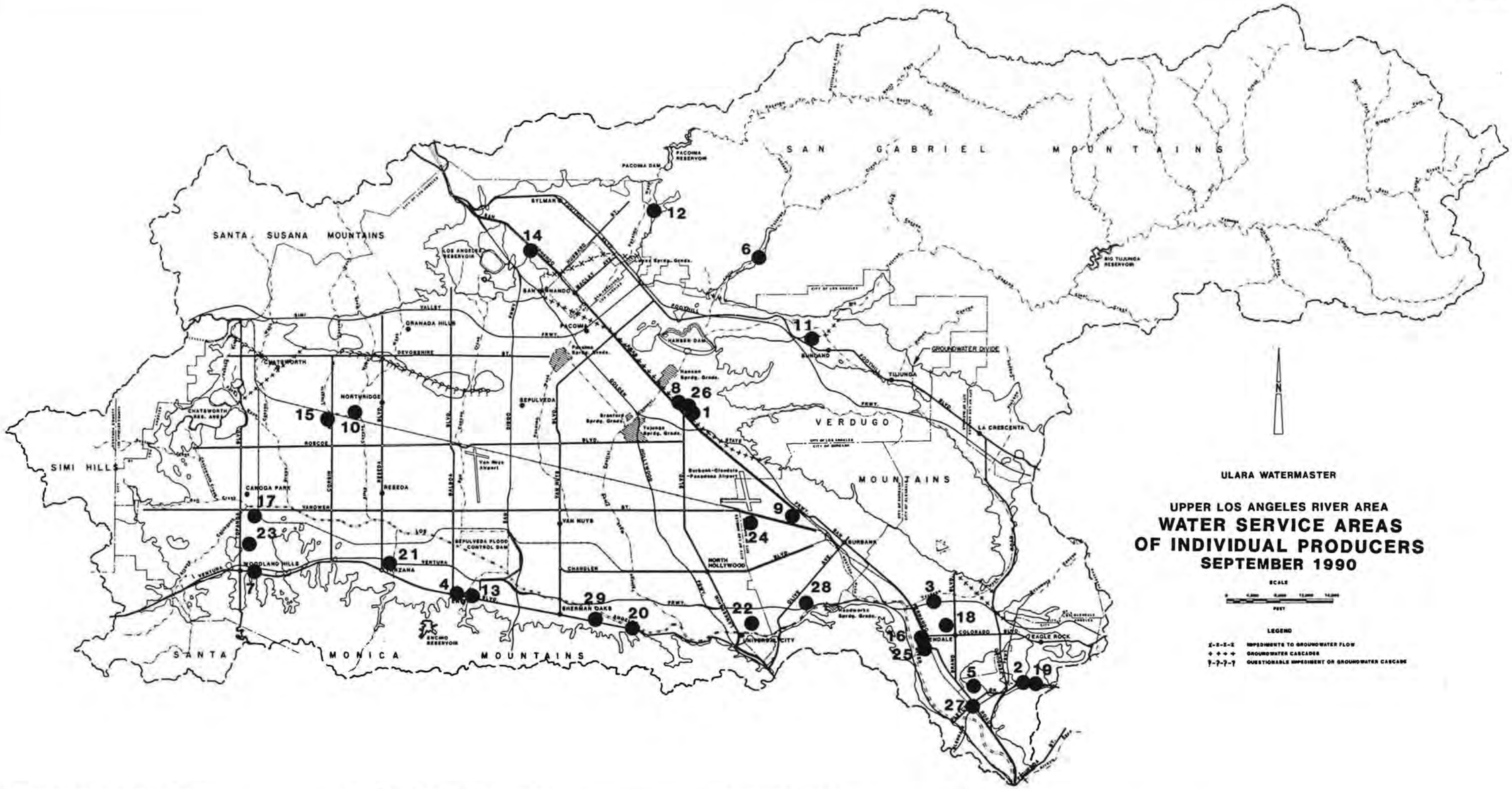

MAGIC MTN
ELEV. 4880
GLEASON MTN.
ELEV. 6532
PACIFICO MTN
ELEV. 7124
UNNAMED PEAK
ELEV. 6197
UNNAMED PEAK
ELEVATION 3670
OAT MTN. LOOKOUT
ELEV. 3747
SANTA SUSANA MOUNTAINS
SAN GABRIEL MOUNTAINS
CITY OF SAN FERNANDO
CITY OF LOS ANGELES
SUNLAND - TUJUNGA
CRESCENTA VALLEY COUNTY
WATER DISTRICT
MISSION HILLS
SANTA SUSANA PASS
CITY OF LOS ANGELES
MISSION WELLS
PACOIMA HILLS
STRAWBERRY PEAK
ELEV. 6164
BARLEY FLATS
UNNAMED PEAK
ELEV. 5410
CHATSWORTH PEAK
ELEV. 2314
UNNAMED PEAK
ELEV. 4304
LA CANADA IRRIGATION
DISTRICT
DEVONSHIRE
NORTHRIDGE HILLS
BURRO FLATS
CHATSWORTH HILLS
CITY OF LOS ANGELES, OWENS RIVER
CITY OF LOS ANGELES
CITY OF BURBANK
VAN NUYS AND ASSOCIATED PLAIN FEATURES
WOODLAND HILLS
LASKEY MESA
CHALK HILLS
CITY OF GLENDALE
EAGLE ROCK
SANTA MONICA MOUNTAINS
CAHUENGA PEAK
ELEV. 1825
SAN VINCENTE MTN
ELEV. 1961
UNNAMED PEAK
ELEV. 1689
LAS VIRGENES MUNICIPAL
WATER DISTRICT
CITY OF LOS ANGELES NARROWS
ELYSIAN HILLS
L.A.C.F.C.D. GAGE F-57
LEGEND
WATERSHED BOUNDARY
WATER COURSE
BOUNDARY OF VALLEY FILL
CITY BOUNDARY
COUNTY BOUNDARY
LINE OF EQUAL ELEVATION OF GROUND SURFACE
REFERENCE: CONTOURS BASED ON U.S.G.S. QUADS
DATUM IS MEAN SEA LEVEL
CONTOUR INTERVALS 50, 200 AND 400 FEET
ULARA WATERMASTER
PUBLIC AGENCY
WATER SERVICE
AREAS
SCALE

PLATE 4



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

WATER SERVICE AREAS OF INDIVIDUAL PRODUCERS

SEPTEMBER 1990

SCALE

0 2,000 4,000 8,000 12,000 16,000

FEET

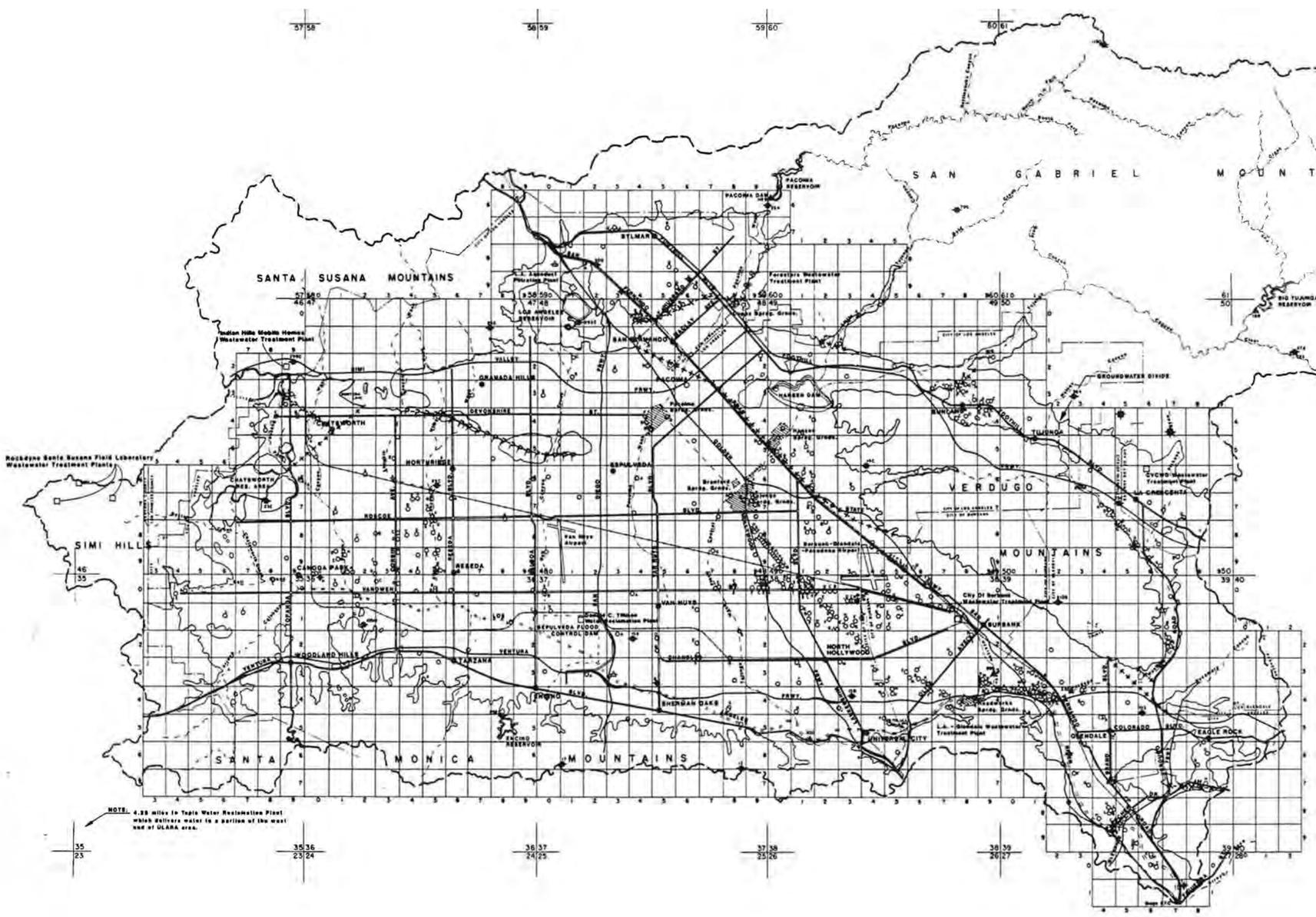
LEGEND

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

1. CONROCK CO. (CAL MAT)
2. DEEP ROCK BOTTLED WATER
3. ENVIRONMENTALS INC.
4. FIRST FINANCIAL PLAZA SUITE
5. FOREST LAWN MEMORIAL PARK
6. HARPER, CECELIA DE MILLE
7. LAMCO
8. LIVINGSTON-GRAHAM, INC.
9. LOCKHEED AIRCRAFT CORP.
10. MAY CO. NORTHRIDGE FASHION PLAZA
11. MENA, JOHN & BARBARA
12. MEURER ENGINEERING CO.
13. MOBIL OIL
14. MOORDIGIAN, KISAG
15. 3M PHARMACEUTICAL
16. PHILIPS COMPONENTS
17. ROCKWELL INTERNATIONAL
18. SEARS, ROEBBUCK & CO.
19. SPARKLETTS DRINKING WATER CORP.
20. SPORTSMEN'S LODGE, INC.
21. THRIFTY OIL
22. TOLUCA LAKE PROPERTY OWNERS ASSN.
23. TRILLIUM CORP.
24. VALHALLA MEMORIAL PARK
25. WICKES CO., INC.
26. VALLEY RECLAMATION CO.
27. VAN DE KAMP'S DUTCH BAKERS, INC.
28. WALT DISNEY PRODUCTIONS
29. UNOCAL CORP.

MRG 4/91

PLATE 5



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

LOCATION OF WELLS AND HYDROLOGIC FACILITIES

SCALE

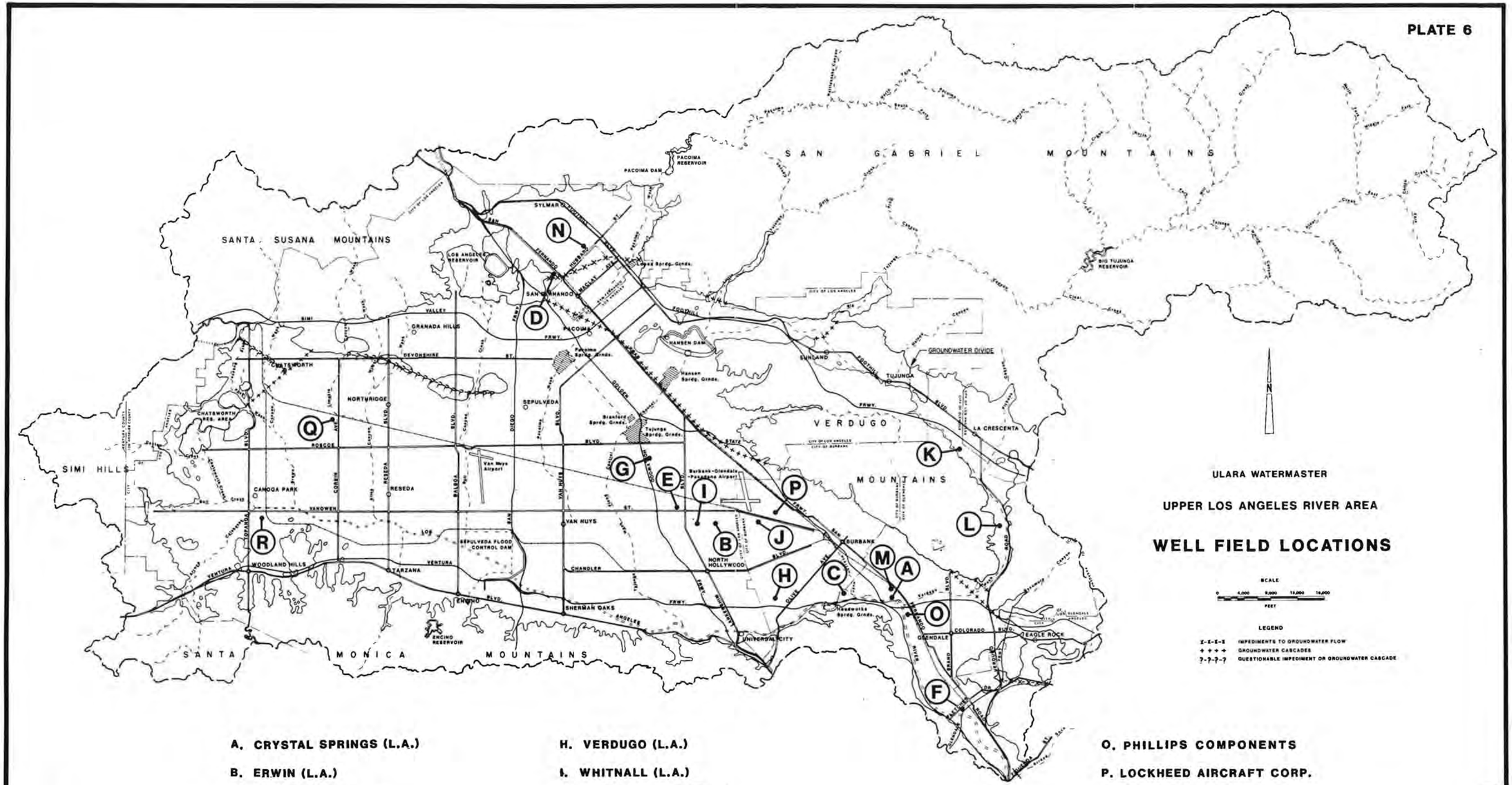
0 4,000 8,000 12,000 16,000

FEET

LEGEND

- Z-Z-Z-Z 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



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

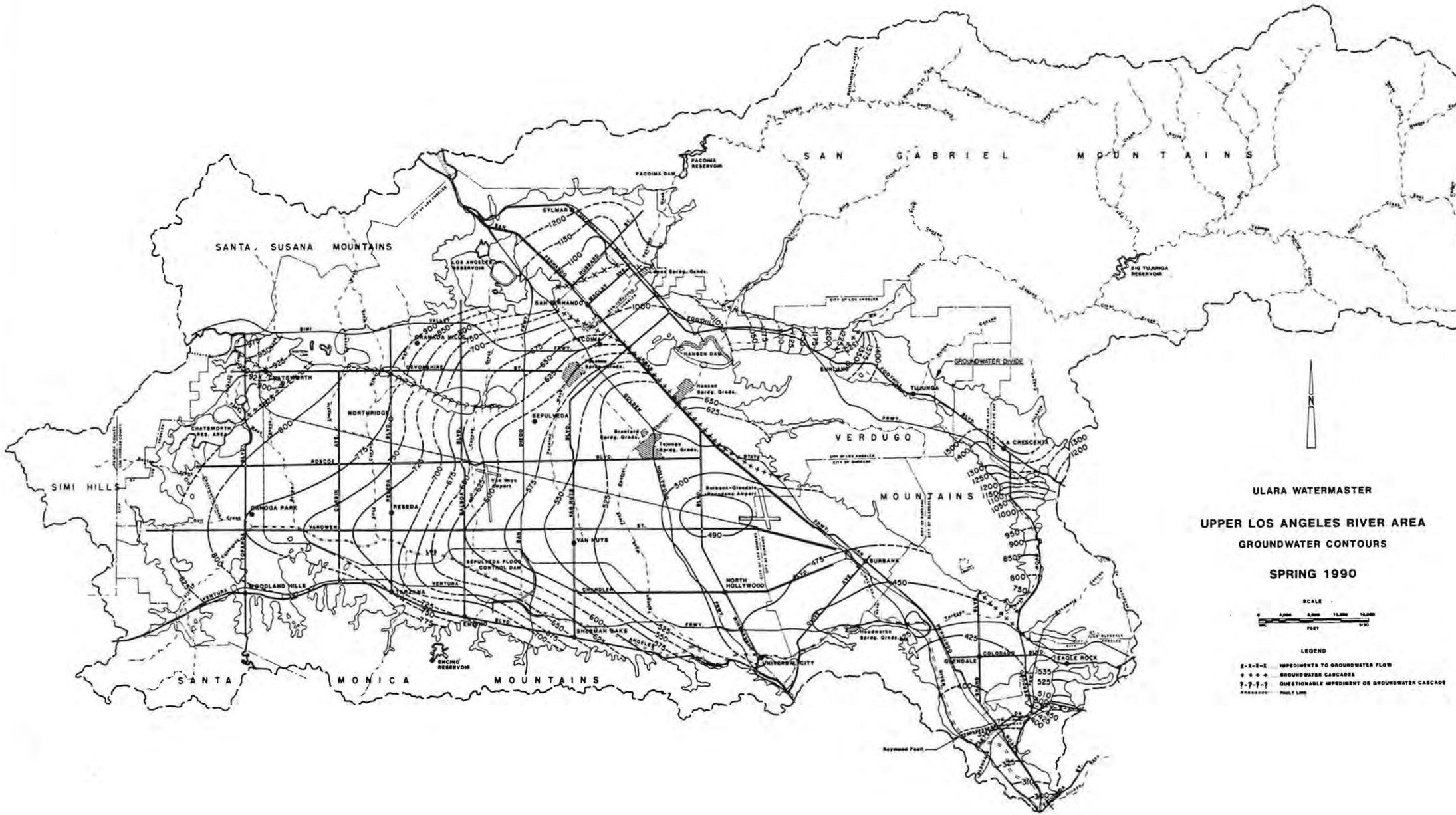
P. LOCKHEED AIRCRAFT CORP.

