July 13, 2012

The attached copy of the Groundwater Quality Management Plan – San Fernando Basins is noted as a draft, but is the same as the final version. This is the only version BWP has on file; a copy of the final adopted plan has been requested from the ULARA Watermaster, however, the copy was not received in time to submit with the application.

The final, adopted version can be submitted to DWR once it is received and/or upon request of DWR.

Sincerely,

Albert Lopez
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PRELIMINARY
DRAFT

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GROUNDWATER QUALITY MANAGEMENT PLAN

SAN FERNANDO VALLEY BASIN

Prepared by

Water Quality Division

Staff

Water System

Department of Water and Power

City of Los Angeles, California

MARCH 1983

This plan was prepared by the Los Angeles Department of Water and Power under a cooperative agreement with the Southern California Association of Governments and was financed in part through Planning Grants #P009325020 and #P009208012 from the United States Environmental Protection Agency, under the provisions of Section 208 of the Federal Water Pollution Control Act of 1972, as amended.

PREFACE

This report is the Groundwater Quality Management Plan for the San Fernando Valley Basin. As such, this report will be used to draft an amendment to the 208 Areawide Waste Treatment Management Plan for the South Coast Planning Area. The recommendations in this report will assist in the development strategies designed to protect the quality of the basin and to ensure the continued availability of safe drinking water.

This report was prepared in partial fulfillment of Cooperative Agreement No. 10590 between the Department of Water and Power (DWP) and the Southern California Association of Governments (SCAG). The study was initiated in July 1981 and funded in part by a grant of $375,000 from the EPA. The study was administered by SCAG and engineering services were performed by the DWP pursuant to a detailed work plan.

To incorporate the input and comments of private citizens, concerned interest groups and affected agencies, a Citizens' Advisory Committee and a Technical Advisory Committee were formed. The Citizens' Advisory Committee was composed of representatives from local governments, public interest groups, economic interest groups and private citizens. The Technical Advisory Committee was composed of representatives from city, county and state agencies that have key roles in the water industry. In addition, a public participation program was conducted that included a public meeting and public speaking engagements before service groups and organizations within the study area. The goal of the public participation program was to disseminate pertinent information and to obtain public support and input to the study.

ACKNOWLEDGMENTS

The formulation of the Groundwater Quality Management Plan for the San Fernando Valley Basin has required the intense effort of numerous organizations and individuals. A special expression of gratitude is extended to the following organizations that made contributions toward the formulation of this plan. The names of individuals are listed in Appendix A of this report

Citizens' Advisory Committee

Technical Advisory Committee

Southern California Association of Governments

Department of Water and Power Staff

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EXECUTIVE SUMMARY

In early 1980, the industrial chemicals trichloroethylene (TCE) and, perchloroethylene (PCE) were discovered in the groundwater of the San Fernando Valley Basin (SFVB). These chemicals were detected at concentrations in excess of levels recommended for drinking water by the State Department of Health Services (DOHS), in approximately one-fourth of the groundwater wells tested in the SFVB.

In response to these findings, the Los Angeles Department of Water and Power, and the Southern California Association of Governments (SCAG) received EPA Funds Under the 208 Grant Program to embark upon a two-year study which began in July 1981. The scope of the study was to determine the extent and severity of the contamination and to develop strategies to control the groundwater contamination problem. The specific objective of the study was the development of a groundwater management plan to ensure the future protection and safe use of the groundwater basin which serves the Cities of Los Angeles, Burbank, Glendale and San Fernando.

The investigation of possible sources of groundwater contamination included: (1) commercial and industrial establishments; (2) accidental spills and unintentional releases of hazardous materials; (3) dry weather drainage; (4) landfills; and (5) other commercial waste sources which included private disposal systems, sewer lines and permitted industrial waste discharges. Extensive investigation to determine the origin of the problem was not pursued because of budgetary and scheduling constraints. However, the presence or use of the industrial contaminants was associated with each of the possible sources investigated. Due to their exhibited potential for groundwater contamination, those sources, within

the sensitive groundwater areas surrounding the well fields where soil permeabilities and groundwater velocities were relatively high, were of special concern.

Although no distinction could be made between past and current groundwater contamination, the findings of the study indicated that most of the contamination currently reaching the wells was probably caused by past disposal practices before hazardous materials classifications and regulations became established. The only practical way to protect the groundwater is to take all reasonable steps to prevent contaminants from entering the groundwater basin. Remedial action to protect the sensitive groundwater areas from additional contamination is the most immediate concern since the groundwater basin is a vital source of water supply for the Cities of Los Angeles, Burbank, Glendale and San Fernando.

The recommendations of the study, presented in the following table, are based on a twofold approach for the control of groundwater contamination in the SFVB. The first part involves the prevention of future contamination of the groundwater basin. These recommendations provide for a comprehensive management plan for the handling, storage and disposal of hazardous materials. The second part involves remedial action to deal with the current contamination problem and recommends engineering strategies to allow full use of the groundwater for drinking. In addition, the table indicates, for each recommendation, the responsible implementing agencies or departments within each City's jurisdiction. Details on specific actions necessary for the implementation of each recommendation, as well as on possible funding sources, are discussed in the report.

GROUNDWATER QUALITY MANAGEMENT PLAN

A. Recommendations for the Prevention of Future Contamination of the Groundwater Basin	Proposed Implementing Agencies
1. Public Education Program	Water Departments, Industrial Waste-Sanitation Departments, State and County DOHS
2. Regulation of Private Disposal Systems	Industrial Waste-Sanitation Departments, Engineering Departments, Building Departments
3. Augmented Enforcement	State and County DOHS, Industrial Waste-Sanitation Departments
4. Regulation of Storage Tanks, Sumps and Pipelines	Regional Water Quality Control Board, State and County DOHS, Fire Departments, Building Departments
5. Small-Quantity Hazardous Waste Disposal Program	SCAG, Sanitation Departments

6. Regulation of Landfills	Regional Water Quality Control Board, Sanitation Departments

B. <u>Recommendations for the Control of In Situ Contaminants</u>	<u>Proposed Implementing Agencies</u>
7. Groundwater Monitoring Program	Water Departments
8. Aquifer Management and Groundwater Treatment Program	Water Departments

SECTION 1

INTRODUCTION

Groundwater reserves are an important source of drinking water in Southern California. The need to protect and manage the quality of this vital resource is critical in this area where approximately 60% of supplies are of groundwater origin. Indeed, for many communities, groundwater may represent the sole source of drinking water.

In addition to supplying regular annual water needs, groundwater basins hold large quantities of stored water which can be drawn upon in dry years and replenished in wet years.