Q. 3M-PHARMACEUTICAL

R. ROCKWELL INTERNATIONAL

MRG 3/89

PLATE 7



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

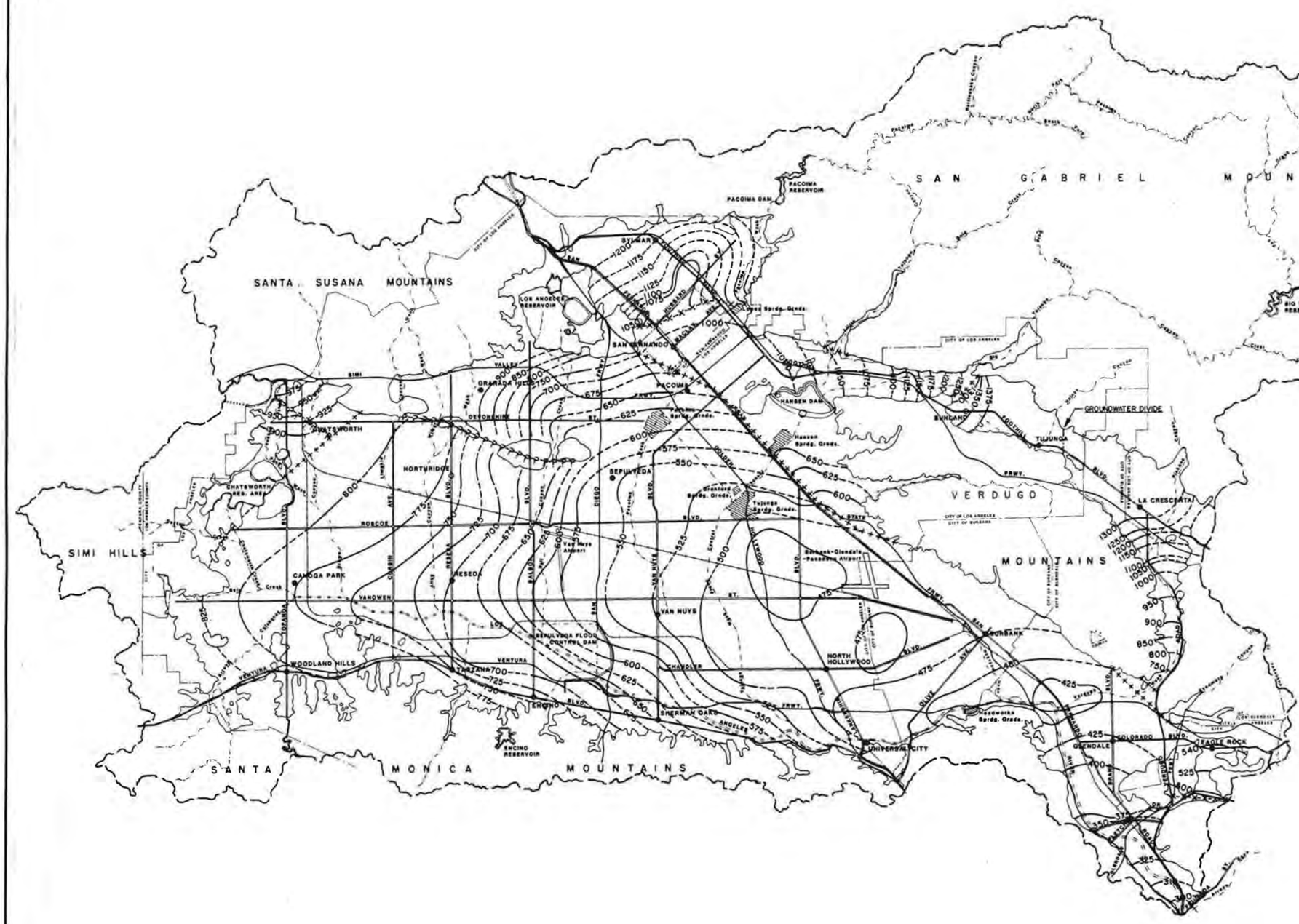
GROUNDWATER CONTOURS

SPRING 1990

SCALE

LEGEND

- Z-Z-Z-Z — IMPEDIMENTS TO GROUNDWATER FLOW
- + + + + — GROUNDWATER CASCADES
- ?-?-?-? — QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE
- FAULT LINE



N

ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

GROUNDWATER CONTOURS

FALL 1990

SCALE

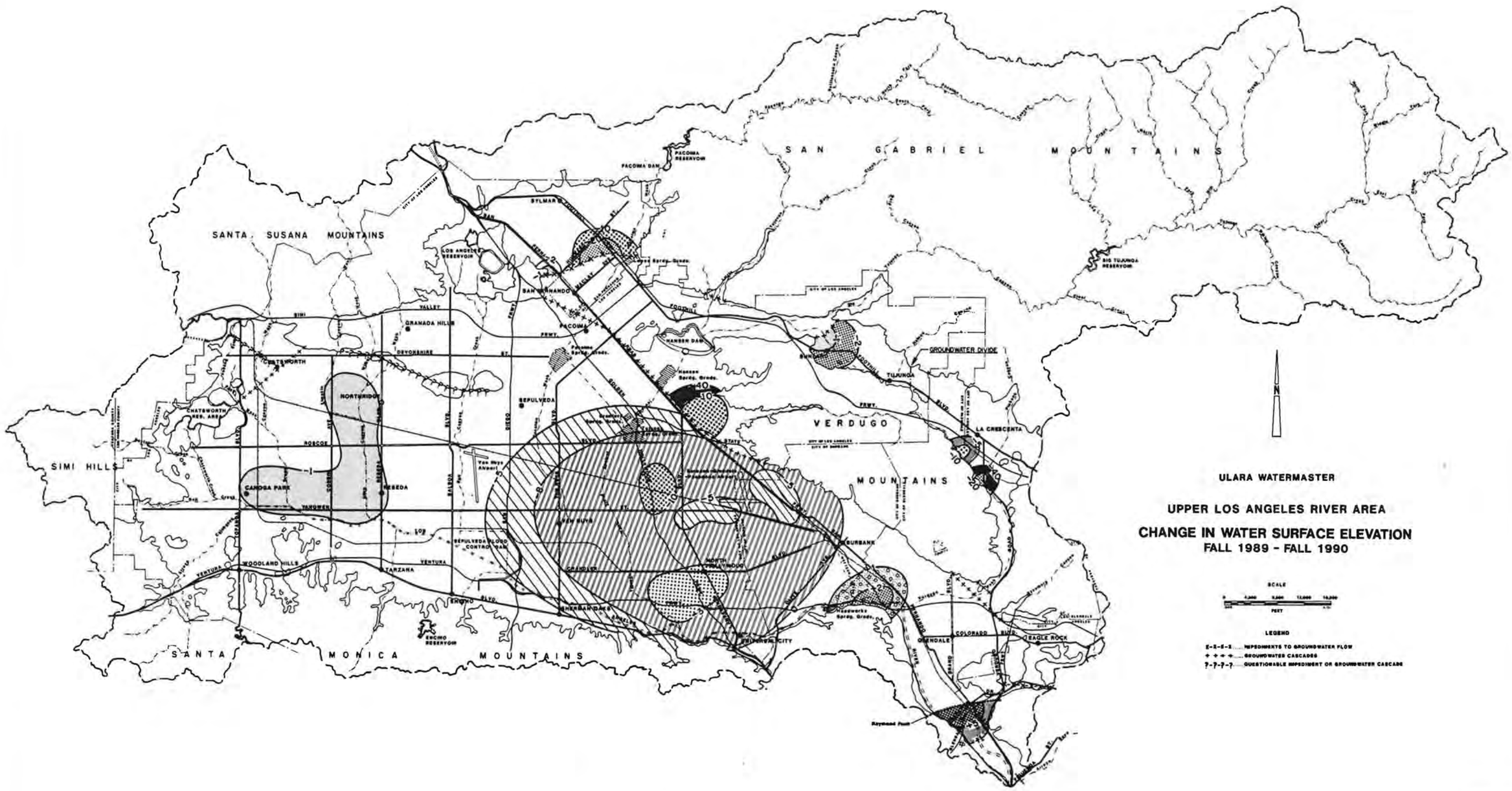
0 4,000 8,000 12,000 16,000

FEET

LEGEND

- ⊥-⊥-⊥-⊥ IMPEDIMENTS TO GROUNDWATER FLOW
- + + + + GROUNDWATER CASCADES
- ?-?-?-? QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE
- FAULT ZONE

PLATE 9



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

CHANGE IN WATER SURFACE ELEVATION
FALL 1989 - FALL 1990

SCALE

0 2,000 5,000 12,000 18,000

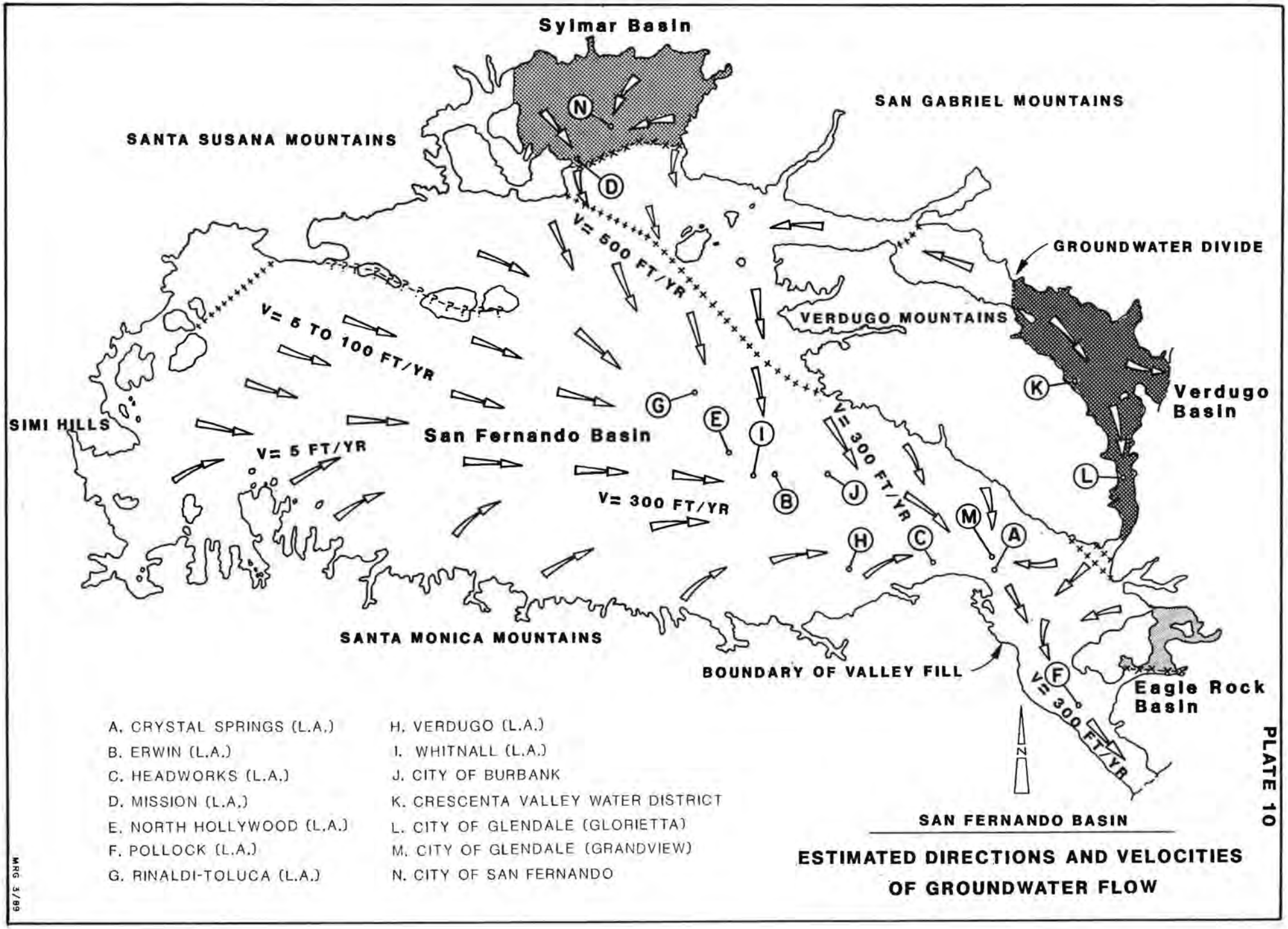
FEET

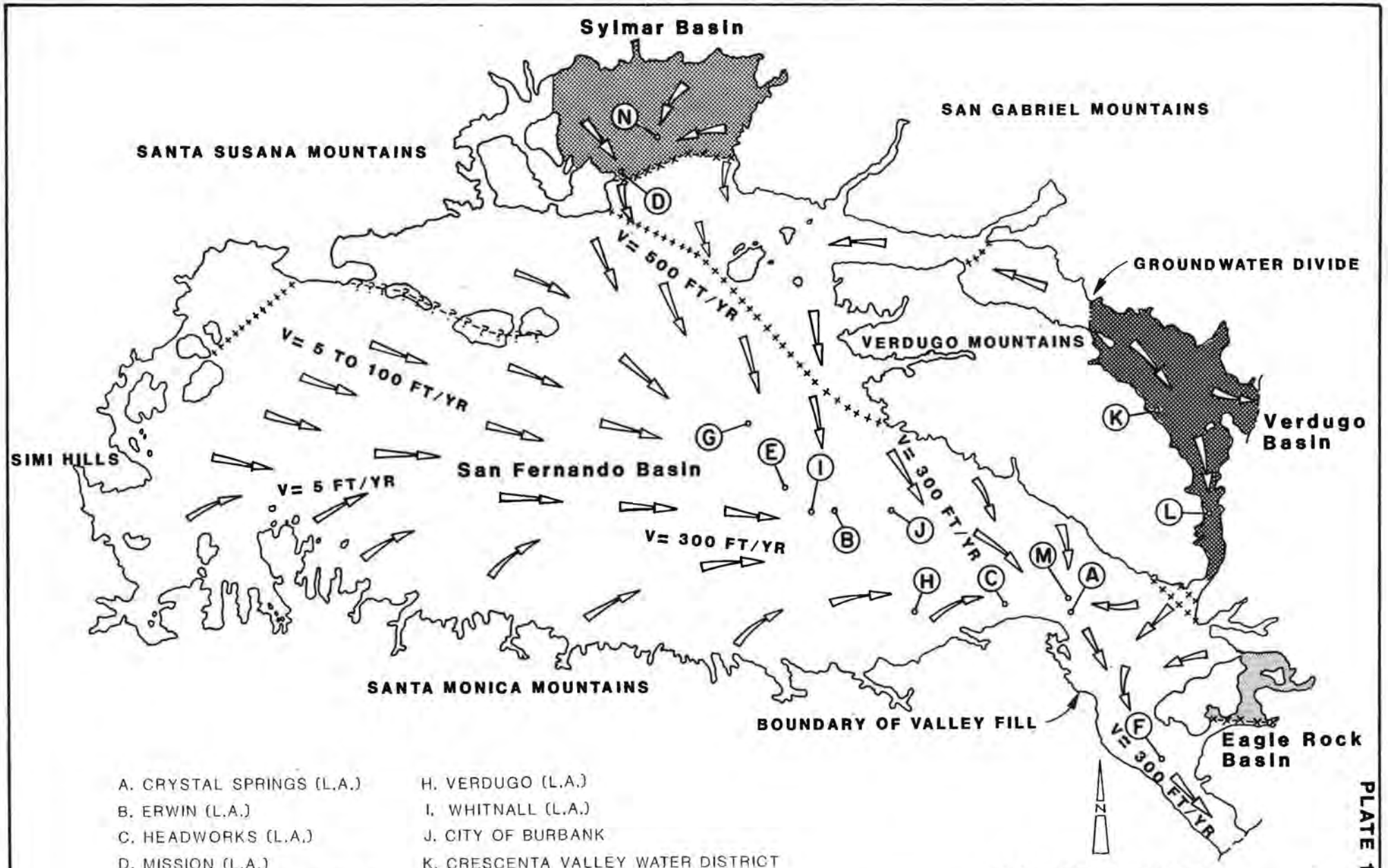
LEGEND

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
V= 300 FT/YR
Eagle Rock Basin
N
SAN FERNANDO BASIN
ESTIMATED DIRECTIONS AND VELOCITIES OF GROUNDWATER FLOW
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
MRG 3/89
PLATE 10

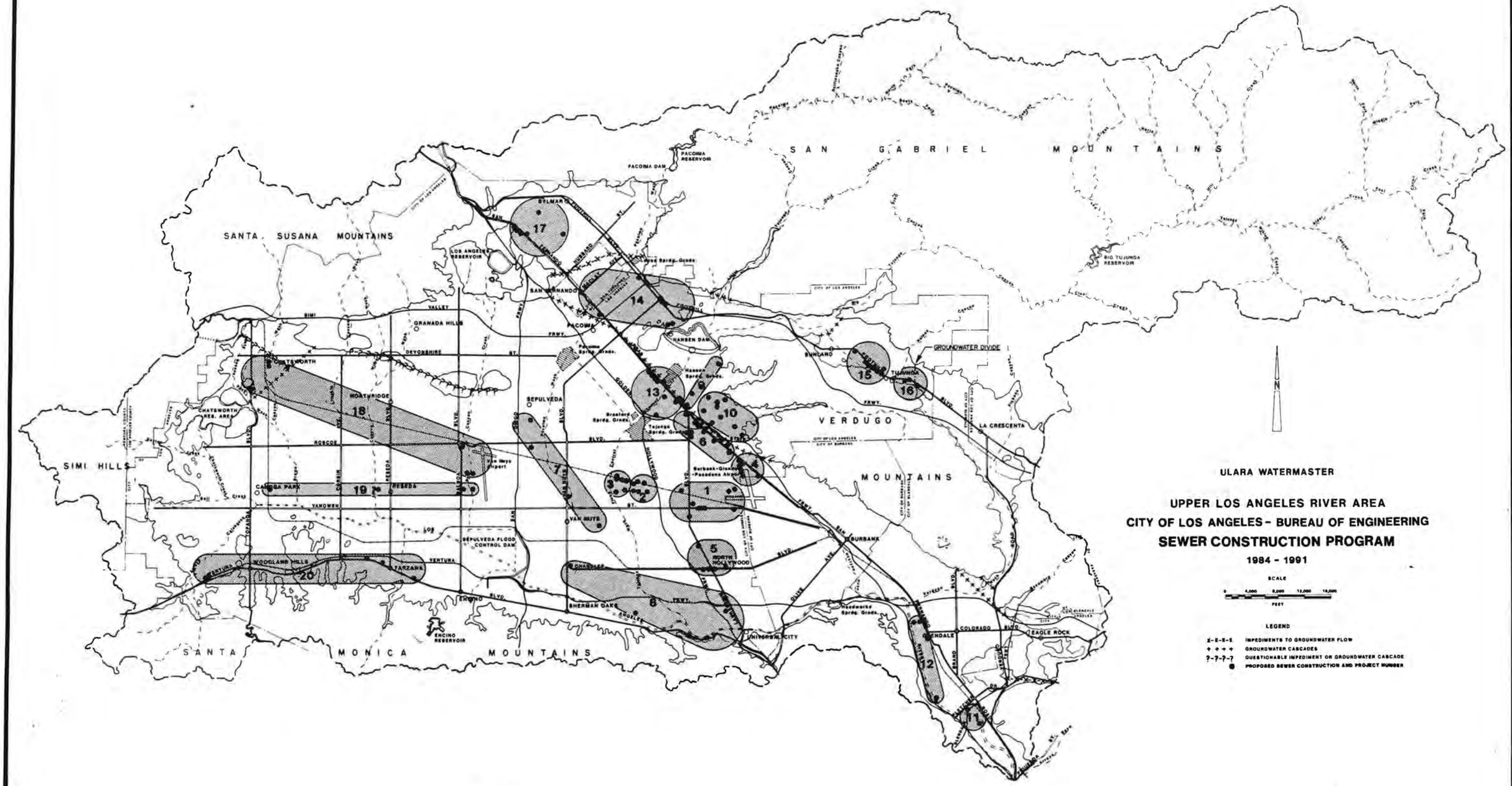


MRG 3/89

SAN FERNANDO BASIN

ESTIMATED DIRECTIONS AND VELOCITIES OF GROUNDWATER FLOW

PLATE 10



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA
CITY OF LOS ANGELES - BUREAU OF ENGINEERING
SEWER CONSTRUCTION PROGRAM
1984 - 1991