The use of groundwater resources will become even more important in Southern California because of the expected loss of imported surface water supplies. With the completion of the Central Arizona Project in 1986, California will lose over half of its supply from the Colorado River Aqueduct. The State Water Project was expected to compensate for the loss of Colorado River water. However, because Delta transfer facilities have not been approved, the State project can deliver only half of the water for which it is obligated. If approved, construction of Delta transfer facilities will require some 10 years.

In Los Angeles, litigation over water rights in the Mono Basin and Owens Valley threaten loss of part of the supply delivered by the Los Angeles Aqueducts. The combined effects of these losses could be quite severe during an extended drought.

Background

The San Fernando Valley Groundwater Basin is a natural underground reservoir that represents an important water resource for the Los Angeles Metropolitan area. Groundwater extractions from the basin figure prominently as a source of both normal and alternative water supply to the Cities of Los Angeles, Burbank, Glendale, San Fernando and to the unincorporated La Crescenta area of the County of Los Angeles.

Extractions from the basin, as governed by the groundwater rights adjudication, typically supply about 15 percent of Los Angeles' water needs. Groundwater also supplies about half of the current needs for the La Crescenta area and nearly all of the water needs for the City of San Fernando. The Cities of Glendale and Burbank currently store groundwater in the basin as an alternative supply to water purchased from the Metropolitan Water District of Southern California (MWD). A conservative estimate of the replacement value of SFVB groundwater is on the order of $15 million per year.

With a usable groundwater storage capacity estimated at approximately one million acre-feet, the SFVB is a source of water supply and the proper management of this basin is essential to the Los Angeles Metropolitan areas. For this reason, water quality management is of vital concern in ensuring the continued use and protection of this valuable resource.

History of Groundwater Contamination Problem

In late 1979, the California State Department of Health Services (DOHS) requested that all major water purveyors test for the presence of certain industrial chemicals in well water supply as part of a nationwide groundwater quality surveillance effort.

These initial tests showed that trichloroethylene (TCE), perchloroethylene (PCE), and to a lesser extent, some other chemicals were present at low concentrations in several wells in the SFVB. As a result of these initial tests, some wells were taken out of service and others were blended with clean supplies from other sources to lower the contaminant levels. Close monitoring assures that only water that meets the recommended quality guidelines of the State DOHS is delivered to the customer for consumption.

Groundwater Quality Management Study

In response to these findings, the LADWP, through a cooperative agreement with the Southern California Association of Governments (SCAG), applied to the California Water Resources Control Board for EPA funding under the 208 Grant program to develop a regional Groundwater Quality Management Plan. Other participating Cities include Glendale, San Fernando and Burbank.

Funds were received and work began in July of 1981. The major objectives of the two year study were:

1. To define and describe the extent and severity of present groundwater contamination in the SFVB,

2. To investigate and examine information relative to potential sources or causes of the contamination,

3. To develop and evaluate engineering and regulatory strategies for controlling the contamination problem, and

4. To recommend specific programs or actions deemed necessary for the protection and safe use of the basin, including proposed implementation and funding alternatives.

Activities of the study included field investigations, industrial site surveys, records and archives searches, literature reviews, etc. In addition, two Advisory Committees were formed to assist with both technical and public input during the development of the study. Appendix B summarizes each activity performed during the course of the study.

SECTION 2

OVERVIEW OF THE STUDY

2.0 Introduction

The following is a brief overview of the findings and conclusions of the investigation of existing groundwater contamination by hazardous industrial chemicals in the SFVB. More detailed information concerning the specific activities of the study may be found in Appendix B, Summary of Subtask Investigations.

2.1 Description of the Study Area

2.1.1 San Fernando Valley Basin

The San Fernando Valley Basin (SFVB) is encompassed within an area known as the Upper Los Angeles River Area (ULARA) which consists of the entire watershed of the Los Angeles River (LAR) and its several tributaries above a point along the LAR near the junction of the LAR and the Arroyo Seco (Flood Control Channel). The ULARA is comprised of a total of 328,500 acres, of which 122,800 acres are alluvial valley fill deposits and 205,700 acres are hills and mountains. The area is bounded on the north and northwest by the Santa Susana Mountains, on the northeast by the San Gabriel Mountains, on the east by the San Rafael Hills, on the west by the Simi Hills, and on the south by the Santa Monica Mountains. (Figure 1)

The 122,800 acres of valley fill encompass four distinct groundwater basins which are separated by natural restrictions to groundwater flow. These basins are replenished by a combination of local and imported surface recharge waters and subsurface inflow. The four groundwater basins are the

UPPER LOS ANGELES RIVER AREA
GROUNDWATER BASINS

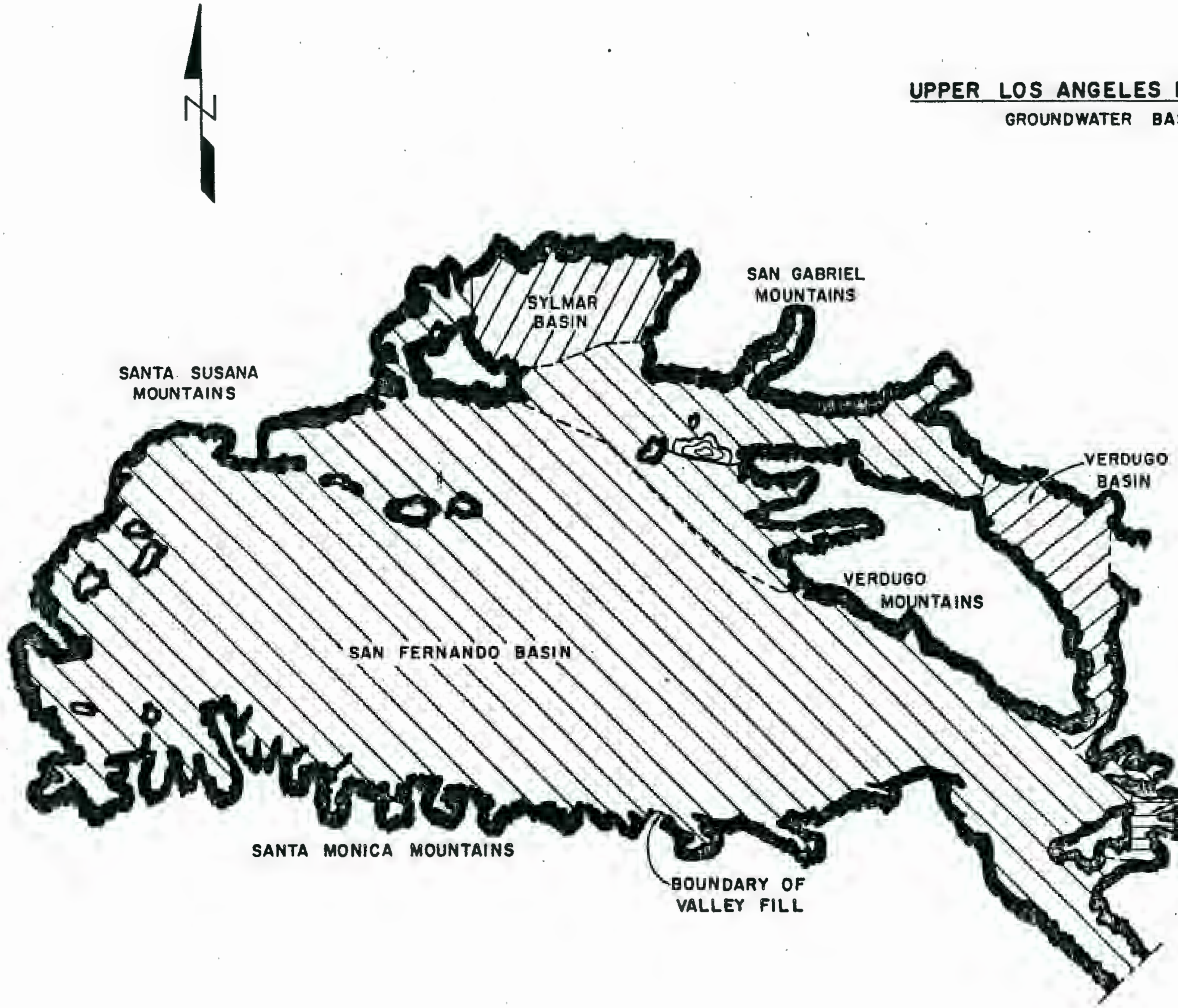


FIGURE 1

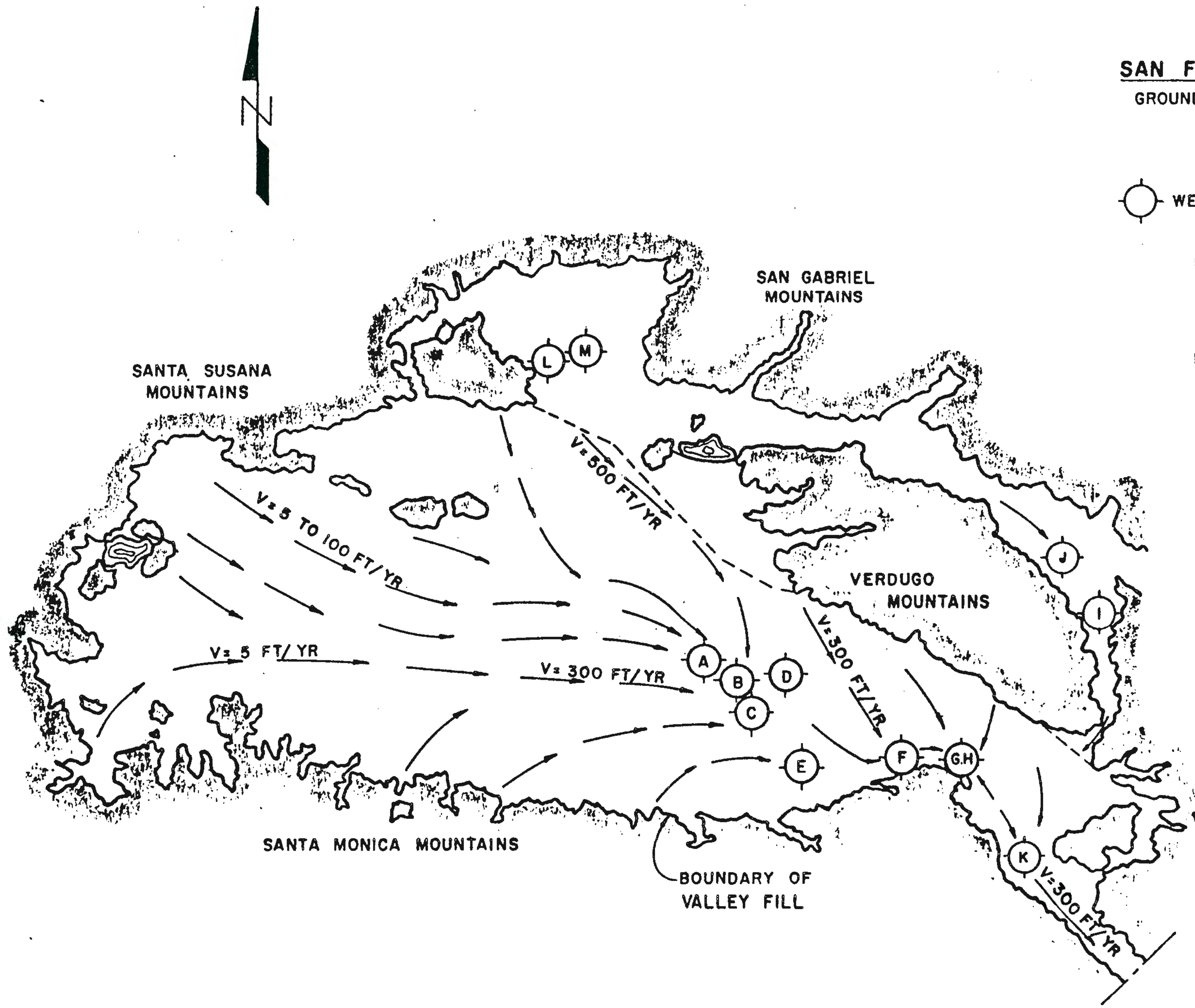
San Fernando, Sylmar, Verdugo and Eagle Rock Basins (Figure 1). The San Fernando Basin is by far the largest and most important, consisting of 112,000 acres, or 91.2 percent of the total valley fill, and holding an estimated 3,200,000 acre-feet of groundwater. For the purpose of this report any reference to the SFVB will include all four basins with particular emphasis on the San Fernando Basin.

2.1.2 Groundwater Conditions

Groundwaters in the San Fernando Valley occur in the alluvial deposits which comprise the valley fill areas. The distribution of these deposits has resulted in a general east west division in groundwater conditions. This division is demonstrated, roughly, in the Soil Infiltration Map for the SFVB (Plate 1). This map shows the general distribution of relative infiltration capacities as they vary from low to high across the valley floor. These surface infiltration capacities are also generally indicative of the relative rates of percolation and the soil permeability across the SFVB.