SCALE

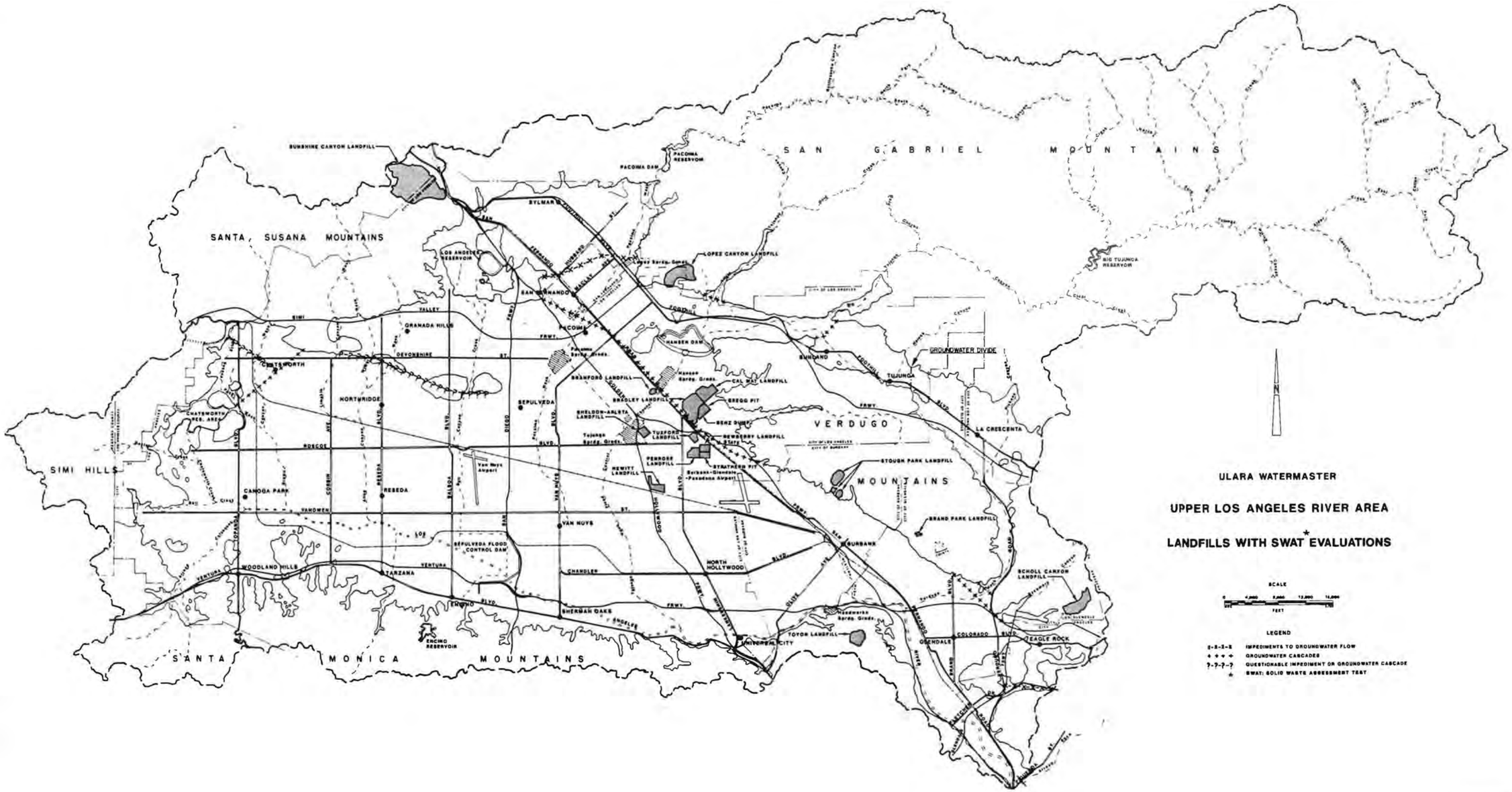
0 4,000 8,000 12,000 16,000

FEET

LEGEND

E-E-E-E	IMPEDIMENTS TO GROUNDWATER FLOW
+ + + +	GROUNDWATER CASCADES
?-?-?-?	QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE
●	PROPOSED SEWER CONSTRUCTION AND PROJECT NUMBER

PLATE 12



ULARA WATERMASTER

UPPER LOS ANGELES RIVER AREA

LANDFILLS WITH SWAT* EVALUATIONS

SCALE

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

FEET

LEGEND

- -I-I-I- IMPEDIMENTS TO GROUNDWATER FLOW
- + + + + GROUNDWATER CASCADES
- ?-?-?-? QUESTIONABLE IMPEDIMENT OR GROUNDWATER CASCADE
- * SWAT: SOLID WASTE ASSESSMENT TEST

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 fifteen 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.

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. Pendleton Street
11. Sheldon-Arleta
12. Scholl Canyon
13. Sunshine Canyon
14. Toyon Landfill
15. 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 levels will be provided when these data are available.

STATUS AS OF MAY 1991

(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 -

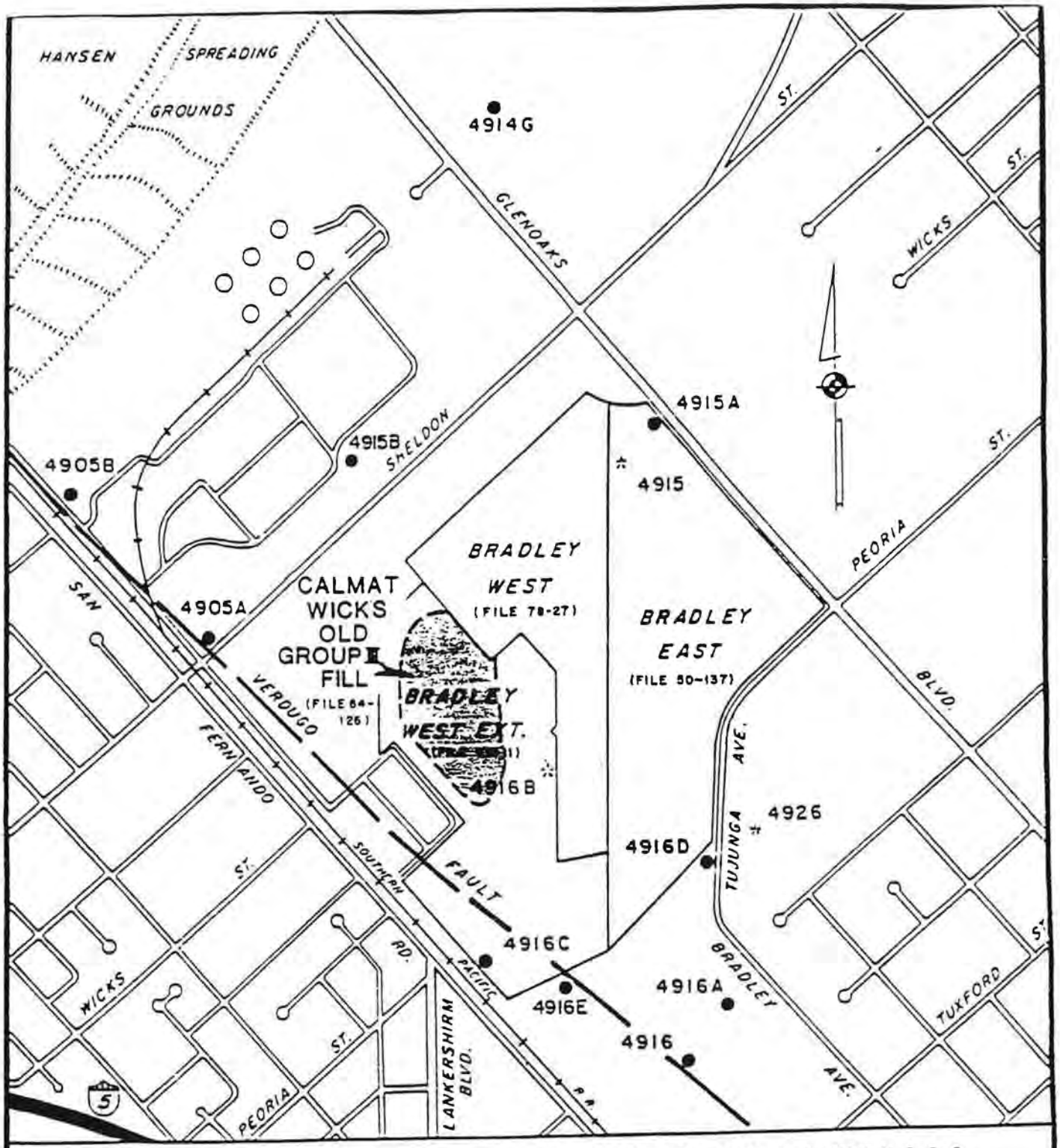
LEACHATE MONITORING - Has no liner. No visible seeps on western slope. No leachate in monitoring wells. No formal leachate collection system.

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 - Final SWAT report submitted Nov. 1990. Report is under review.



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 1991

(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.

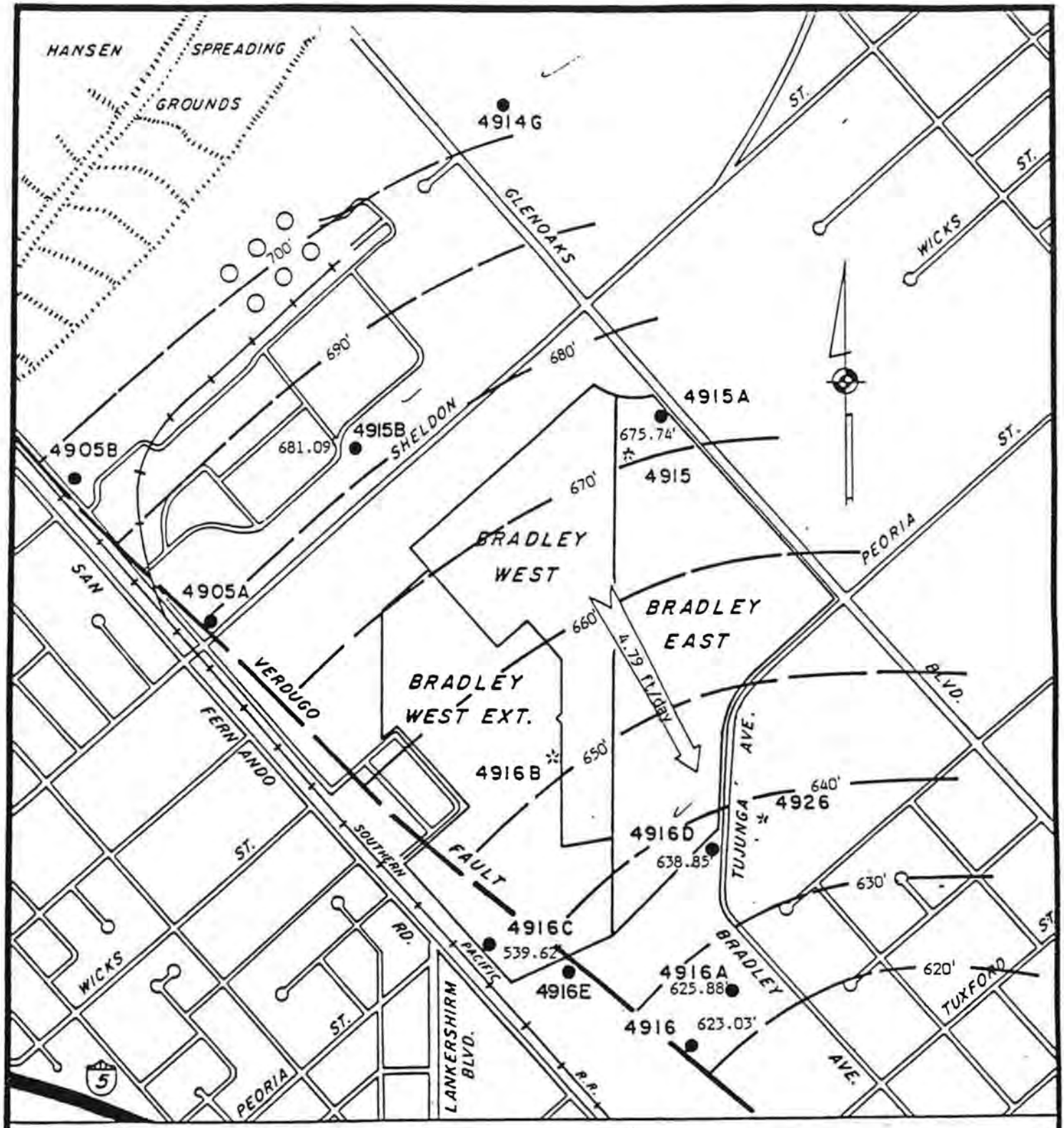
GROUND WATER QUALITY MONITORING - May be slight increase in chloride and TDS with lower water levels. No evidence of chloride increase due to landfill; no evidence of increase in bicarbonate due to the landfill. Liner and gas control system seem to be effective in preventing gas from reaching the water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

REPORTS

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

SWAT Supplement - March 21, 1988 - Law Environmental

REGIONAL BOARD - Final SWAT report submitted Nov. 1990. Report is under review.



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

12-19-87

WELL LOCATIONS, GROUND WATER LEVELS AND VELOCITY MAP

FIGURE 1

LAW ENVIRONMENTAL, INC.

STATUS AS OF MAY 1991

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 -

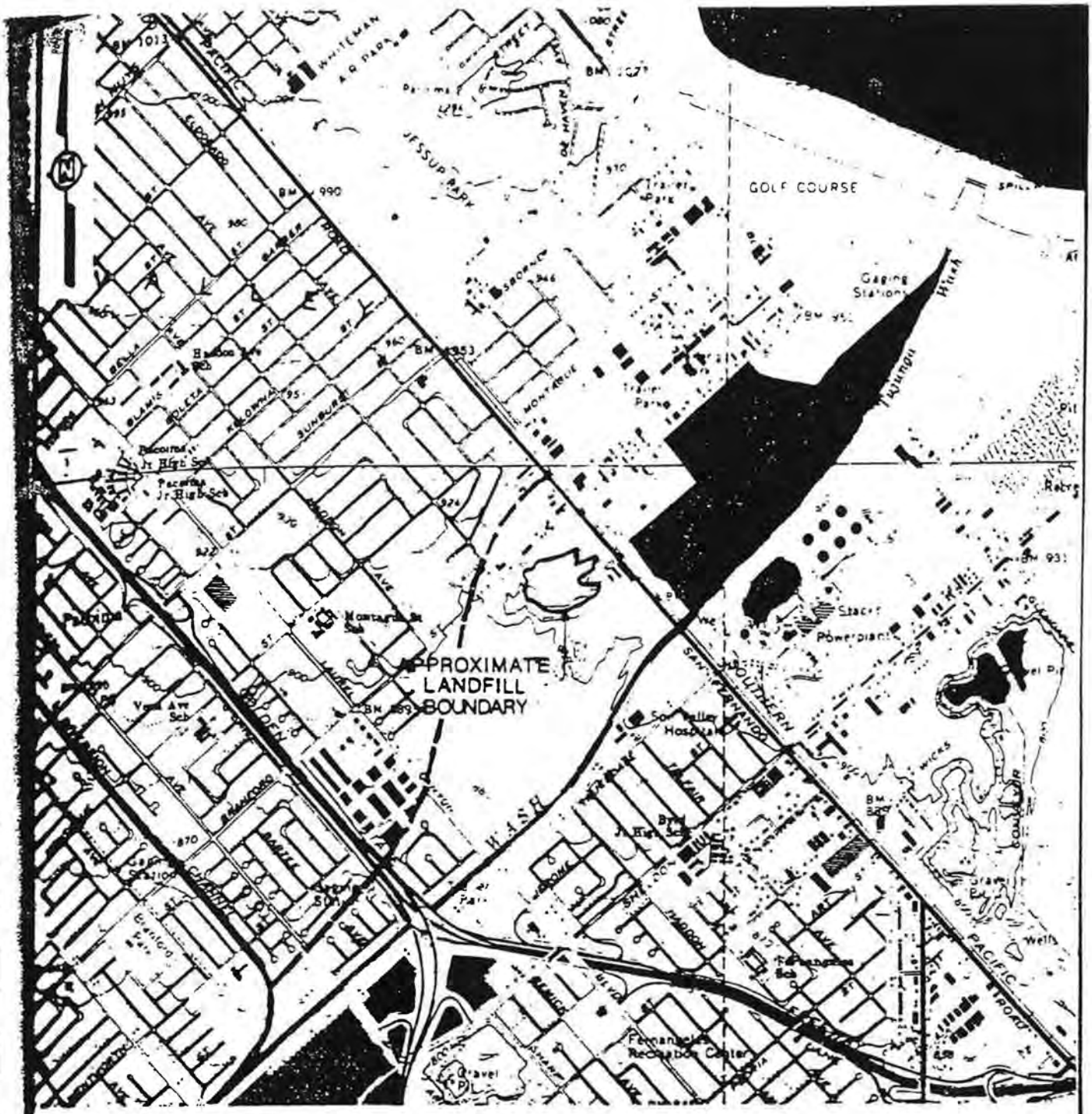
LEACHATE MONITORING -

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.

REGIONAL BOARD - Final SWAT report submitted Oct. 1990. Report is under review.



EXPLANATION

SURFACE WATER RETENTION AREA

SCALE

0 2000 4000 FEET

REFERENCE:

1938 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 1991

(SWAT DATA REQUIREMENTS COMPLETED)

NAME - CalMat Landfill (Sun Valley #3)

OWNER - CalMat Properties

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

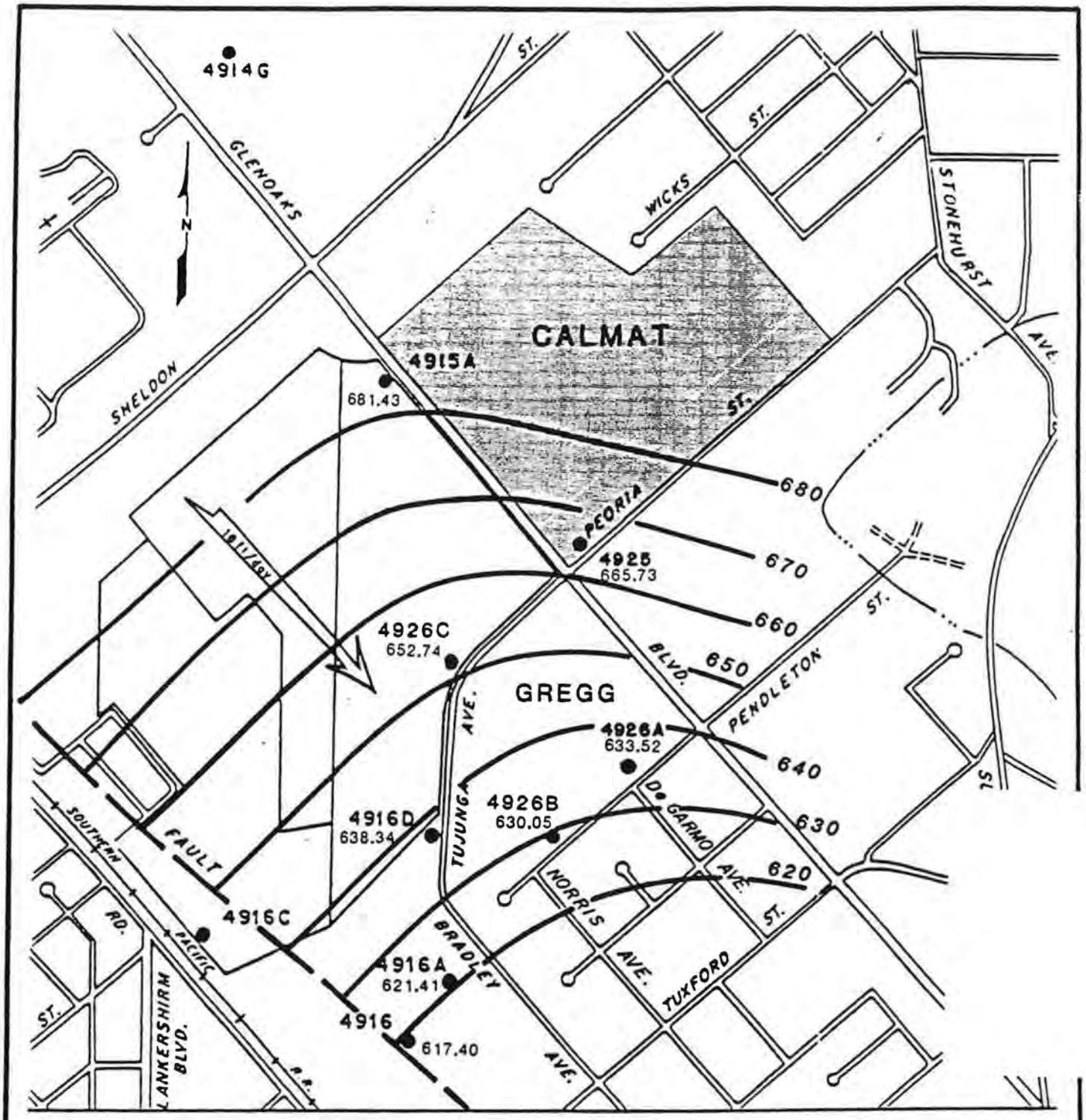
GROUND WATER QUALITY MONITORING - Background quality is obtained from the Bradley landfill complex SWAT wells. Quarterly sampling started in April 1988. There are regional plumes of TCE which are unrelated to the landfill. There are two different water types under the landfill which appear to be related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

REPORTS

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

Supplement - July, 1989 - Law Environmental

REGIONAL BOARD - Final SWAT report submitted Nov. 1990. Report is under review.



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. N.G.

DIETERICH POST REORDER NO. 128233

STATUS AS OF MAY 1991

(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.

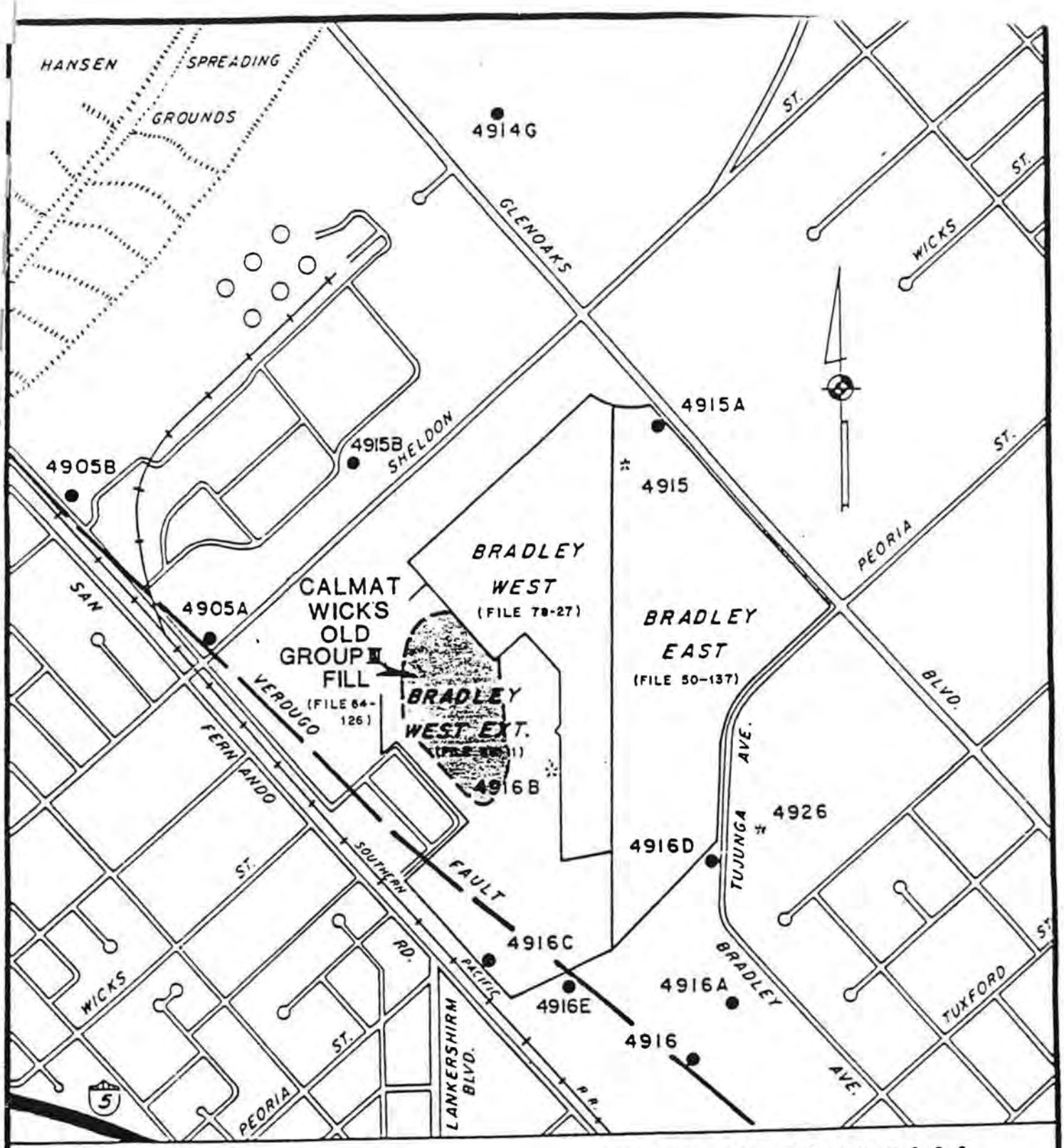
LEACHATE MONITORING - No liquid in any of the borings.

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 - Final SWAT report submitted Nov. 1990. Report is under review.



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 1991

(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.

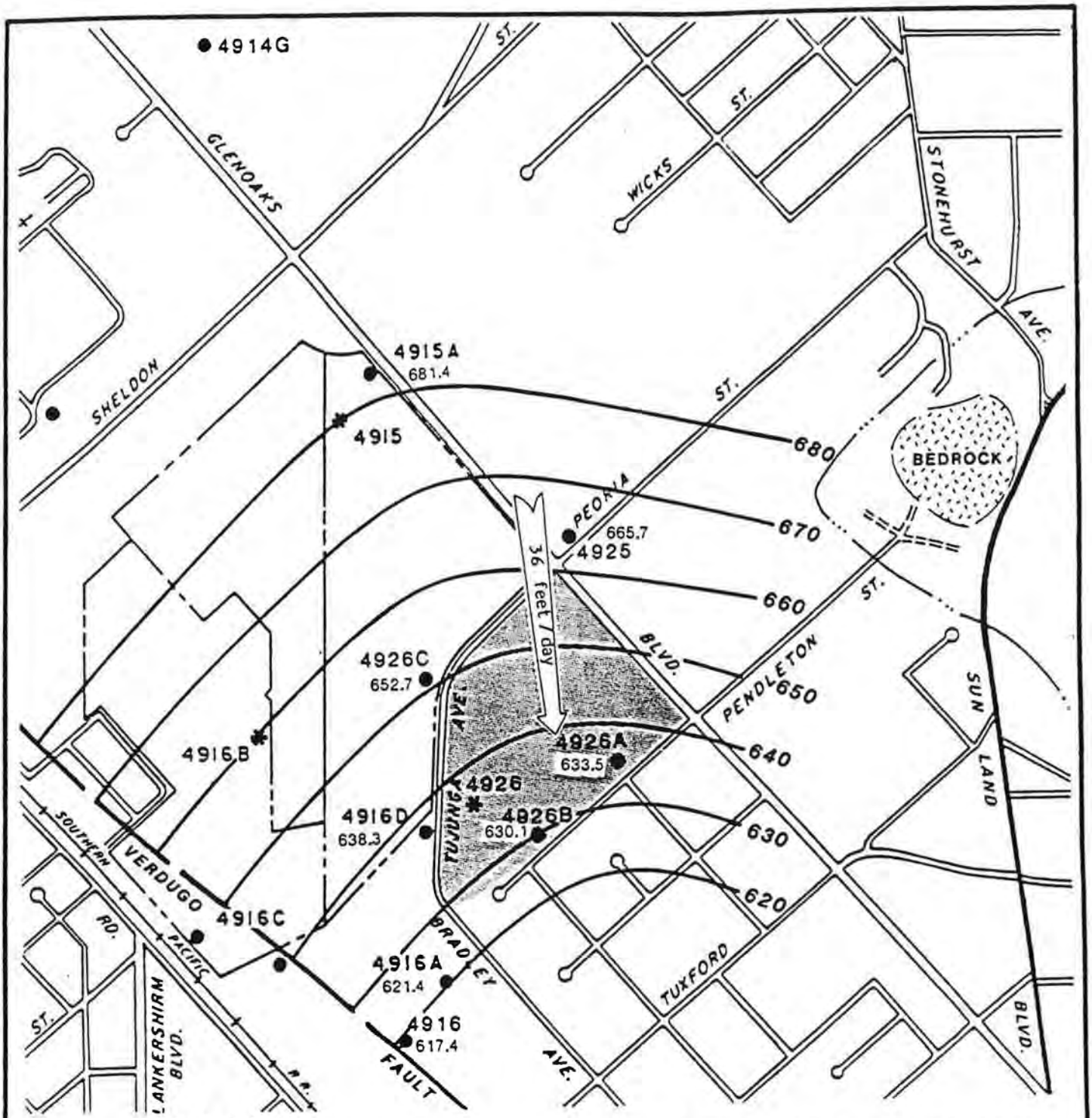
GROUND WATER QUALITY MONITORING - Share monitoring wells with the program for the Bradley landfill complex. Two monitoring wells drilled along Pendleton Street. Pumps with packers used to sample the uppermost 20 feet of saturation. Landfill gas contains no PCE, and the PCE found in upgradient wells is 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 Feb. 8, 1990. Further groundwater monitoring is required under Chapter 15.



PROJECT No. 58-8628 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 REORDER NO. 128233

STATUS AS OF MAY 1991

(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.

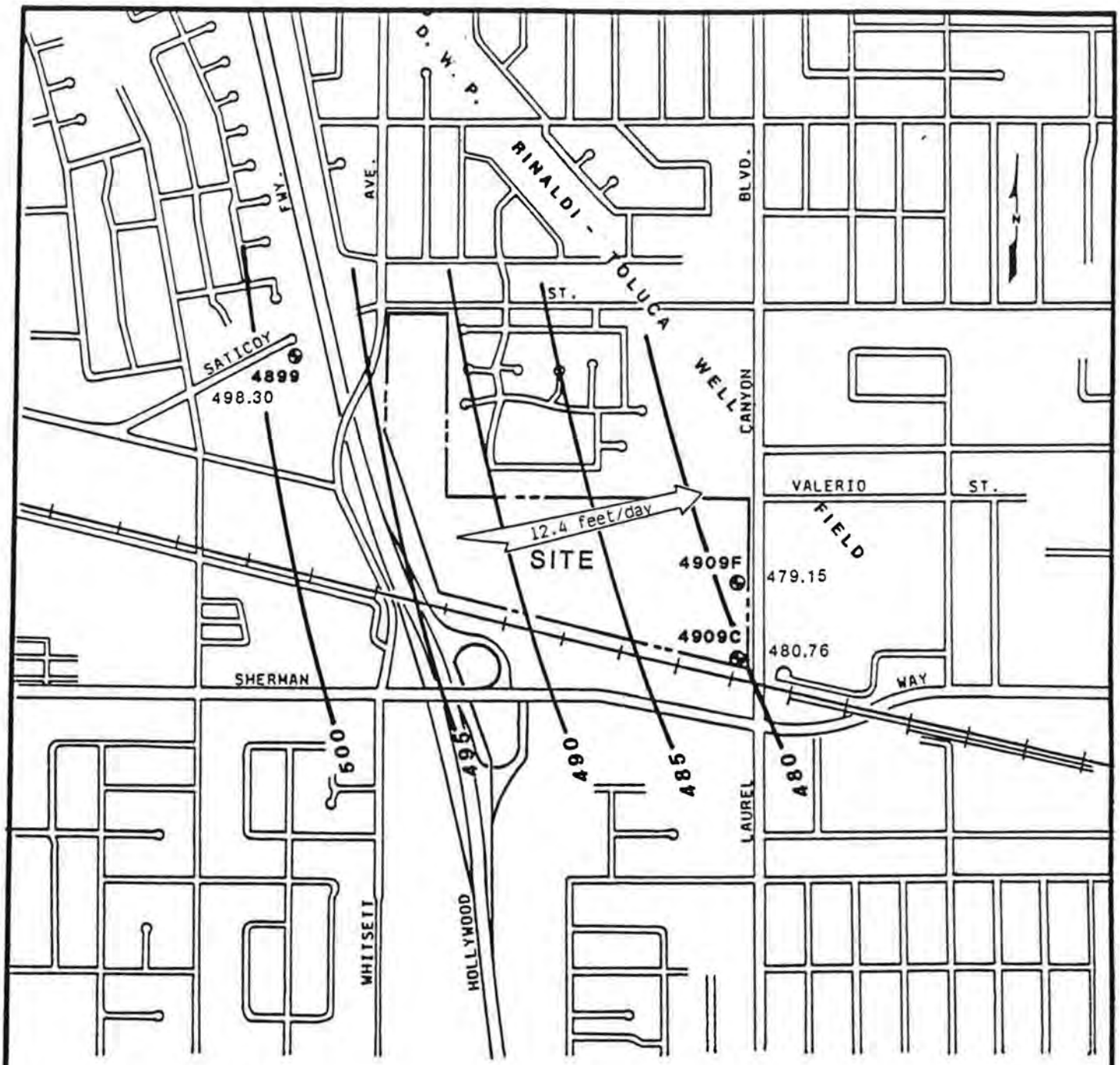
LEACHATE MONITORING - A leachate well drilled in the trash showed moist conditions but no free leachate.

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
Final SWAT report - July 1, 1989 - Law Environmental

REGIONAL BOARD - Report is under review. Further groundwater monitoring may be required under Chapter 15.



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

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

FIGURE 1

LAW ENVIRONMENTAL, INC.

STATUS AS OF MAY 1991

(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.

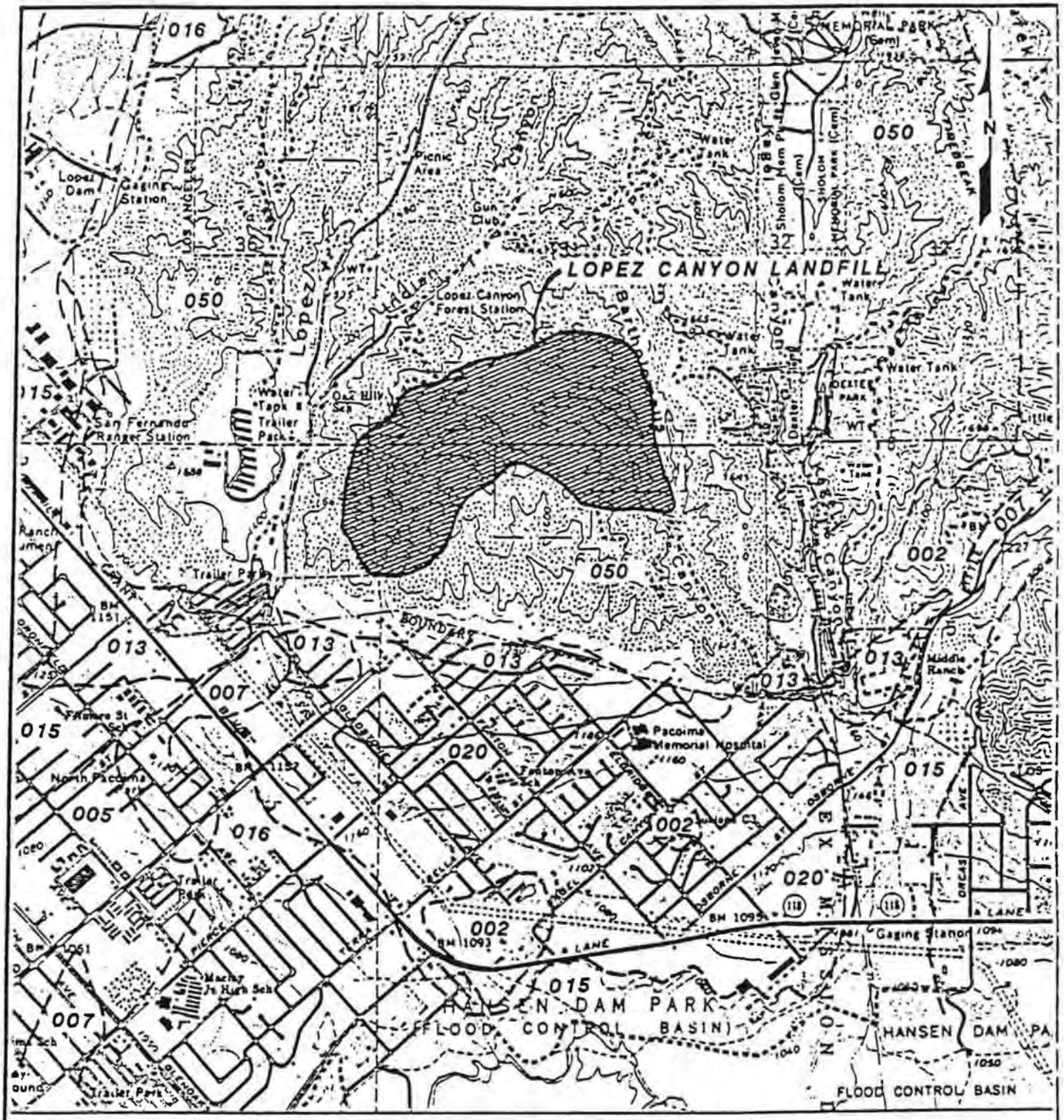
GROUND WATER QUALITY MONITORING - Two upgradient and three downgradient monitoring wells. Only ground water encountered was in a shallow silty sand near the lower debris basin in Disposal Area B. Native water is highly mineralized. The landfill is dry with no evidence of leakage.

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 Feb. 8, 1990. A Phase II SWAT report is being required.



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.

PROJECT No. 58-6425-01 DATE 09-20-88 PROJ. MGR. DFTR.

STATUS AS OF MAY 1991

(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.