The alluvial deposits in the eastern portion of the SFVB are comprised primarily of sands and gravels with some localized lenses of silts and clays interbedded. Conditions in the eastern portion of the SFVB are therefore characterized by high permeability and good water yields. Groundwater is generally unconfined with a depth to water table of 100 to 200 feet. The presence of intermittent clay lenses partially restricts the vertical movement of groundwater.

The western portion of the basin, on the other hand, consists of finer sediments and clays exhibiting low permeability and low water yields. Groundwater generally is confined or partially confined, and rising water or artesian



SAN FERNANDO BASIN

GROUNDWATER FLOW 1980

LEGEND

WELL FIELDS

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

FIGURE 2

flow, is not uncommon in this area. Groundwater in the western portion also contains higher Total Dissolved Solids (TDS) and nitrate concentrations than waters in the eastern portion.

The general direction of groundwater flow in the SFVB is southeasterly from the recharge areas on the alluvial fans along the edges of the valley fill toward the discharge area within the Los Angeles River Narrows (Plate 2). Figure 2 shows groundwater flow directions and the variations in apparent groundwater flow velocities over the eastern and western portions of the basin.

Due to the dense grouping of wells in certain areas, extensive pumping of groundwater has resulted in the formation of several large cones of depression in the water table. These cones of depression cause major changes in the natural groundwater flow patterns and generally persist throughout the year despite the highly seasonal variation in pumping activities. One such cone of depression in the North Hollywood Well Field is illustrated by the groundwater contours shown on Plate 4. Similar cones of depression have also developed in the Crystal Springs and Grandview Well Fields, and the Pollock Well Field. The locations of these Well Fields are shown on Figure 2.

2.1.3 <u>Groundwater Use</u>

Because of the favorable geohydrologic conditions in the eastern portion of the SFVB, extensive development of producing well fields has occurred there. Between the mid 1940's and the late 1960's, excessive groundwater extractions resulted in significant lowering of water tables over the eastern portion of the basin, with an accompanying influx of higher TDS groundwaters from the western portion.

The total allowable groundwater extraction rights for the SFVB were determined through a protracted court case involving the City of Los Angeles. In 1955, water rights in the SFVB were challenged in what was to become a litigation lasting over 20 years. In 1975, the Pueblo Water Rights of the City of Los Angeles were upheld by Supreme Court decision. The City of Los Angeles retained rights to almost all of the native groundwaters. Rights to extract imported return waters were apportioned among all cities. In addition, all of the cities have rights to store water in the SFVB and to extract equivalent amounts.

Currently, the total annual extraction right to groundwater in the SFVB amounts to more than 100,000 acre-feet with accumulated water storage credits totaling more than 150,000 acre-feet for future use. The total usable storage capacity for groundwater in the SFVB has been estimated to be approximately one million acre-feet.

2.2 Extent and Severity of Problem

2.2.1 Groundwater Quality Testing Program

The groundwater quality testing program was designed to more accurately define both the extent and severity of contamination by Volatile Organic Compounds (VOC's) in the SFVB. Samples from production and monitoring wells throughout the SFVB were analyzed for the presence of these organic contaminants. Complete Gas Chromatograph-Mass Spectrometer (GC-MS) scans allowed detection of up to 36 possible VOC's. GC-MS scans were performed on over 60 samples taken from 45 wells.

Gas Chromatograph (GC) analysis was used to more accurately quantify the concentrations of individual contaminants in the groundwater. Over 600 analyses for TCE and PCE were performed on samples from 135 wells. This information was used to better define the temporal and areal distribution of these hazardous chemicals in the SFVB.

2.2.2 Results

Following is a brief description of the results of the water quality investigations.

2.2.2.1 Types of Contaminants Present

Results of the GC-MS survey indicated that the major contamination problem is primarily from TCE. PCE was also present in many samples but to a much lesser extent than TCE. These two compounds were found with greater frequency and at higher concentrations than any other contaminants. While other VOC's were present in some samples, they were detected at concentrations considered well below action levels recommended by the State DOHS.

2.2.2.2 Contaminant Concentrations

Follow up investigations with GC analysis were conducted through January 1983 to better define the concentration and distribution of both TCE and PCE. One important finding was that the concentration of these compounds varied considerably from well to well and over time within each well. Concentrations were shown to vary widely in a single well over periods of months, weeks and even hours. For this reason it was difficult to assign much meaning to the concentrations reported except as an average or statistical indication of the overall level of contamination in the basin. Tables 1 and 2 summarize the maximum concentrations of TCE and PCE found in production wells throughout the SFVB.

TCE was found in 42 municipal production wells at concentrations exceeding the State DOHS recommended Action Level of 5 ppb. Average concentrations in most of these wells generally ranged from 5 to 50 ppb. However, maximum concentrations of as high as 200 to 500 ppb were found in some wells.

PCE was found at concentrations greater than the recommended Action Level of 4 ppb in 17 wells. Average concentrations generally ranged from 4 to 50 ppb with maximum levels as high as 130 ppb occurring in a small number of wells.

2.2.2.3 Contaminant Distribution

The sampling survey showed that contamination was present in four groundwater collection systems in the SFVB. These

TABLE 1

SAN FERNANDO VALLEY WELLS

STATUS OF TCE CONTAMINATION

Well Group	Total No. Wells In Group	Total No. Wells Above Action Limit for TCE of 5 ppb	No. Wells Containing TCE Between 5 and 50 ppb	No. Wells Containing TCE Greater Than 50 ppb
LADWP Wells				
North Hollywood	35	17	9	8
Erwin	7	1	1	0
Whitnall	10	4	2	2
Verdugo	7	1	1	0
Headworks	6	6	2	4
Crystal Springs	3	3	3	0
Pollock	2	2	2	0
Mission	3	0	0	0
(Sub Total)	73	34	20	14
Glendale Wells				
Grandview	8	4	4	0
Glorietta	3	0	0	0
(Sub Total)	11	4	4	0
Burbank Wells	10	4	3	1
San Fernando Wells	5	0	0	0
Crescenta Valley County Water District Wells	10	0	0	0
TOTAL	109	42	27	15

Note: The ranking of wells in the above tables indicates that at some time between January 1980 and January 1983, the individual well analysis has attained the indicated level.