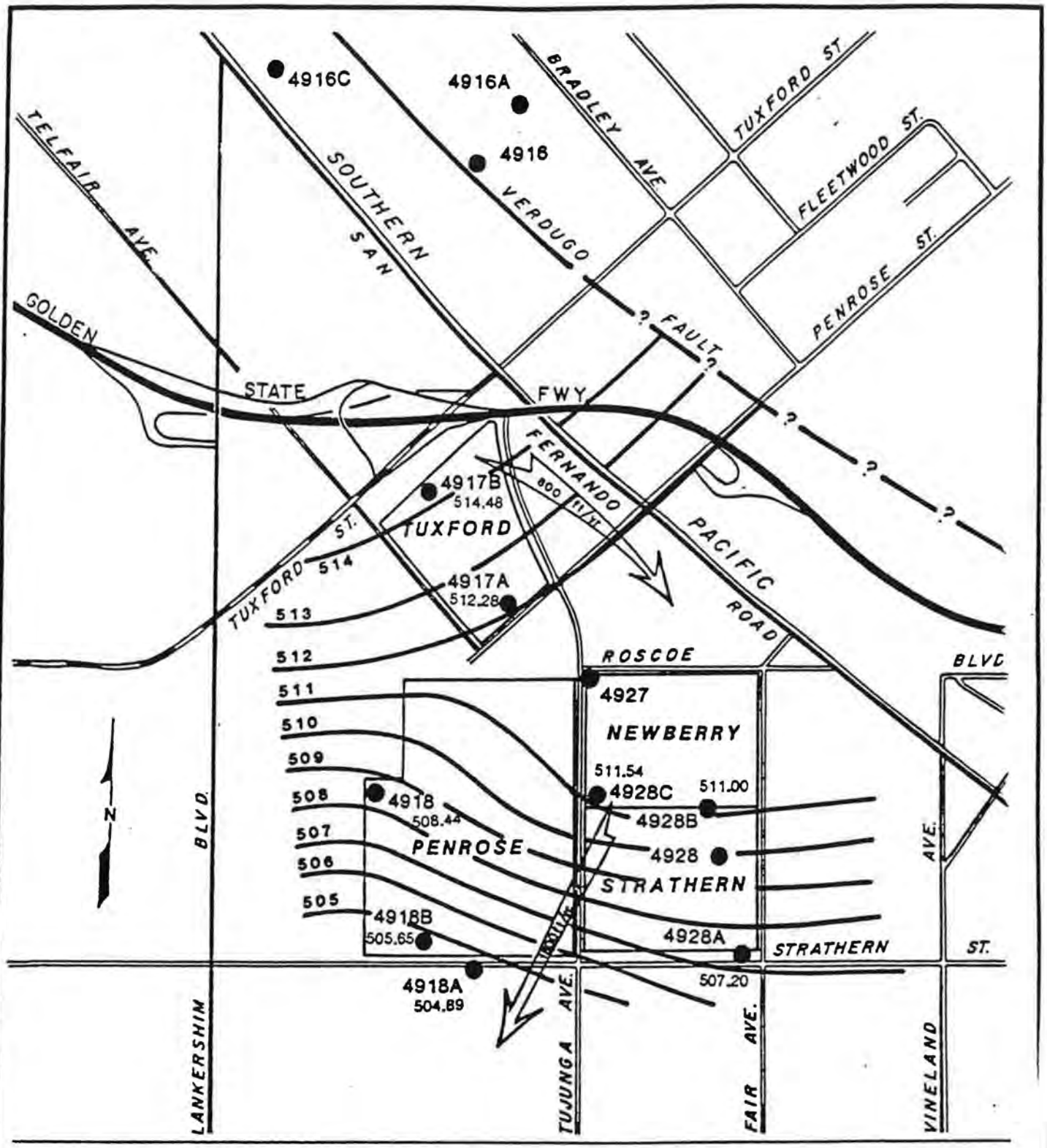
LEACHATE MONITORING - Penrose - Replacement gas well showed 8-30% (25% average) moisture in trash samples. No leachate was found. Newberry - In leachate test hole, moisture was 9.8-20.8%. No liquid leachate was found.

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 report - June 29, 1988 - Law Environmental
Supplement - July 1, 1989 - Law Environmental

REGIONAL BOARD - Approved on Sept. 22, 1989. Further groundwater monitoring will be required under Chapter 15.



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.

DIETERICH POST REORDER NO. 128233

STATUS AS OF MAY 1991

NAME - Pendleton Street Landfill

OWNER - City of Los Angeles, Department of Water and Power

LOCATION - Southeast side of Pendleton Street, about 700-1600 feet northeast of Glenoaks Boulevard.

GEOLOGY - Holocene and Late Pleistocene alluvium in the Hansen Subarea which lies to the northeast of the Verdugo Fault. North of La Tuna Canyon Fault.

GENERAL OPERATIONS - Area of 15 acres, of which 10 acres have already been filled. Not open to the public. Accepts non-water-soluble, non-decomposable, inert solids, mainly construction debris, from LADWP sources. Maximum depth of fill about 40 feet.

GAS CONTROL SYSTEM - None required.

VADOSE ZONE MONITORING - None required.

LEACHATE CONTROL AND MONITORING - No containment structures, drainage control, covers, liners, leachate collection, or leak detection systems.

GROUND WATER QUALITY MONITORING - Three monitoring wells on periphery of property.

REPORTS - SWAT (Rank 4) - June 1990 - International Technology

REGIONAL BOARD - Final SWAT report is due July 1991.

DR. N BY	B.J.W	CHECKED BY	K.S.A	6-27-90	DRAWING NUMBER 241343-A15
	5-21-90	APPROVED BY	H.A	7-11-90	

LEGEND:

4936● WELL LOCATION AND WELL NUMBER (WELL NUMBER ACCORDING TO LOS ANGELES COUNTY WELL NUMBERING SYSTEM)

SCALE

0 2000 4000 FEET

REFERENCE:

U.S.G.S. 7.5 MINUTE TOPOGRAPHIC MAP OF BURBANK, SAN FERNANDO, SUNLAND, AND VAN NUYS; CALIFORNIA QUADRANGLES; DATED: 1966, PHOTOREVISED: 1972

FIGURE 18

LOCATIONS OF WELLS WITHIN ONE MILE OF THE SITE PENDLETON STREET LANDFILL

PREPARED FOR

CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER
LOS ANGELES, CALIFORNIA

INTERNATIONAL TECHNOLOGY CORPORATION

137773

STATUS AS OF MAY 1991

NAME - Scholl Canyon Landfill - (Active and Inactive)

OWNER - Los Angeles County - 85 acres; City of Glendale - 200 acres; Southern California Edison Company - 25 acres. Operated by County Sanitation Districts of Los Angeles County. Upon completion of fill, entire property will go to City of Glendale.

LOCATION - In the City of Glendale, on the the southwestern flank of the San Rafael Hills, about one mile west of the Rose Bowl.

GEOLOGY - Canyon cut in quartz diorite gneiss. Thin alluvium is tributary to San Fernando Valley.

GENERAL OPERATION - Class III Site open to the public. Operations began March 22, 1961. Accepts residential, commercial, some industrial wastes, but no liquid or hazardous wastes. Weathered rock and colluvium is used for cover.

GAS CONTROL SYSTEM - None.

VADOSE ZONE MONITORING - Not required.

LEACHATE CONTROL AND MONITORING - Two subsurface barriers to cut off alluvial underflow. Extraction wells upgradient from barriers. Alluvial monitoring wells downgradient from barriers.

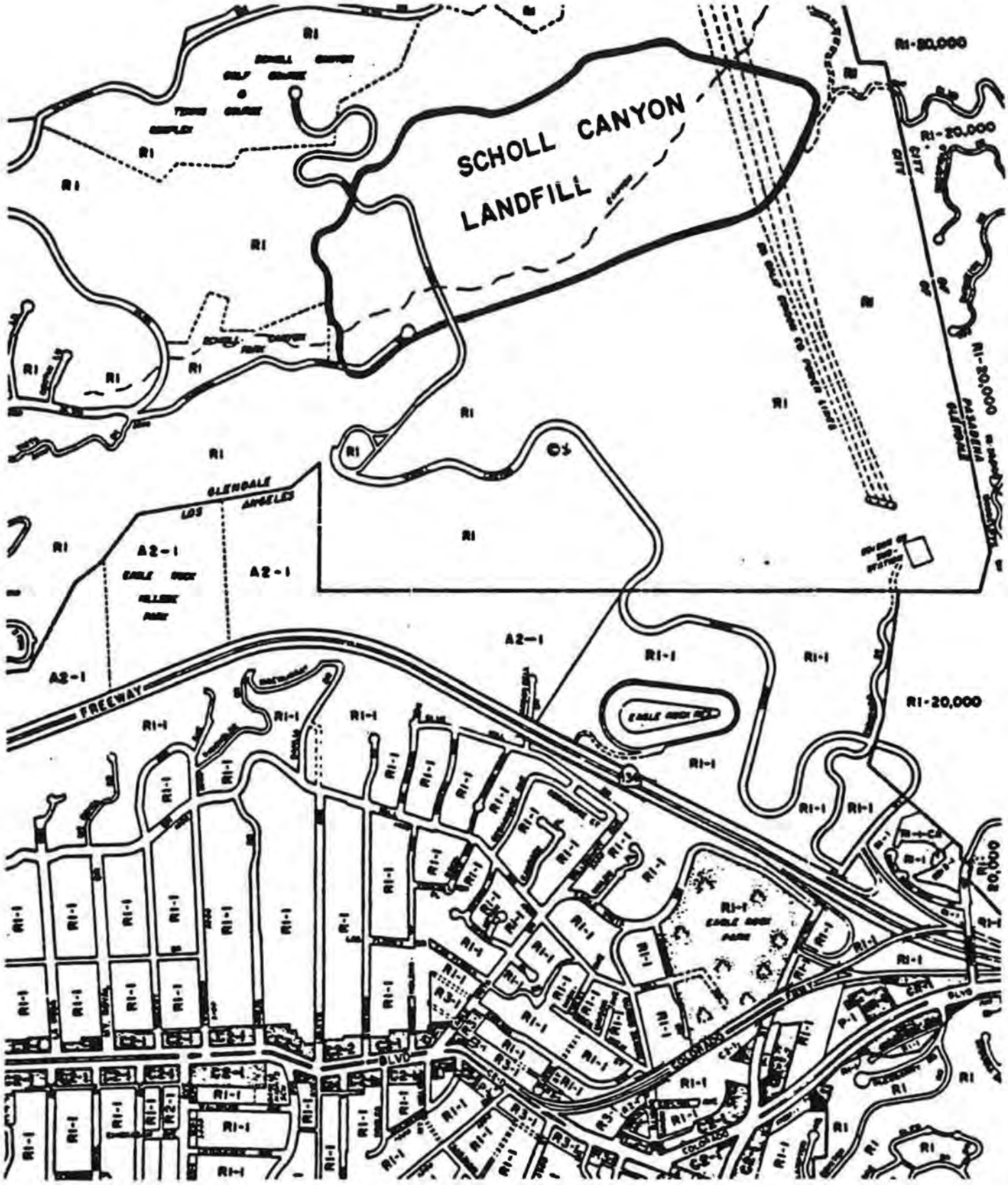
REPORTS

Stone Geological Service - 1967
Converse Consultants - 1984
Woodward-Clyde - 1986
Earth Technology - 1987
SWAT Report - July 1, 1987 - Dale Hinkel
SWAT Progress Report - April 15, 1988 - CoSan Dists.

STATUS WITH REGIONAL BOARD

Active -(Rank 1)- SWAT report completed July 1987. Final SWAT report completed April 1988. SWAT report approved August 1990. Further monitoring required under Chapter 15.

Inactive - (Rank 2) - SWAT report completed July 1987. Final SWAT report completed Jan. 1991. Report is under review. Further monitoring may be required under Chapter 15.



SCHOLL CANYON LANDFILL
LOCAL ENVIRONMENT

FIGURE 4

STATUS AS OF MAY 1991

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.

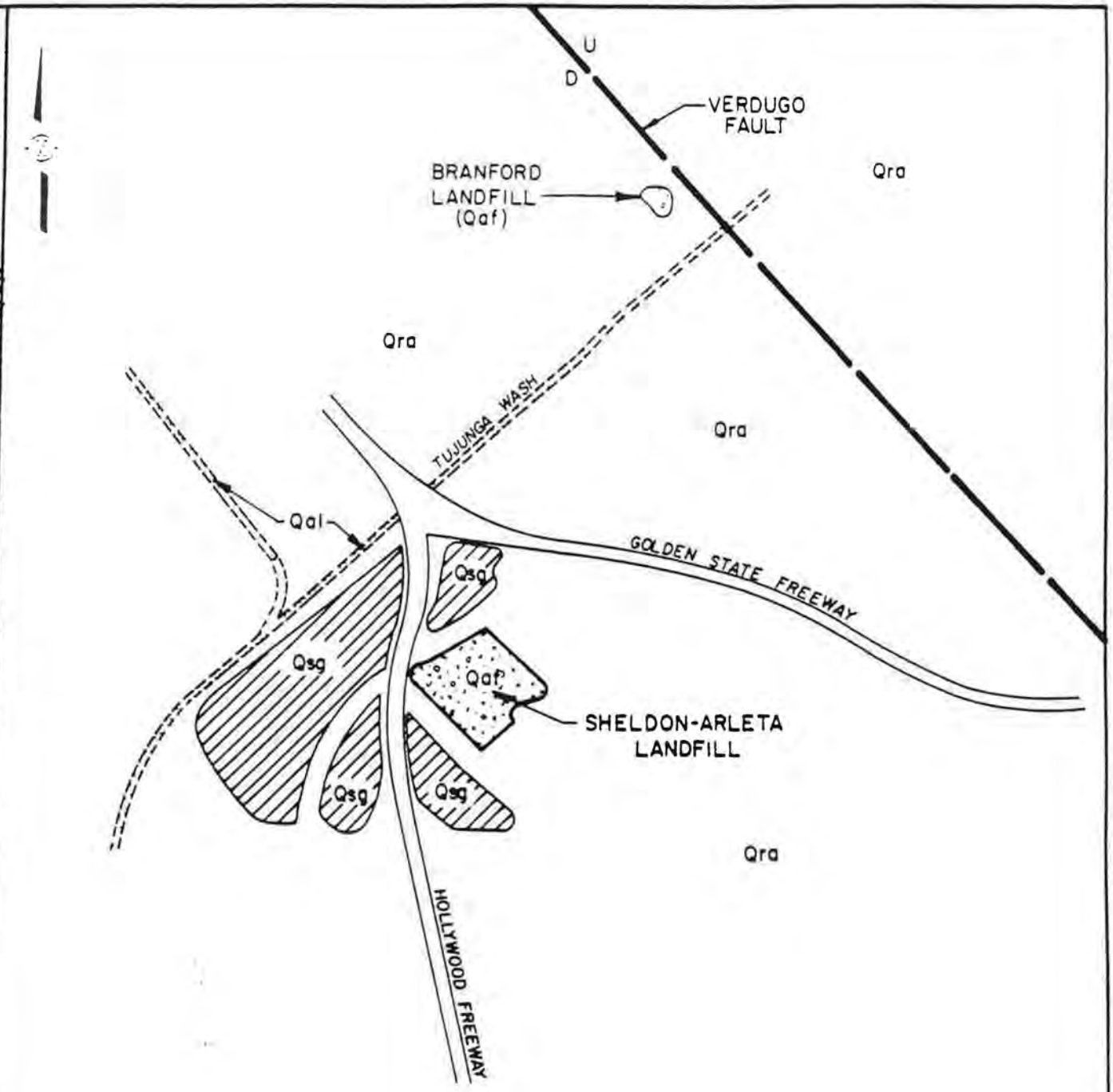
LEACHATE MONITORING - No evidence of leachate buildup within the landfill. Will be sampled again after spreading at the Tujunga Spreading Grounds.

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 Feb. 9, 1990. Further groundwater monitoring will be required under Chapter 15.



DRAWN BY: s a m 4-8-87
CHECKED BY: [illegible]
APPROVED BY: [illegible]
DRAWING NUMBER 240199-A15

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 1991

(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.

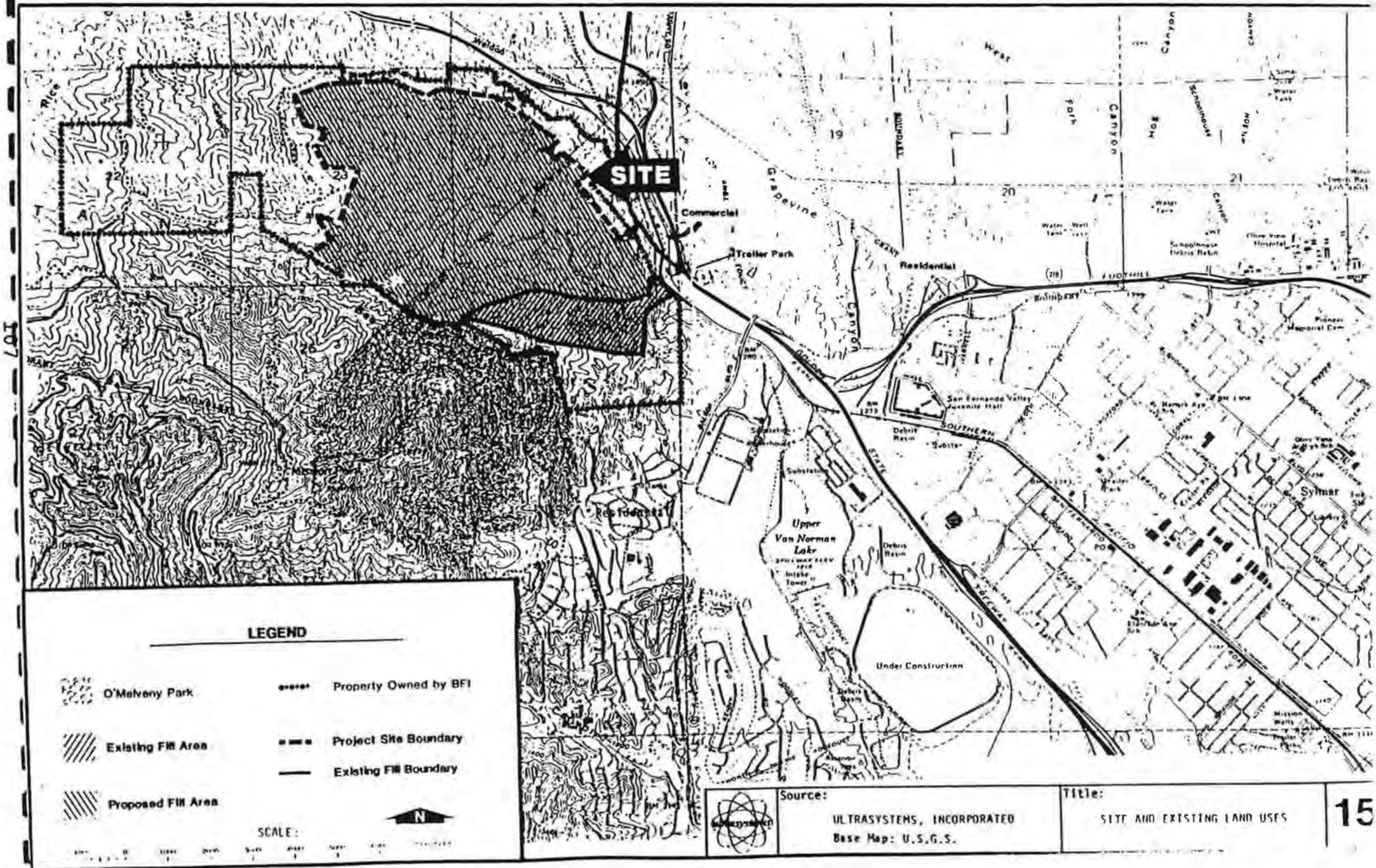
LEACHATE MONITORING - The main concern is the potential for leachate leaving Sunshine Canyon and joining the ground water of the San Fernando Valley.

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 - Report is under review. Further groundwater monitoring will be required under Chapter 15.


SITE
Commercial
Trailer Park
Residential
Grapevine
Canyon
Weldon Canyon
West Fork
Schoolhouse
Upper Van Norman Lake
Under Construction
San Fernando Valley Juvenile Hall
Sylmar
LEGEND
O'Melveny Park
Existing Fill Area
Proposed Fill Area
Property Owned by BFI
Project Site Boundary
Existing Fill Boundary
SCALE:
N
Source:
ULTRASYSTEMS, INCORPORATED
Base Map: U.S.G.S.
Title:
SITE AND EXISTING LAND USES
15

STATUS AS OF MAY 1991

NAME - Toyon Landfill

OWNER - City of Los Angeles, Bureau of Sanitation

LOCATION - Griffith Park

GEOLOGY - In old rocks away from alluvium of San Fernando Valley and the Los Angeles Narrows. Arkosic sandstones and conglomerates of the Miocene Hollycrest formation along a northwest-trending overturned anticline and displaced along a northest-trending fault.

GENERAL OPERATIONS - 90 acres. Operated from 1957 to February 1986 for the placement of a total of 16 million tons of household trash. Fills a former northeast-facing canyon with 140 to 290 feet of trash. Never open to the public.

GAS CONTROL SYSTEM - Gas samples from 16 perimeter probes are analyzed monthly for toxic constituents. Gas is collected from 30 duplex and 41 single pipe wells 40 to 100 feet deep. Power plant, operated by Pacific Lighting Systems, consists of six 150-HP generators which deliver 9.4 megawatts to the Southern California Edison Co.

VADOSE ZONE MONITORING - None.

LEACHATE MONITORING - Three systems of perforated pipes in gravel-filled trenches which drain to sewer. Total leachate flow of 3-7 gpm. No liners or containment structures.

GROUND WATER QUALITY MONITORING - Six monitoring wells around periphery. Direction of ground water flow in old, fractured rocks is poorly known. Some evidence of leachate in the monitoring wells, with chlorides, bicarbonates, and sodium above background levels. However, significant concentrations of toxic pollutants are not believed to be migrating away from the landfill.

REPORTS

SWAT (Rank 2) - June 1988 - IT Corporation.

Final SWAT report - March 1989.

REGIONAL BOARD - Approved Final SWAT report April 1991.

Further groundwater monitoring required under Chapter 15.

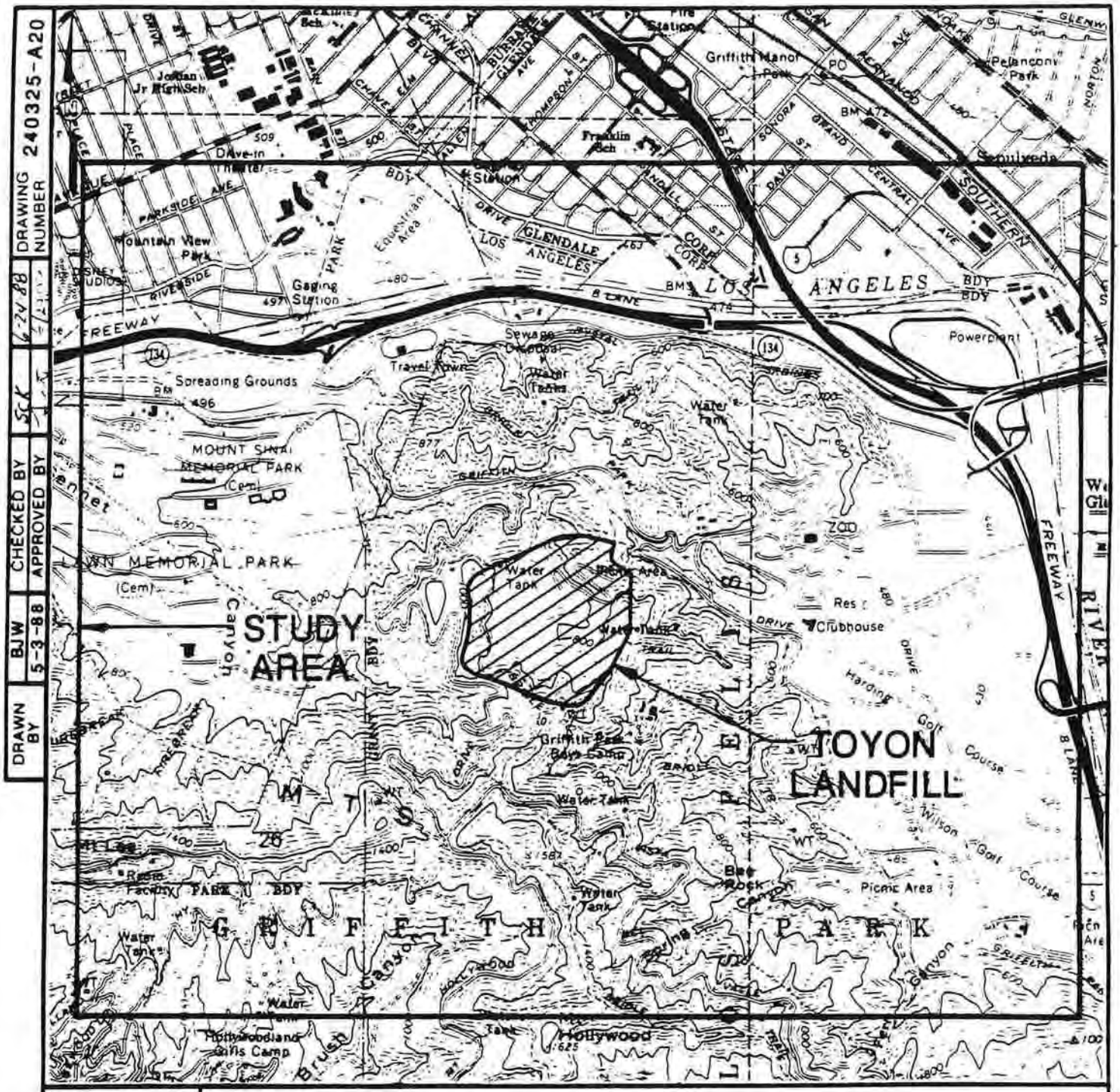


FIGURE 1

SITE LOCATION MAP
TOYON LANDFILL

PREPARED FOR

BUREAU OF SANITATION
DEPARTMENT OF PUBLIC WORKS
CITY OF LOS ANGELES

REFERENCE:

USGS TOPOGRAPHIC MAP OF
BURBANK, CALIFORNIA QUADRANGLE;
DATED: 1966; PHOTOREVISED: 1972;
SCALE 1:24000

INTERNATIONAL TECHNOLOGY CORPORATION

"Do Not Scale This Drawing

STATUS AS OF MAY 1991

(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 - Was open to 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.

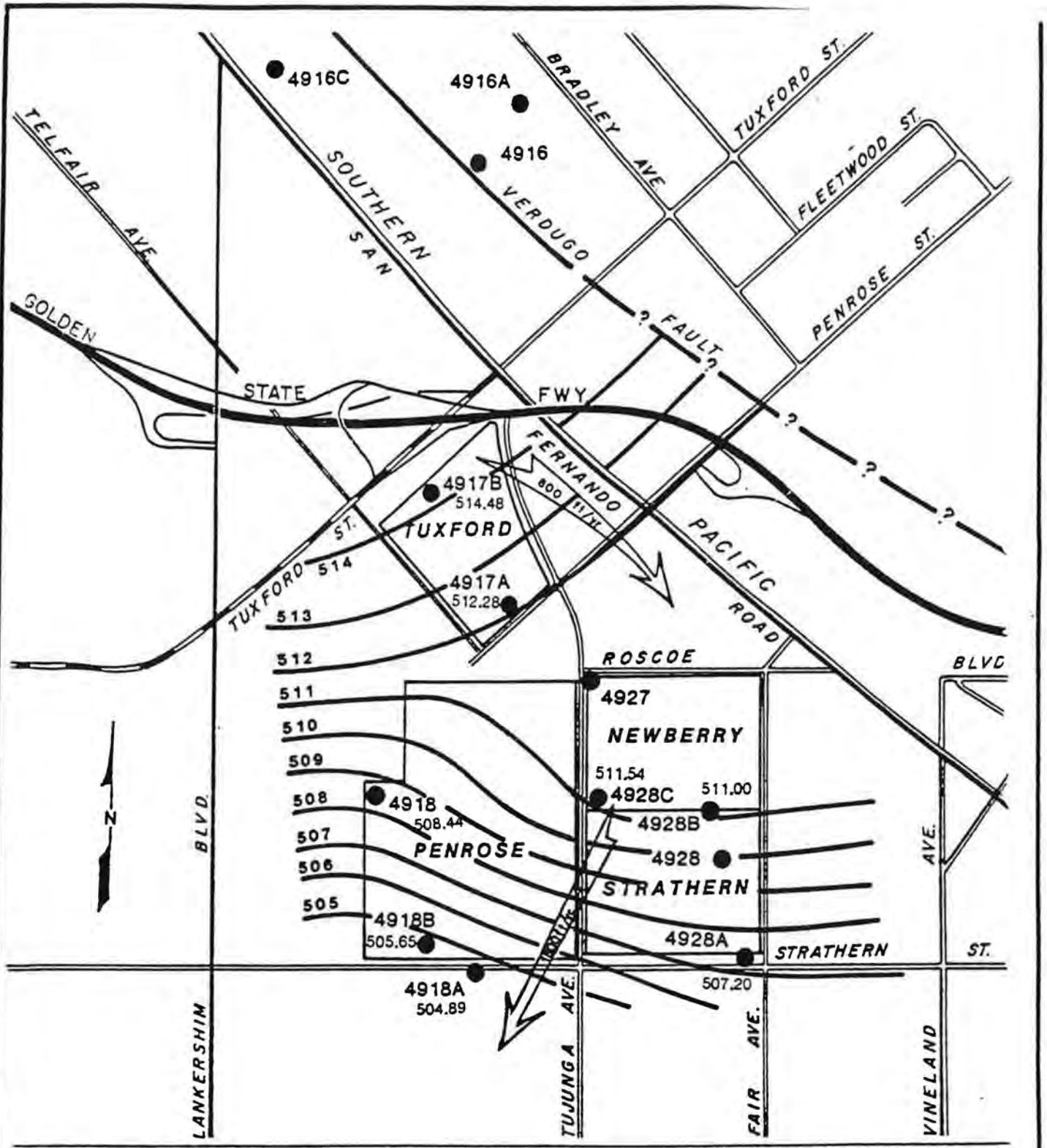
GROUND WATER QUALITY MONITORING - Shares monitoring wells with Penrose/Newberry/Strathern. Sample by a pump with packer. Two wells upgradient and two wells downgradient. VOCs are above action levels -- appear to be coming from upgradient. High nitrates in two upgradient wells (84 and 88 mg/l) are probably 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 - Final SWAT report submitted Dec. 1990. Report is under review. Further groundwater monitoring may be required under Chapter 15.



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. 126233

APPENDIX G

EVALUATION OF WATER RIGHTS AND WATER USE OPTION - SAN FERNANDO VALLEY BASIN

APPENDIX G

AN EVALUATION OF WATER RIGHTS AND WATER USE

OPTION - SAN FERNANDO VALLEY BASIN

As part of the San Fernando Basin Superfund Project, the Environmental Protection Agency (EPA) completed a report in March of 1991 entitled - "Evaluation of Water Rights and Water Use Options in the San Fernando Valley Basin"

This report was reviewed by the ULARA Watermaster and staff. EPA has indicated that any implied conflict in interpretations are not intentional and should be resolved in consultations with the ULARA Watermaster.

The "Executive Summary" (pages iv to vi) and conclusion (Section 7) are enclosed to provide some insight as to the nature of this report. Basically, this report describes both the adjudicated water rights in the four basins - San Fernando, Sylmar, Verdugo, and Eagle Rock, and possible uses for the water that EPA expects will be extracted from the valley and treated to remove the volatile organic compounds. Also described are implications for basin-wide remedial planning that result from water rights and water use options in the San Fernando Valley.

ARCS WEST

Remedial Activities at Selected Uncontrolled Hazardous Waste Sites in the Zone of Regions IX and X

AN EVALUATION OF WATER RIGHTS AND WATER USE OPTIONS IN THE SAN FERNANDO VALLEY BASIN LOS ANGELES, CALIFORNIA

Environmental Protection Agency
Contract No. 68-W9-0031

CH2M HILL

EXECUTIVE SUMMARY

The purpose of this document, An Evaluation of Water Rights and Water Use Options in the San Fernando Valley Basin (SFVB), is to describe how some of the institutional and physical constraints associated with water supply management will affect remedial action planning as the SFVB Remedial Investigation/Feasibility Study (RI/FS) progresses. Preliminary estimates indicate that it might be necessary to extract, treat, and use as much as three-quarters of the safe yield of the SFVB (about 80,000 acre-feet per year) in the process of remediating the SFVB groundwater contamination. Extraction of such a large amount of water will require close coordination among EPA, the Upper Los Angeles River Area (ULARA) Watermaster, and the local water purveyors and a shared understanding of both objectives and constraints.

The SFVB is located in Los Angeles County, California, within the ULARA. The ULARA contains the watershed of the Los Angeles River and its tributaries above the confluence of the Los Angeles River and the Arroyo Seco Flood Control Channel. Four separate groundwater basins form the SFVB: the San Fernando Basin, Sylmar Basin, Verdugo Basin, and Eagle Rock Basin. Five water purveyors pump groundwater from the SFVB: the Los Angeles Department of Water and Power (LADWP); the Burbank Public Services Department; the Glendale Public Services Department; the San Fernando Department of Public Works--Water Division; and the Crescenta Valley County Water District. Each of these purveyors uses both local groundwater and imported surface water as sources of supply. Both supplies are now facing possible future limitations due to contamination, litigation over Owens Valley/Mono Lake supplies, debate over exports from the San Francisco Bay-Delta, and startup of the Central Arizona Project.

Four sites in the SFVB were listed on the EPA National Priorities List in 1986 due to contamination of production wells by trichloroethylene (TCE) and perchloroethylene (PCE). Since then, EPA has entered into cooperative agreements and provided funding to LADWP to conduct the basinwide Remedial Investigation and to the Regional Water Quality Control Board (RWQCB) to conduct source identification and investigation activities. Two Records of Decisions (RODs) have been signed: one for the North Hollywood Operable Unit in 1987 and one for the Burbank Operable Unit in 1989. LADWP is currently conducting an OUFS in the Glendale area; a ROD is expected in 1991. EPA is also conducting a basinwide Feasibility Study, of which this water rights and water use evaluation is a part.

Because the SFVB is an adjudicated groundwater basin, court-defined water rights affect who can extract groundwater, how much they can extract, and how the extracted groundwater can be used. The 1979 ULARA Judgment assigned specific water rights to each of the five purveyors and to some additional private parties. The Judgment mandated safe yield operation of the four groundwater basins and designated a Watermaster and an Administrative Committee, who now operate the basin under

Court supervision. A variety of different types of water rights are incorporated into the Judgment, including the right of some parties to store imported water in the SFVB and to accumulate import return flow. In addition, non-parties (those not assigned water rights as part of the Judgment) can extract groundwater from the SFVB under specified physical solution arrangements.

The ULARA Watermaster has also developed specific policies on non-party extraction for groundwater remediation purposes. These policies require compliance with safe yield operation, prior approval by the Watermaster, and compensation to parties to the Judgment who may be adversely affected by the extraction. These policies have already been applied to extractions at several facilities that are extracting groundwater as part of preliminary investigations required by the RWQCB. It is expected that the Burbank Operable Unit will be the first Superfund remedial action in the SFVB affected by the Watermaster policy.

Water use options in the SFVB fall into two categories: consumptive uses and non-consumptive uses. Consumptive uses are those that do not directly return the water to the groundwater basin; these uses include (1) use as drinking water, industrial, or irrigation supplies, or (2) discharge of the extracted water into a sanitary sewer or storm drain. Non-consumptive uses are those that do return the water to the SFVB and include recharge using either spreading grounds or injection wells.

Before choosing any one of these options as part of a remedial alternative for a future operable unit, specific information would need to be collected and various different design elements would need to be considered. In addition, each option would be limited by either technical or institutional constraints. Examples of constraints that would need to be evaluated include: the water quality requirements associated with specific industrial uses and the limited capacity of spreading ground facilities. Compatibility with existing water distribution systems and seasonal demand fluctuations would also be important considerations.

Two local water management programs and two agency policy directives on using treated water for potable supply have been identified as important considerations during development of future remedial alternatives. The City of Los Angeles Water Reclamation Program is increasing the amount of reclaimed water used for irrigation and industrial uses, which will limit the usefulness of treated groundwater for those purposes. MWD's Seasonal Storage Service Program will most likely increase seasonal fluctuations in groundwater pumping by the purveyors and will also increase the use of local spreading grounds. Increased recharge could cause changes in the migration of contaminants, which must be considered during remedial planning for specific operable units. DHS' guidelines on domestic use of treated water and MWD's policy on acceptance of treated water into their distribution lines are also discussed as they apply to use of the treated water as a potable supply.

In conclusion, this report describes some of the local institutional and system operation constraints in the SFVB. As the amount of water extracted and treated for remedial purposes increases, these constraints will become increasingly apparent. Integrating remedial action planning and water supply planning will be necessary to achieve both remedial and water supply goals. Mechanisms are already in place to allow for extractions to meet short-term goals. In the long term, the cumulative effects of the constraints posed by both water rights and water use options will need to be carefully considered and mechanisms to overcome them will need to be built into operable-unit design and basinwide remedial planning.

Section 7
CONCLUSIONS

Remediation efforts have begun in the SFVB and are expected to increase steadily in magnitude. During the 1986-1987 Water Year, a total of 1.88 acre-feet of groundwater was extracted by non-parties for groundwater remediation purposes (ULARA, 1988) compared to 14.42 acre-feet extracted during the 1987-1988 Water Year (ULARA, 1989). In March 1989, the North Hollywood extraction and treatment facility began operation which, when fully operational, is intended to extract 2,000 gpm or 3,200 AFY. This represents a significant increase over time in extraction for remediation purposes. When the planned Burbank facility begins operation, the total amount of groundwater extracted for remediation purposes (North Hollywood and Burbank) will increase to more than 22,400 AFY. Eventually, extractions for remedial purposes could approach three-quarters of the safe yield of the SFVB (EPA, 1988). The discussion presented in the previous sections of this report is intended to illustrate some of the ways water rights and water use issues will affect future remediation efforts in the SFVB.

The SFVB is an adjudicated groundwater basin, and remediation efforts must be conducted within the constraints of the 1979 Judgment. The Judgment specifies who can extract groundwater and how much groundwater each party can extract. To address issues that were not included in the original text of the Judgment, the ULARA Watermaster has developed new policies to implement the intent of the Judgment; additional policies could be developed in the future, as necessary. In response to the groundwater contamination problem in the SFVB, the ULARA Watermaster has developed a policy for groundwater extractions for remediation purposes by parties or non-parties (non-parties are those who do not hold water rights under the Judgment). According to this policy, groundwater extractions for remediation purposes that are then used consumptively require approval from the ULARA Watermaster and may require an agreement with a party to the Judgment and payment to the local purveyor.