TABLE 2

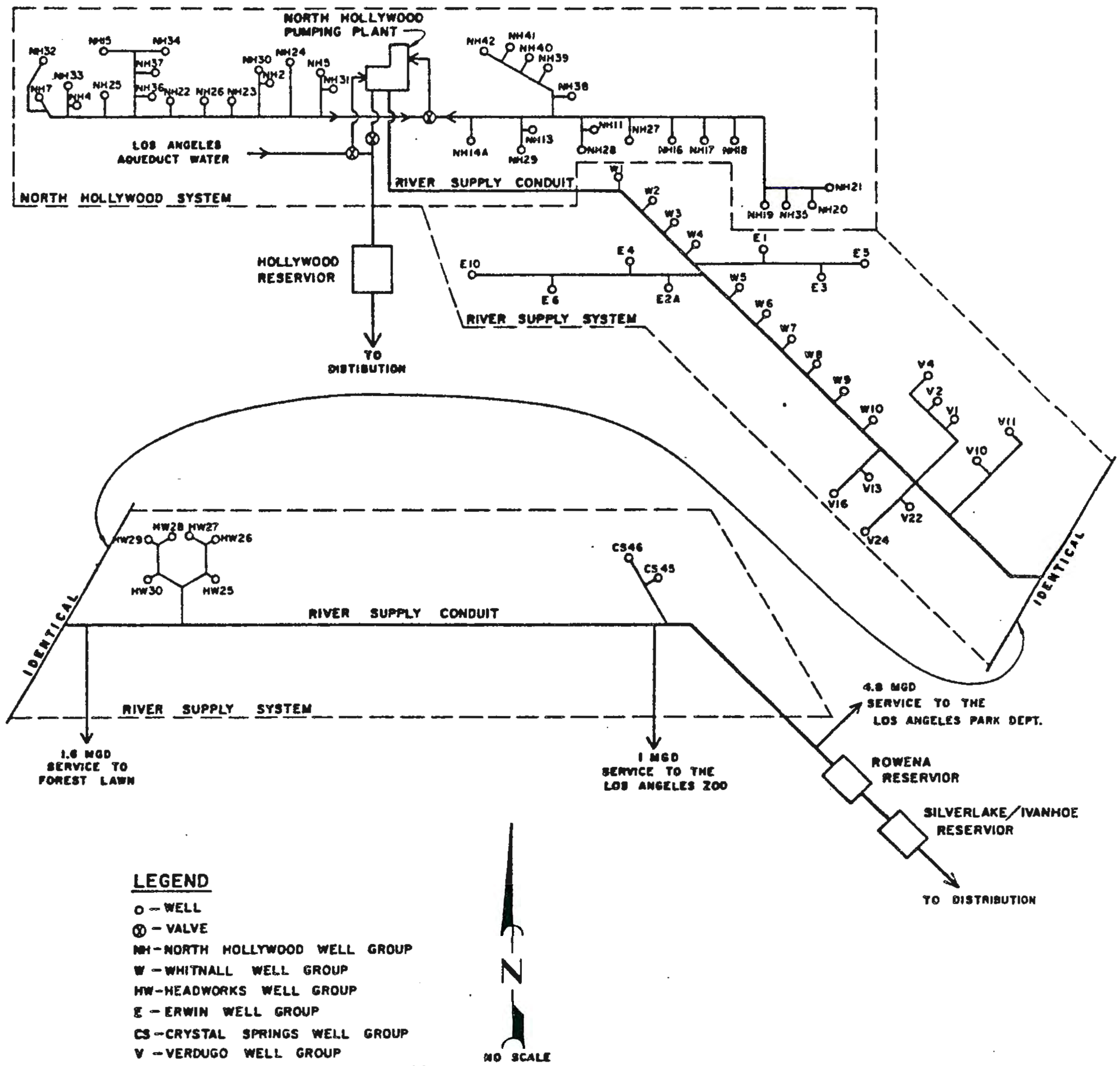
SAN FERNANDO VALLEY WELLS

STATUS OF PCE CONTAMINATION

Well Group	Total No. Wells In Group	Total No. Wells Above Action Limit for PCE of 4 ppb	No. Wells Containing PCE Between 4 and 50 ppb	No. Wells Containing PCE Greater Than 50 ppb
LADWP Wells				
North Hollywood	35	4	4	0
Erwin	7	1	1	0
Whitnall	10	2	2	0
Verdugo	7	0	0	0
Headworks	6	0	0	0
Crystal Springs	3	0	0	0
Pollock	2	2	2	0
Mission	3	0	0	0
(Sub Total)	73	9	9	0
Glendale Wells				
Grandview	8	0	0	0
Glorietta	3	1	1	0
(Sub Total)	11	1	1	0
Burbank Wells	10	3	2	1
San Fernando Wells	5	0	0	0
Crescenta Valley County Water District Wells	10	4	4	0
TOTAL	109	17	16	1

Note: The ranking of wells in the above tables indicates that at some time between January 1980 and January 1983, the individual well analysis has attained the indicated level.

CITY OF LOS ANGELES
GROUNDWATER COLLECTION AND DISTRIBUTION SYSTEM



LEGEND

- o – WELL
- ⊗ – VALVE
- NH – NORTH HOLLYWOOD WELL GROUP
- W – WHITNALL WELL GROUP
- HW – HEADWORKS WELL GROUP
- E – ERWIN WELL GROUP
- CS – CRYSTAL SPRINGS WELL GROUP
- V – VERDUGO WELL GROUP
- ● – WELL CONTAINING ≥ 5.0 ppb TCE