As the amount of groundwater extracted for remediation purposes increases over time, the cumulative impact of these extractions will become more apparent. Integration of remedial action planning and water supply planning will be necessary if both remedial goals and water supply goals are to be achieved. Existing water supply conditions influence the feasibility of water use options that might be included as part of a remedial action. For example, low winter water demand could be a limiting factor when evaluating potable water use options. Current knowledge of the lateral and vertical extent of contamination could also be a limiting factor when evaluating the feasibility of water use options involving groundwater recharge.

Existing water supply conditions could also change as the population in Southern California increases and if the availability of imported water supplies decreases. The imported water supply from the Central Arizona Project will decrease, and the Bay Delta Hearings could result in less water being exported to the South. In partial

response to this situation of increasing water demand and potentially decreasing water supply, MWD has developed the SSSP to reduce the summer peak demand for MWD import water. This program is intended to increase groundwater recharge during the winter and groundwater extraction during the summer. This program may alter water management planning in the SFVB and, as a result, could influence remedial action planning. The potential effect of increasing recharge on groundwater flow and on the direction and velocity of contaminant migration will be especially important considerations.

In the short term, mechanisms are already in place to allow for the extraction of groundwater for remedial purposes. In the long term, however, the cumulative effect of extracting more and more water will present constraints. The technical, political, and economic considerations described in this report must be evaluated in more depth and addressed as basinwide remedial planning continues.

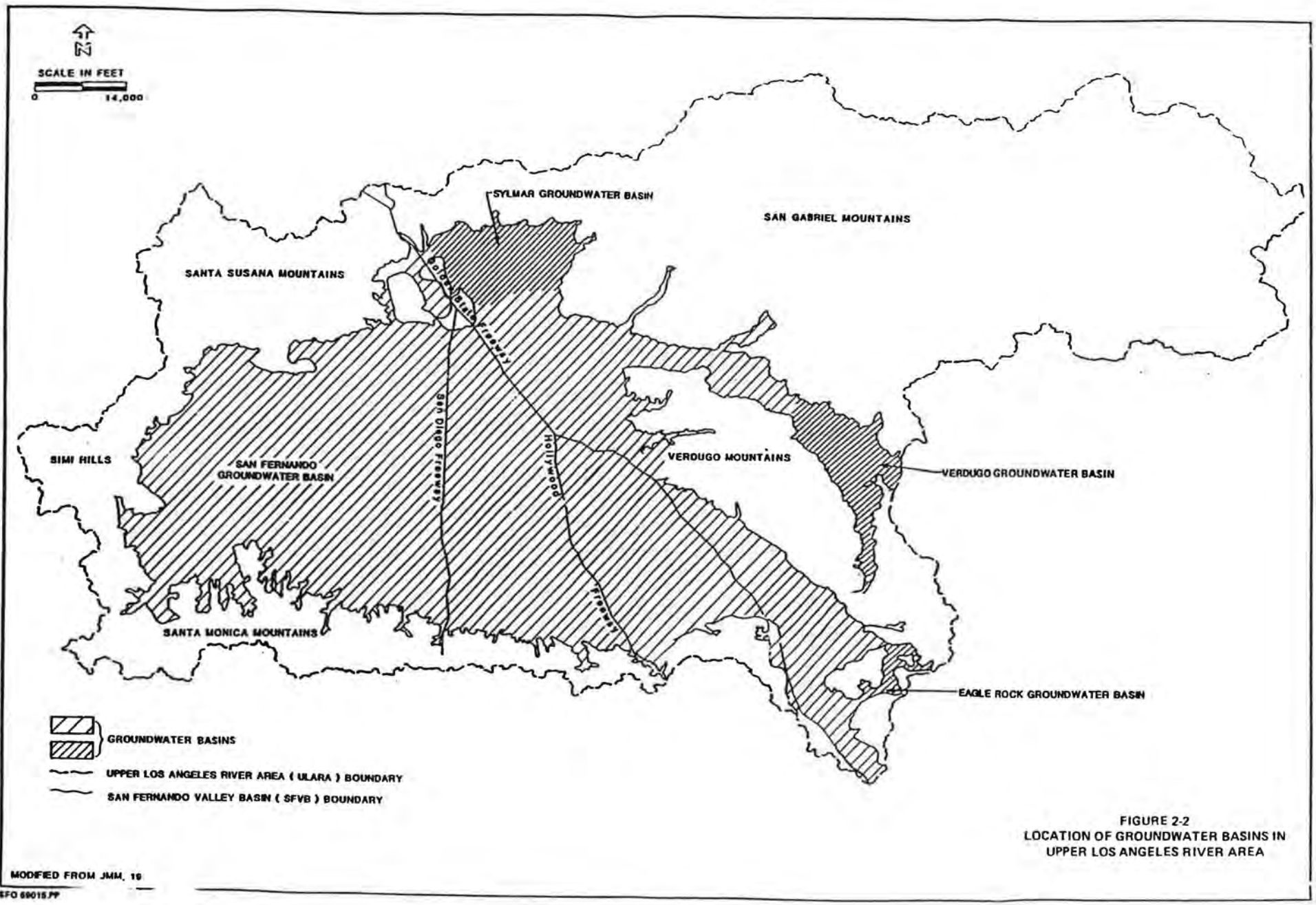


FIGURE 2-2
LOCATION OF GROUNDWATER BASINS IN
UPPER LOS ANGELES RIVER AREA

MODIFIED FROM JMM, 19

SFO 69015.PP

APPENDIX H

ULARA DEWATERING
AND
REMEDIATION PROJECTS

APPENDIX H

ULARA DEWATERING AND REMEDIATION PROJECTS

The following is a description of the columns in the list of projects.

NO. -- Refers to number in ULARA WATERMASTER notebooks that each project is filed under.

COMPANY NAME -- Name of the company that is involved in cleanup or dewatering.

CONTACT NAME -- Name of either the company or the individual that submitted the required report to the ULARA Watermaster.

ADDRESS -- Street address.

ID -- Refers to type of project:

D = Permanent dewatering required.
N = No dewatering required (depth to water table is deep).
P = No dewatering required now, but there is potential for dewatering in the future due to higher water levels.
R = Groundwater remediation site.

START -- Date at which project of cleanup or dewatering was brought to ULARA Watermaster.

ULARA DEWATERING AND REMEDIATION PROJECTS

NO.	COMPANY NAME	CONTACT NAME	ADDRESS	ID	START
01	DANALEX ENGINEERING CORPORATION	KRELL, ALEX	11239 VENTURA BLVD	P	
02	ELLIS PLUMBING CO	ELLIS, CHRIS	11110 CAMARILLO ST	N	
03	AMI BUILDERS	KAWA, AMI	11657 OXNARD ST	N	
04		HENKIN, DOUG	8806 ETIWANDA AVE	P	
05	DELTA TECH ENGINEERING INC	ABBASI, Z A	12800 VENTURA BLVD	P	
06	HELFMAN/HOFFMAN & ASSOCIATES	VARADI, IVAN	5550 TOPANGA CYN	D	19-Jun-89
07	ENCINO SPECTRUM PROJECT	HELFMAN/HALOOSSIM & ASS	15503 VENTURA BLVD	D	14-Jun-89
08	HOME SAVINGS OF AMERICA	ELI SILON & ASSOCIATES	13949 VENTURA BLVD	D	14-Jun-89
09	WARNER CENTER ENTERTAINMENT CMPLX	TSUCHIYAMA AND KAINO	5955 OWENSMOUTH AVE	D	26-Jun-89
10	WARNER CENTER PLAZA BUILDING NO 6	TSUCHIYAMA AND KAINO	21700 OXNARD ST	D	26-Jun-89
11	LAUREL CANYON APARTMENT PLAZA	STEELE PLUMBING	4500 LAUREL CYN BLV	N	
12	T VIOLES CONSTRUCTION COMPANY INC	VIOLE, TIM JR	15840 VENTURA BLVD	P	
13	MOBIL OIL	ALTON GEOSCIENCE INC	16461 VENTURA BLVD	R	11-May-89
14		ECCLESTON, C W	22020 CLARENDON ST	P	
15	THRIFTY OIL	DELTA TECH ENGR INC	18226 VENTURA BLVD	R	02-Feb-90
16		KUSHNER, HAROLD	15455 SAN FERNANDO MISSION BLV	N	
17		MARKS, RONALD	5348 TOPANGA CYN BLVD	P	
18		HALOOSIM, HALFMAN	21820 BURBANK BLVD	P	
19		CLARKE, ROBERT	6151 KESTER AVE	N	
20	CAL ENGINEERING	SERENA, HUGO	11000 MORRISON ST	N	
21	BRICE/DOWNING/ASSOCIATES	BRICE, KATHRYN	11470 CALIFA ST	N	
22		VASQUEZ, RODNEY	19019 VENTURA BLVD	N	
23	MAROKO AND ASSOCIATES		15531- SAN FERNANDO MISSION BLV	N	
24	ELLIS PLUMBING CO	ELLIS, CHRIS	5004 BAKMAN AVE	N	
25		FERNANDEZ, EDUARDO	15739 VENTURA BLVD	N	
26	ELLIS PLUMBING CO	ELLIS, CHRIS	5712 CAMELLIA AVE	N	
27	PARK HILL MEDICAL PLAZA	ANJOMSHOAA, MAHMOUD	7303 MEDICAL CENTER DR	D	27-Dec-89
28	DANALEX ENGINEERING		12050- VENTURA BLVD	P	
29	ELLIS CONSTRUCTION	ELLIS, WAYNE	10630 MOORPARK ST	N	
30	ELLIS PLUMBING CO	ELLIS, CHRIS	6034 FULTON AVE	N	
31	D & R PLUMBING		14284- DICKENS ST	N	
32	ELLIS PLUMBING CO	ELLIS, CHRIS	4235 MARY ELLEN AVE	P	
33	TARZANA OFFICE PLAZA	VARADI ENGINEERING	18701 BURBANK BLVD	P	
34	HELFMAN/HALOOSIM & ASSOCIATES	VARADI, IVAN	5350 WHITE OAK AVE	P	
35	CALIFORNIA ENVIRONMENTAL	BUCKLEY, CHARLIE	5455 VAN NUYS BLVD	R	04-Oct-89
36	FIRST FINANCIAL PLAZA	SLADE, RICHARD	16830 VENTURA BLVD	D	09-Oct-87
37	MORAN CONST/TRILLIUM	LEWIS, BILL	6310- CANOGA AVE	D	27-Apr-88
38	LAMCO	O'NEIL, JOHN	21300? VICTORY BLVD	D	27-Apr-88

ULARA DEWATERING AND REMEDIATION PROJECTS

NO.	COMPANY NAME	CONTACT NAME	ADDRESS	ID	START
39	LA REINA FASHION PLAZA	BLUMENFELD, DOLORES	14622 VENTURA BLVD	D	27-Apr-88
40	NORTHRIDGE FASHION CENTER-MAY CO	FRED FIEDLER & ASSCTS	9301 N TAMPA AVE	R	19-May-89
41	I K PLUMBING	KLINEMAN, GARY	11014 ACAMA ST	N	
42	ROCKWELL INTERNATIONAL	LAFFLAM, S R	6633 CANOGA PARK AVE	R	10-Jun-90
43	LOCKHEED AERONAUTICAL SYSTEMS CO	HELGERSON, R N	E EMPIRE AVE	R	05-Jan-89
44	3M RIKER LAB	LEE, M E	19901 NORDHOFF ST	R	08-Feb-89
45	MEPCO/CENTRALAB, INC (PHILLIPS)	SMITH, WADE	4561 COLORADO ST	R	14-Jul-87
46	ELLIS PLUMBING CO	ELLIS, CHRIS	11126 RIVERSIDE DR	N	
47	ELLIS PLUMBING CO	ELLIS, CHRIS	14904 HAMLIN ST	N	
48	ELLIS PLUMBING CO	ELLIS, CHRIS	10925 BLIX ST	N	
49	ELLIS PLUMBING CO	ELLIS, CHRIS	11050 RIVERSIDE DR	N	
50	ELLIS PLUMBING CO	ELLIS, CHRIS	10914 CAMARILLO ST	N	
51	VICTORY PLUMBING CO	O'TOOLE, DAVID	4227 TUJUNGA AVE	N	
52	AUTO STIEGLER	STIEGLER, JOHN	16721 VENTURA BLVD	D	31-Oct-90
53	RINALDI MEDICAL COMPLEX	SCULLY, BOB	14901 RINALDI ST	N	
54	VICTORY PLUMBING CO	O'TOOLE, DAVID	10629 WOODBRIDGE ST	N	
55	RLM CONSTRUCTION CO	MCBAIN, RICK	14100 DICKENS ST	N	
56	SHERWAY PROPERTIES	VASQUEZ, RODNEY	4477 WOODMAN AVE	P	
57	WILLIAMS PLUMBING CO	HAVIV, ABE	5127 KLUMP AVE	N	
58	MECHANICAL DESIGN SERVICE	DEUNAY, JOHN	4630 WOODLEY AVE	N	
59	ELLIS PLUMBING CO	ELLIS, CHRIS	19951 ROSCO BLVD	P	

APPENDIX I

FACT SHEET NO. 5

GROUNDWATER CLEANUP STUDIES

CONTINUE IN THE SAN FERNANDO VALLEY BASIN

Groundwater Cleanup Studies Continue in the San Fernando Valley Basin

United States Environmental Protection Agency, Region IX, San Francisco

Fact Sheet Number 5 **July 1990**

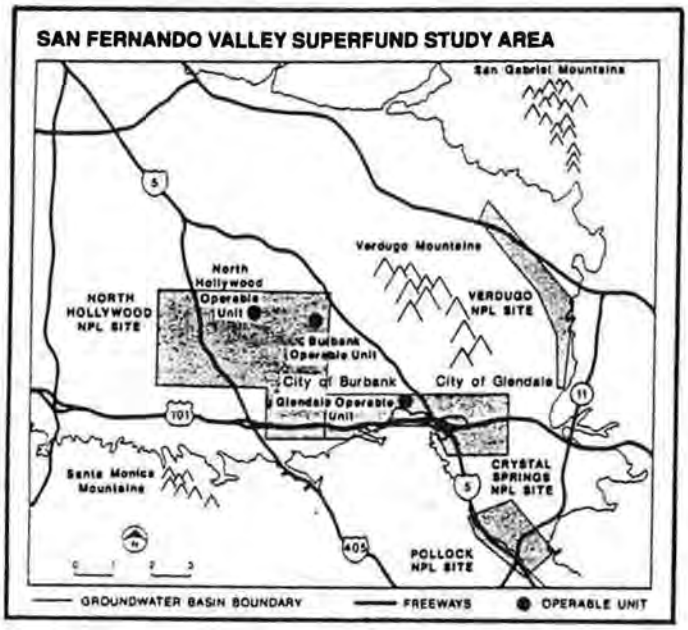


FIGURE 1

WHAT IS SUPERFUND?

Superfund is the common name used for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA). This federal law authorizes EPA to respond to releases or threatened releases of hazardous substances that may endanger public health and the environment.

INTRODUCTION

Federal, state and local agencies have been conducting investigations and cleanup of contaminated groundwater in the San Fernando Valley Basin since contamination was discovered in 1979.

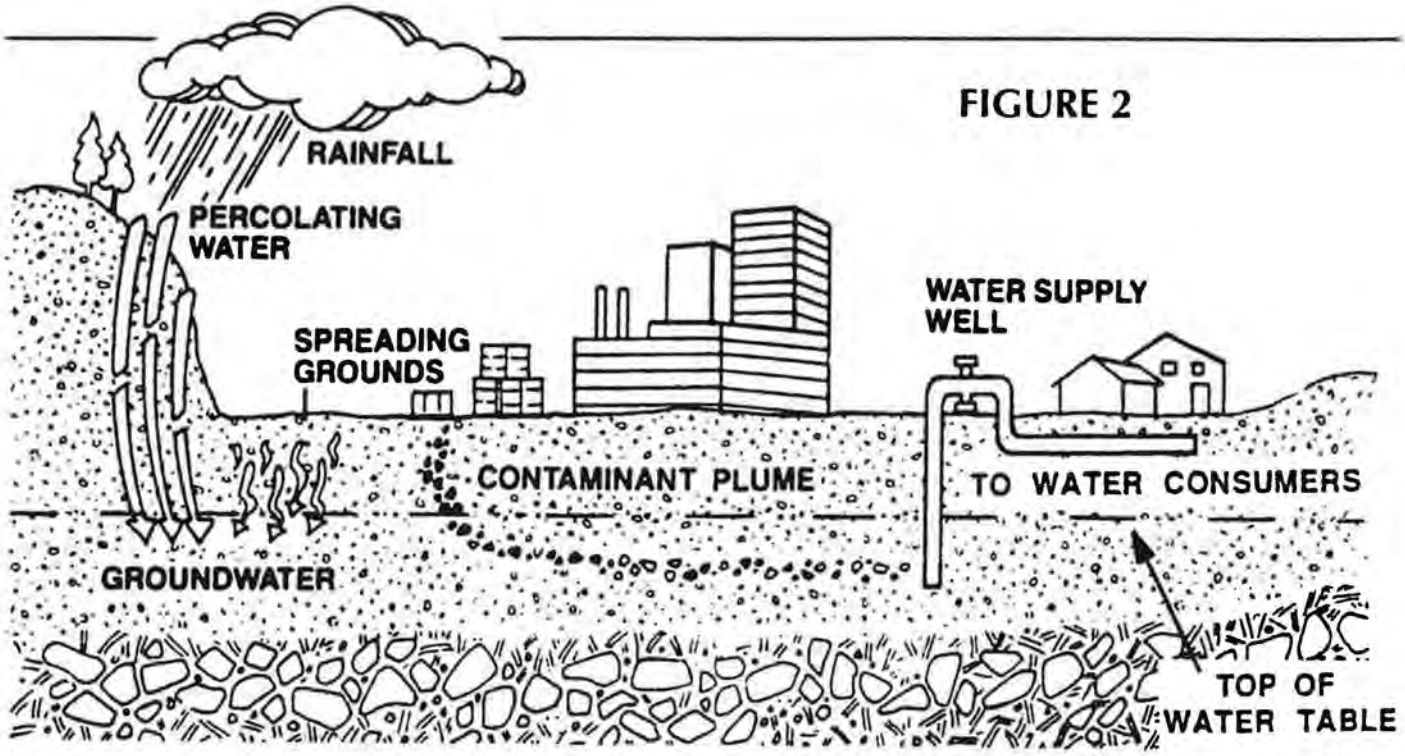
This document discusses recent and future studies and activities under the Environmental Protection Agency (EPA) Superfund program. These activities include measuring the extent of contamination, developing and implementing cleanup remedies, and making polluters pay for cleanup.

SITE BACKGROUND

The San Fernando Valley is located between the San Gabriel Mountains and the Santa Monica Mountains. Several groundwater basins in the valley are collectively referred to as the San Fernando Valley Basin. The basin is an important source of drinking water for the Los Angeles metropolitan area, La Crescenta, and the Cities of Glendale, Burbank, and San Fernando (Figure 1).

In 1986, EPA placed four sites in the San Fernando Valley Basin on the Superfund National Priorities List (NPL). The NPL is a list of the most seriously contaminated hazardous waste sites eligible for federal cleanup funds under the Superfund program. As shown on Figure 1, the four sites are North Hollywood, Crystal Springs, Verdugo and Pollock. The sites are located in the cities of Los Angeles, Burbank, and Glendale. Although specific groundwater cleanup actions are taking place at each site, EPA manages the entire San Fernando Valley Basin cleanup as one large site, referred to as the San Fernando Valley Study Area.