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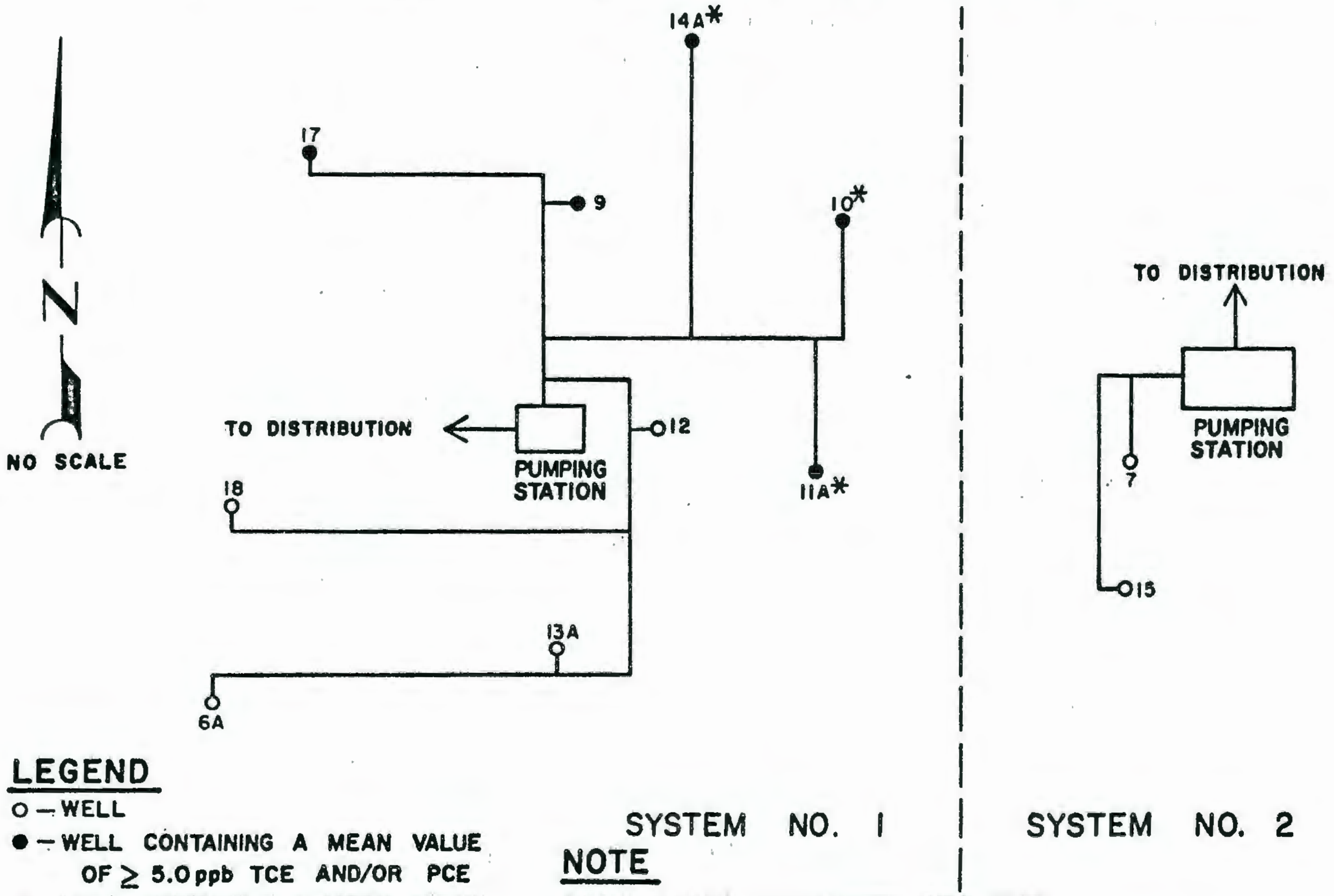
CITY OF BURBANK
GROUNDWATER COLLECTION AND DISTRIBUTION SYSTEMS AFFECTED BY TCE AND PCE CONTAMINATION



LEGEND

o – WELL

● – WELL CONTAINING A MEAN VALUE OF ≥ 5.0 ppb TCE AND/OR PCE

* – WELL CONTAINING A MEAN VALUE OF ≥ 20.0 ppb TCE AND/OR PCE

NOTE

MEAN VALUES CALCULATED FOR DATA COLLECTED JANUARY, 1980 TO AUGUST, 1982.