FIGURE 2



The primary contaminants found in the San Fernando Valley Groundwater Basin are industrial solvents. These solvents have found their way to the groundwater basin as a result of improper use, storage, and disposal practices.

CONTAMINANTS

The Superfund sites are areas where groundwater from wells has been found to contain volatile organic compounds (VOCs) above state and federal drinking water standards. Volatile organic compounds are chemicals that evaporate readily when exposed to air. Some VOCs have been shown to increase the rate of cancer in laboratory animals. Exposure to these chemicals may also increase the risk of cancer in humans. Volatile organic compounds have been and/or are being used in many San Fernando Valley industries, such as aeronautical, automotive, dry cleaning and metal plating. Figure 2 illustrates how groundwater becomes contaminated.

The Los Angeles Department of Water and Power (LADWP), California Department of Health Services (DHS), California Regional Water Quality Control Board (Regional Board), EPA, and local water agencies have taken steps to reduce human exposure to these chemicals. Many contaminated wells have been shut down and drinking water has been provided from alternate surface water sources such as the Owens River Aqueduct, the Colorado River Aqueduct, and the California Aqueduct. In some cases, groundwater is blended with surface water from other sources to meet drinking water standards.

Public drinking water in the San Fernando Valley Basin area is safe to drink. Drinking water is tested regularly before it is delivered to consumers.

BASINWIDE ACTIVITIES

Basinwide Investigations

EPA is overseeing the basinwide Remedial Investigation being conducted by LADWP, to study the groundwater flow patterns and the nature and extent of groundwater contamination within the eastern half of the San Fernando Valley Basin.

The Remedial Investigation has been divided into two phases. In phase one, LADWP has installed 43 shallow monitoring wells to obtain preliminary contamination information at the four NPL sites; 14 monitoring wells at the North Hollywood site; 11 wells at the Crystal Springs site; 11 wells at the Pollock site; and 7 wells at the Verdugo site. LADWP will also install 14 well clusters during 1990 to collect more detailed information by sampling groundwater at different depths. Based on the results of phase one, an additional 63 wells may be installed in phase two.

The data obtained from the remedial investigation and more than 60 private wells and existing

monitoring and production wells will be used to construct a computerized groundwater and contamination flow model. The data and model will help EPA select the most effective cleanup alternatives. Figure 3 shows the approximate location of VOC contamination above the maximum contaminant level (MCL) based on current data.

Basinwide Cleanup Plans

EPA is developing a Basinwide Plan to examine contamination cleanup methods, with the goal of minimizing public health risks and environmental impacts. The study uses available data from the Remedial Investigation to evaluate and compare cleanup alternatives. EPA is also evaluating the effectiveness of existing operable unit projects, such as the North Hollywood Treatment Facility (page 4) and considering whether or not other interim measures will be required. The Basinwide Plan will incorporate the basinwide technical needs, the operable units, and agency roles into a statement of long-range cleanup goals and methods.

Payment for Cleanup Activities

Enforcement is one of the most important Superfund activities. Enforcement efforts are underway in the basin to get polluters to pay for cleanup and to prevent further contamination.

EPA and the Regional Board are identifying potential sources of contamination and pursuing facility owners or operators that may be responsible for contaminating groundwater, regardless of when the contamination occurred. Potential sources include businesses, industries, or agencies that generate, transport, use, treat, store, or dispose of the hazardous substances. Hundreds of facilities in the Valley are possible sources.

The search for contamination sources includes, but is not limited to, site visits and review of historic aerial photographs and agency files. EPA requests information from industrial facilities about historic property use, industrial processes, and hazardous substance handling. EPA will also use groundwater data and modeling to help trace contamination to its source.

The Regional Board conducts investigations at individual facilities to determine if they have contamination. If contamination is found, the Regional Board will oversee cleanup activities at the site. EPA reviews the information gathered by the Regional Board and determines whether facility owners or operators are potentially responsible for the groundwater cleanup. If they are found to be a Potentially Responsible Party (PRP), EPA will negotiate an enforcement agreement with them. EPA encourages the PRPs to perform cleanups themselves whenever possible.

If a settlement is not reached, EPA has the authority to order PRPs to do the work with EPA oversight. If PRPs do not abide by the order, EPA may file suit against them. If EPA does the work, EPA can also file suit against the PRPs to recover the federal money spent on the site cleanup.

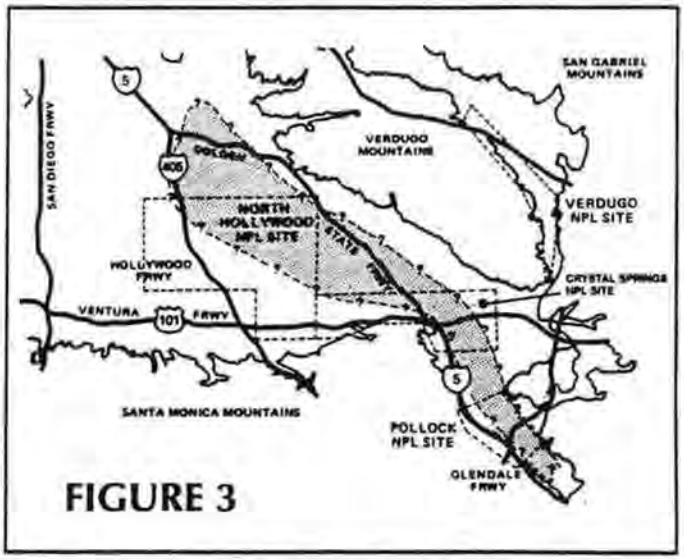


FIGURE 3

Shaded area shows approximate extent of VOC contamination above MCL based on current data.

We need your help identifying groundwater polluters

If you have information about groundwater contamination or potential sources of contamination that will be of value to the investigation, please call Chris Stubbs, EPA Remedial Project Manager, at (415) 744-1890.

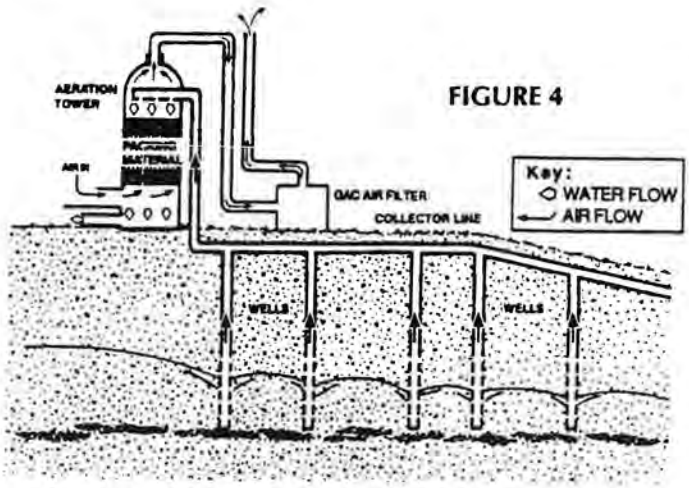


FIGURE 4

A typical aeration facility similar to the North Hollywood Extraction and Treatment Plant.

SITE SPECIFIC CLEANUP ACTIVITIES

EPA and LADWP are evaluating and constructing individual cleanup measures to address the most immediate contamination problems. These individual measures are called operable units. Operable units have been designated for North Hollywood and Burbank in the North Hollywood NPL site. An operable unit has been designated in Glendale in the Crystal Springs NPL site. The results of studies for each operable unit will be integrated into the long-term basinwide cleanup plan. The current status of each operable unit is described below.

North Hollywood Cleanup Plan

In September 1987, EPA signed a Record of Decision for the North Hollywood Operable Unit. The Record of Decision documents the selection for the preferred remedy at the operable unit. EPA and the State of California constructed a groundwater extraction and treatment facility to remove the highest concentrations of VOCs within a portion of the North Hollywood NPL site. Construction was completed in early 1989 and the facility began extracting and treating water in March 1989. EPA has paid for 90% of the construction and operation of the facility. The California Department of Health Services (DHS) funded the remaining 10% of the construction costs, and LADWP pays the remaining 10% of the operation costs. EPA pays 90% of the operation and maintenance costs for 10 years.

The facility is located at 11845 Vose St., near Lankershim Boulevard in the North Hollywood section of Los Angeles. Eight extraction wells pump the groundwater to the top of a 45 foot tower. As the water cascades through packing material in the tower, air is forced up through the water. As the water comes into contact with the air, the volatile organic compounds (VOCs) transfer into the air stream. The air stream is filtered through two tanks containing granular activated carbon (GAC), a specially treated material that attracts the contaminants. The treated air meets all federal and state air quality standards. Figure 4 shows a typical aeration facility similar to the North Hollywood Extraction and Treatment Plant.

The treated water is disinfected and flows through a pipeline to LADWP's North Hollywood Pumping Station for distribution to the public. The water meets state and federal drinking water standards. EPA intends to recover the costs from PRPs that were incurred during the investigation, construction and operation of the North Hollywood operable unit.

Status of San Fernando Superfund Activities

Remedial Investigation (Data Collection)	Feasibility Study (Analysis of Alternatives)	Proposed Plan	Record of Decision (Selection of Plan)	Design	Construction	Operation
North Hollywood Operable Unit						
Burbank Operable Unit						
Glendale Operable Unit						
Basinwide Plan						
Enforcement – Ongoing						

Burbank Cleanup Plan

In June 1989, EPA signed the Record of Decision for the Burbank Operable Unit, selecting a remedy similar to the one chosen for the North Hollywood Operable Unit. EPA has proposed locating the facility on City of Burbank property near the intersection of Hollywood Way and Victory Boulevard. During treatment system design, the final location will be chosen. Monitoring wells will also be installed to monitor the system and effect on groundwater movement and quality. Treated water will be delivered to Burbank's water supply system for distribution to the public and/or put back into the basin.

EPA is negotiating with PRPs in the Burbank area to reach an agreement in which the PRPs will pay for design, construction, and operation of the treatment facility and will reimburse EPA for the earlier Burbank area study and enforcement costs.

Glendale Cleanup Plan

High concentrations of VOCs have been found in groundwater in the Glendale area of the Crystal Springs NPL site. Glendale has closed most of its wells and is now receiving the majority of its drinking water from imported surface water. A Feasibility Study will be conducted for the Glendale operable unit to determine what cleanup measures may be appropriate to protect human health and the environment.

Groundwater testing is underway in Glendale to define the nature and extent of the contamination. LADWP will begin the Operable Unit Feasibility Study in late 1990 when data from the Remedial Investigation will be available. When the Glendale OUFS has been completed, EPA will request public comment on the proposed cleanup alternatives.

EPA is identifying potential sources of contamination in the Glendale area. As with the Burbank Operable Unit, EPA will negotiate with PRPs in the Glendale area to get them to pay for design, construction, and operation of the selected remedy and reimburse EPA for study costs.

GLOSSARY

AERATION FACILITY: A treatment system that removes volatile organic compounds from contaminated water by forcing air through the water. The volatile chemicals evaporate when exposed to the air.

ARARs (Applicable or Relevant and Appropriate Requirements): Remedial actions must comply with relevant and appropriate or applicable federal and state laws at Superfund Sites.

CONTAMINANT PLUME: A three-dimensional zone within the groundwater aquifer containing contaminants that generally move in the direction of, and with, groundwater flow.

GAC (Granular Activated Carbon): An adsorptive material that attracts and holds contaminants. GAC has been demonstrated to be especially effective due to its large adsorption surface area.

HAZARDOUS SUBSTANCE: Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.

MCL (Maximum Contaminant Levels): Enforceable standards that apply to public drinking water supplies.

MONITORING WELL: Wells drilled at specific locations for the purpose of determining direction of groundwater flow, types and concentrations of contaminants present, or vertical or horizontal extent of contamination.

NPL (National Priorities List): A list of the top-priority hazardous substance sites in the country that are eligible for investigation and cleanup under the federal Superfund program.

OPERABLE UNIT: A discrete action taken that contributes to the permanent site cleanup. A number of operable units can be conducted during the course of a Superfund project.

PERCOLATING WATER: Surface water that filters through the soil and eventually reaches the groundwater.

PRP (Potentially Responsible Party): An individual or company potentially responsible and therefore potentially liable for the cost of cleaning up contamination at a Superfund site.

PRODUCTION WELL: A well that pumps water out of the ground to provide a municipal, agricultural, or industrial water supply.

ROD (Record of Decision): A public document that explains what cleanup alternative will be used at a specific NPL site. The ROD is based on information and technical analysis generated during the remedial investigation/feasibility study and consideration of public comments and community concerns.

VOC (Volatile Organic Compound): An organic (carbon containing) compound that evaporates readily at room temperature. VOCs are commonly used in dry cleaning, metal plating and machinery degreasing.

FOR MORE INFORMATION

Questions, comments, or concerns about the San Fernando Superfund Project can be addressed to:

Fraser Felter
Community Relations Coordinator
U.S. EPA
1235 Mission St. (H-1-1)
San Francisco, CA 94103

Alisa Greene
Remedial Project Manager
U.S. EPA
1235 Mission St. (H-6-4)
San Francisco, CA 94103

EPA's Superfund Toll-Free Message Line: 1-800 231-3075. Please leave your name and number for Fraser Felter and your call will be returned.

Copies of general introductory material, previous fact sheets, and Superfund documents are available at the following information repositories:

California State University Northridge Library
18111 Nordhoff St.
Northridge, CA 91330
(818) 885-2285
Contact: Mary Finley

The University Research Library/U.C.L.A.
Public Affairs Service
405 Hilgard Ave.
Los Angeles, CA 90024
(213) 825-3135
Contact: Barbara Silvernail

L.A.D.W.P. Library
111 North Hope St., Room 518
Los Angeles, CA 90012
(213) 481-4612
Contact: Joyce Purcell

City of Glendale Public Library
222 East Harvard St.
Glendale, CA 91205
(818) 956-2027
Contact: Lois Brown

City of Burbank Public Library
110 North Glenoaks Blvd.
Burbank, CA 91502
(818) 953-9741
Contact: Helen Wang

AGENCY COORDINATION

Due to the size and complexity of the San Fernando Superfund project, many agencies must work together to clean up the groundwater contamination and protect human health and the environment. These agencies are briefly described below:

EPA – The U.S. Environmental Protection Agency (EPA) has overall responsibility for cleanup and enforcement efforts at the San Fernando Valley Superfund sites. EPA provides review and oversight for the Remedial Investigation and Operable Unit Feasibility Studies. EPA also conducts cleanup, enforcement, and community relations activities and is the primary funding agency. EPA has delegated additional tasks to other agencies.

LADWP – The Los Angeles Department of Water and Power (LADWP) has overall responsibility for water supply in the City of Los Angeles. As part of this role, LADWP is required to provide water to its customers that meets state and federal drinking water standards.

In 1987, EPA signed a cooperative agreement with LADWP which provided LADWP with federal funds to conduct the basinwide Remedial Investigation, to construct the North Hollywood treatment facility, and to conduct the Burbank and Glendale Operable Unit Feasibility Studies. EPA has also signed a cooperative agreement with the Regional Board to assist in identifying sources of contamination and PRPs.

Regional Board – The Los Angeles Regional Water Quality Control Board is one of several agencies responsible for the protection of surface and groundwater for the State of California. The Regional Board investigates facilities which use, store, or handle chemicals and when contamination is found, requires site cleanup. Through a cooperative agreement with EPA, the Regional Board has been provided additional funds to investigate potential sources of groundwater contamination and when required, orders site specific source cleanup in the San Fernando Valley.

Department of Health Services (DHS) – The Department of Health Services (DHS) is the state agency responsible for protecting the health and welfare of California residents. DHS, through its Office of Drinking Water, requires regular testing of drinking water and has established state standards for more than 50 potential contaminants. Drinking water suppliers that service five or more connections (approximately 15 people) must meet the standards. Through its Toxic Substances Control Program, DHS also enforces state hazardous waste cleanup requirements.

Burbank and Glendale – The Cities of Burbank and Glendale each provide drinking water to their residents through local municipal utilities. As water providers, each city must test water regularly and ensure that water supplies meet federal and state standards. Both cities have been closely involved in the Superfund studies.

ULARA Watermaster – The Upper Los Angeles River Area Watermaster is appointed by the Los Angeles Superior Court and is responsible for ensuring compliance with the Superior Court Judgement of 1979, which defines water rights in the San Fernando Valley Basin. The Watermaster oversees and documents all actions that affect groundwater supply in the basin such as yearly rainfall, import and export of water to other areas, pumping of groundwater for both water supply and cleanup purposes.

COMMUNITY WORK GROUP

The Community Work Group (CWG) was established in 1987 by EPA and LADWP to provide a forum for representatives from San Fernando Valley community groups, public interest organizations, local businesses, and government agencies to discuss the Superfund project. The CWG has been meeting regularly to hear presentations and progress reports from EPA and LADWP. Members have reviewed and commented on the investigations and cleanup alternatives. To improve distribution of project information, CWG members have provided Superfund status reports to their organizations.

EPA and LADWP would like to introduce six current and former Community Work Group members:

David Brooks lives in Glendale and works for the Crescenta Valley County Water District as Secretary to the Board and District Auditor. He has been interested in water quality for many years and sees the CWG as a way to keep informed about progress of the groundwater cleanup. He notes that most people are interested in health and need to receive more information about the water supply system and regulations that govern drinking water.

Barbara Fine is Vice President of the Federation of Hillside and Canyon Associations. She is a professional journalist and is currently a student at U.C.L.A. She is also a member of the City of Los Angeles Solid Waste Citizens Advisory Group. Barbara became interested in water quality when she learned that stormwater from overloaded drains carried pollutants which were seeping into the San Fernando Valley groundwater. She feels that too few people are aware of the source of their drinking water and that groundwater cleanup is important to everyone.

Ingrid Markul serves as the Air and Water Consultant to the League of Women Voters. Ingrid is a retired science teacher living in West Los Angeles. She has always had an interest in environmental issues and joined the CWG to learn more about groundwater contamination and cleanup. She enjoys relaying the technical information to the League and feels that awareness of the Superfund site has improved. She recently organized a successful symposium for community members on drinking water issues.

Mike Nolan is a Director of the Metropolitan Water District and represents the City of Burbank on the CWG. He participates in the CWG to keep current on groundwater cleanup and regularly presents information to the Burbank City Council. After getting involved in the CWG, Mike realized the group could encourage steady progress in the cleanup process. He feels that in spite of differing opinions on many issues, members of the CWG have learned from one another and have maintained a focus on the groundwater contamination problem and how it affects their communities.

Patty Prickett represents California Advocates for Pure Water. When asked why she was interested in the Community Work Group, Patty replied, "As a mother, it's hard not to be interested in drinking water!" Since learning about water quality as a researcher for a city councilperson, she has educated others and encouraged them to influence water quality policy. She feels it is important to monitor EPA and LADWP cleanup activities through the Community Work Group.

Jim Wilson is retired and lives in Los Angeles. He attends meetings as a representative of the Council of Community Clubs in Los Angeles, a community improvement organization. He sees the cleanup of contaminated groundwater as a way to improve the quality of life for people in his community, and he joined the CWG to find out what is being done to improve water quality.

OPPORTUNITIES FOR COMMUNITY INVOLVEMENT

EPA welcomes questions and comments from you. Comments can be directed to the EPA representatives listed on page 6. The public is encouraged to attend Community Work Group meetings. Contact Bob Haw, LADWP, at (213) 482-7295 (M-Th, 7:00-4:00) for additional information.

EPA also holds public meetings to receive comments before deciding on cleanup actions. Individuals returning the enclosed mailing list coupon will be sent notices of future public meetings and activities.