10-18-82

FIGURE 2

CITY OF GLENDALE
GROUNDWATER COLLECTION SYSTEMS AFFECTED BY TCE AND PCE CONTAMINATION

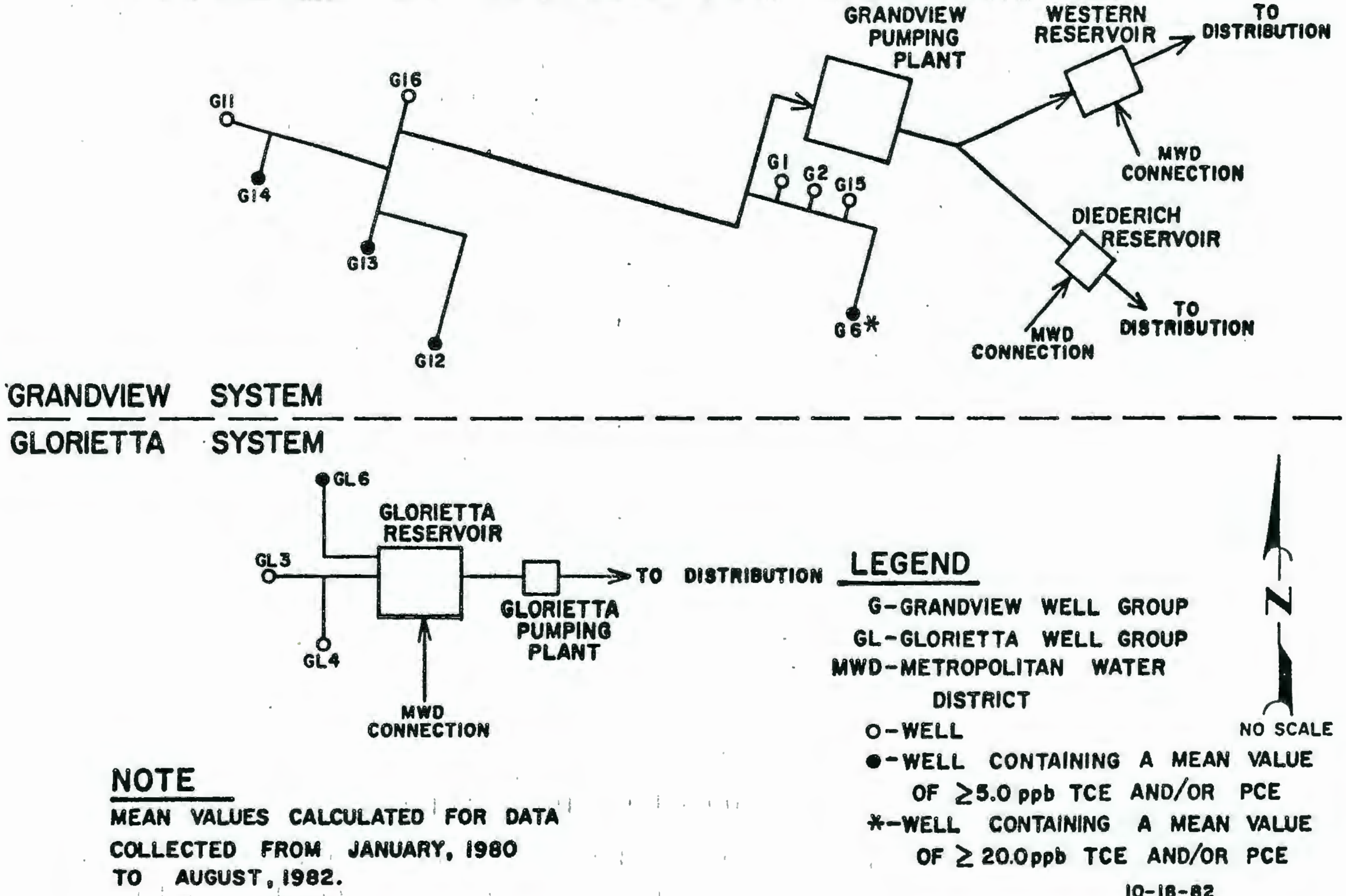


FIGURE 5

CRESCENTA VALLEY COUNTY WATER DISTRICT
GROUNDWATER COLLECTION SYSTEMS
AFFECTED BY TCE AND PCE CONTAMINATION

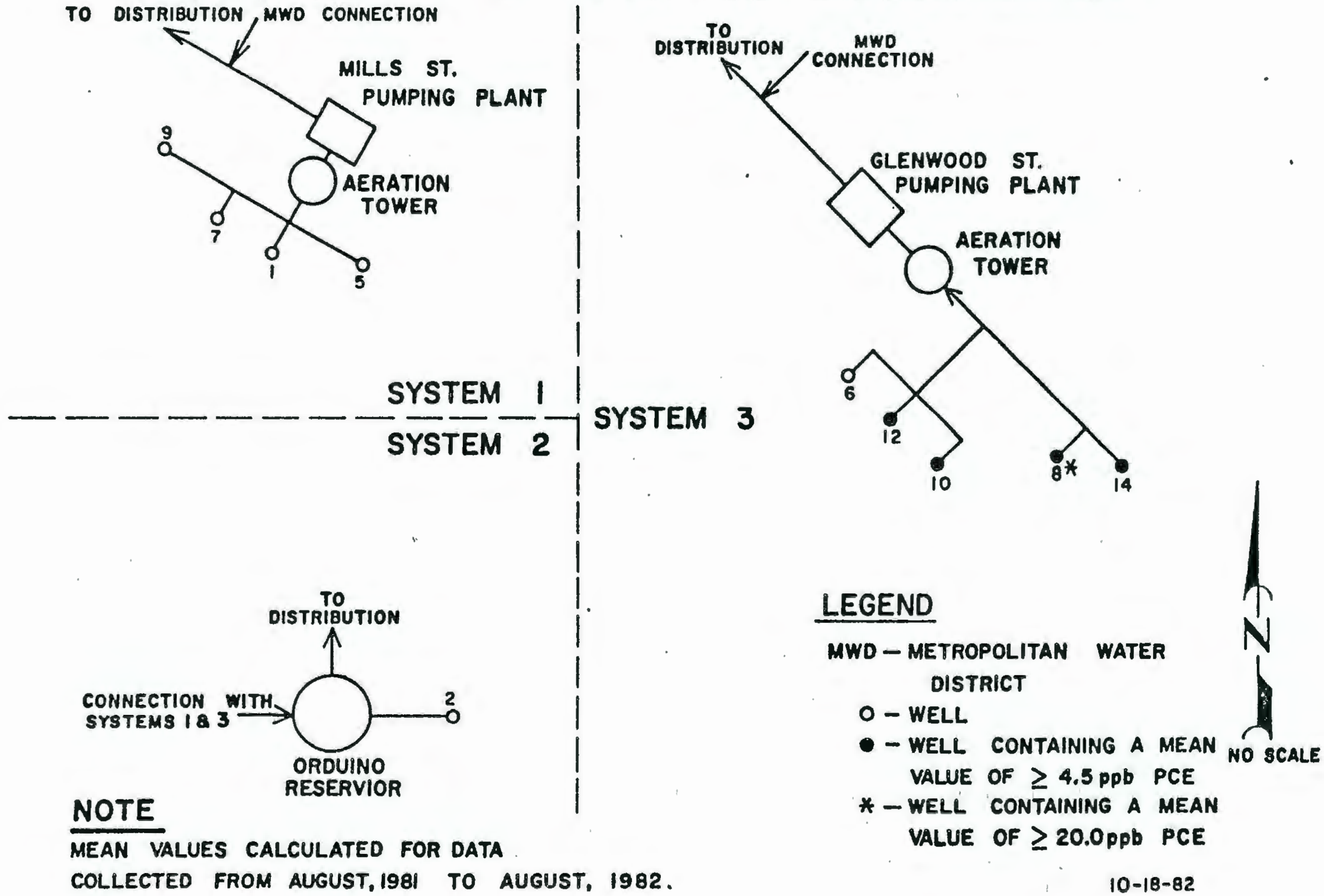


FIGURE 6

systems are operated by the Cities of Los Angeles, Burbank and Glendale. Figures 3, 4, 5 and 6 show the wells in these systems affected by TCE and PCE contamination.

The North Hollywood area is the most heavily contaminated area in the SFVB. Contamination in this area affects wells in the DWP's North Hollywood, Erwin and Whitnall well fields and the Burbank well field. Contamination is greatest from TCE, with PCE also present at substantial levels in several wells.

TCE contamination in the Crystal Springs area affects wells from the DWP Crystal Springs and Headworks well fields and Glendale's Grandview well field. No significant contamination by PCE has been found to date in this region.

Contamination in the Pollock well field was found in two of the DWP's wells. However, PCE is at somewhat greater levels than TCE in this area.

The La Crescenta area consists of wells in Glendale's Glorietta wellfield and of wells owned by the Crescenta Valley County Water District. These wells are located in the Verdugo basin and are isolated from the main body of the San Fernando Basin. To date PCE is the only significant contaminant found in this area.

No significant contamination was found in the City of San Fernando wells or the DWP Mission wells located in the Sylmar basin. The Sylmar basin is a confined aquifer with a substantial clay confining layer near the surface that may act as a barrier to restrict the infiltration of organic contaminants.

2.2.3 Summary

The information gathered during the water quality survey indicates that VOC's, and in particular, TCE and PCE, are present at relatively low concentrations in wells throughout the south-eastern and south-central portion of the SFVB. At present contamination by TCE has severely restricted the use of 13 municipal production wells in the SFVB. Two production wells each in the Cities of Burbank and Glendale have been ordered shut down by the State DOHS as a result of contamination. In the City of Los Angeles, the use of at least 9 wells has been limited under the operating guidelines of the State DOHS Water from these wells can be used only after blending with water from clean sources to assure that water delivered to the consumer is below the recommended action levels for TCE and PCE.

To date, it has not been possible to determine the point sources of contaminants or to plot individual plume patterns in areas where groundwater contamination exist. There is currently a lack of monitoring facilities available in extensive areas in the SFVB surrounding existing well fields. Because of this, it is not possible to determine zones of groundwater contamination or plumes of contamination flowing across the southeastern portion of the SFVB.

Some other considerations also make it difficult to accurately interpret groundwater quality data. As mentioned previously, there are large variations in the concentrations of TCE over time in individual wells. While these changes make it difficult to interpret data over short periods, long term trends seem to indicate that the number of contaminated wells in the SFVB may be slowly increasing.

Another consideration that has not been completely investigated is that of the vertical distribution of contaminants. Investigations with a special well packer indicate that contaminants may be present at higher concentrations primarily near the surface of the water table. The non-continuous clay lenses in certain areas may act to prevent or retard the movement of contaminants into the deeper zones of the aquifer. In addition, contaminants may be held in the unsaturated zone of soil above the water table and be slowly leached into the aquifer over time.

Water quality data obtained from production wells generally does not give any information about vertical distribution of contaminants. A well casing that is perforated primarily in the deepest zones of the aquifer will generally exhibit lower TCE concentrations than an adjacent well with a casing perforated such that it draws water primarily from the uppermost zones of the aquifer. Further determination of this vertical distributon could help to explain some of the temporal and areal variations in contaminant concentrations.

Results of the water quality investigation are not conclusive at this time and indicate the need for continued, long-term monitoring in the SFVB. With the use of the existing well system along with the strategic selection of future production and monitoring wells sites, the determination of sources of contaminants and the patterns of movement in the groundwater may be achieved.

2.3 Hazardous Waste Sources Investigation

2.3.1 Background

The objective of this phase of the study was to identify and to investigate major potential sources of hazardous wastes in order to assess their overall impact of these potential sources on groundwater quality. Although it was not the goal of this study to search out illegal industrial waste dischargers or discharge sites, any available information relative to groundwater contamination was examined and analyzed. The investigation of these potential hazardous waste sources was as comprehensive and complete as possible under the scheduling and budgetary constraints of the study. Whenever warranted, laboratory analyses were conducted to aid in the detection of major organic contaminants which could have orignated from these sources.

2.3.2 Investigations Performed

2.3.2.1 Industrial Survey

An industrial survey, by Stearns, Conrad and Schmidt Consulting Engineers, was conducted in a 1300-acre area of North Hollywood. The survey attempted to 1) quantify the types and sources of hazardous materials within the study area, 2) evaluate current industrial practices for the handling, storage and disposal of hazardous materials and 3) evaluate current industrial inspection and enforcement programs for the regulation of the use and disposal of hazardous materials. It was not possible to directly assess the impact of historic use, handling and disposal of these materials on current groundwater quality conditions.

Based on results of the survey, very little TCE is presently used in the North Hollywood area. This is primarily due to the strict control placed on the use of TCE because of its high volatility by the Air Pollution Control District Board (now the South Coast Air Quality Management District) in 1966. Prior to this time, TCE was widely used as a degreasing solvent in aircraft manufacturing, dry cleaning and other industries.

At present, however, PCE and other solvents that are less volatile have replaced TCE in most industrial applications.

The survey also indicated that, in general, current hazardous materials management practices are adequate among most large commercial-industrial establishments (greater than 100 employees). However, the following deficiencies were noted in the survey, especially among commercial or industrial facilities that handle small quantities of hazardous materials;

1. There is little formal spill control planning or employee training;

2. There is no monitoring for leaks from underground or surface tanks storing hazardous materials;

3. Because of prohibitive costs for proper disposal, small-quantity waste generators may tend to dispose of wastes improperly. Improper disposal including on-site dumping, uncontrolled discharge to storm drains and sewer facilities and disposal to municipal refuse are suspected to be more prevalent than observed.

Since current industrial use of TCE is not significant, it is believed that existing contamination generally originated from disposal practices of past decades. Nevertheless, the potential for contamination by other hazardous materials still exists at many industrial plant sites.

2.3.2.2 Accidential Spills and Unintentional Releases

The investigation of spills and unintentional releases of hazardous materials involved an examination of records kept by the DWP, the Los Angeles City Bureau of Sanitation, the Los Angeles City Fire Department, the Los Angeles County Flood Control District, and the County Department of Health Services. Such spills and releases may result from transportation accidents, industrial storage and pipeline leaks, equipment failures and overflows, mishandling of materials, fire control runoff and removal by washdown.

In general, reported spill incidences do not appear to have resulted in a significant degree of contamination of the groundwater. During recent years, most of the harmful effects which could have resulted from major spill and release incidences were prevented through quick response and the implementation of proper containment and clean up procedures. Spill contingency planning is the single most important factor for the successful prevention of groundwater contamination by accidental or unintentional releases of hazardous materials.

However, no assessment was made of the extent and impact of unreported spills and leaks of hazardous materials. Studies in other areas indicate that leak incidences from storage tanks and pipelines are widespread and prevalent but may often go undetected and unreported. Complete investigation of these facilities was beyond the scope of this study.

2.3.2.3 Dry Weather Drainage

The term dry weather drainage denotes the flow patterns in the Los Angeles River (LAR) during the annual dry season. Dry weather drainage flow tributary to the LAR originates from the following sources:

(1) runoff including excess irrigation and washdown water entering the storm drain system,

(2) wastewater discharges including effluents from the Los Angeles-Glendale and Burbank Water Reclamation Plants and other NPDES permitted discharges, and

(3) rising groundwater occurring in the western portion of the SFVB.

Dry weather drainage from the LAR may enter the groundwater basin either through water spreading activities at the Headworks Spreading Grounds or through percolation along the unlined reaches of the LAR. Pollutants in the LAR could conceivably migrate to nearby wells and impact groundwater quality.

A limited field survey of LAR water quality was conducted to determine the background levels of both TCE and PCE. While these chemicals were sometimes present at low concentrations in the LAR, they did not appear to significantly endanger groundwater quality. However, continued monitoring of the LAR at the Headworks spreading ground is necessary to evaluate the impact of both sporadic pollutant discharges and of scheduled discharges from the Los Angeles Glendale and Burbank Water Reclamation Plants and from the proposed Sepulveda Water Reclamation plant.

2.3.2.4 Landfills

The sanitary landfill investigations consisted primarily of a review of available information on the siting, design, classification and use of active and completed landfills in the SFVB. However, little or no information was available concerning privately operated, on-site disposal operations. Appendix C and Plate 5 show the names and locations of the sites identified in the San Fernando Valley.

When available, nearby groundwater quality data was also examined to evaluate the impact of individual sites. However, since most owner/operators of older landfills were not required to install monitoring equipment, specific water quality data from these older sites are generally not available.

While most of the landfills investigated were not permitted to receive hazardous industrial wastes, it is generally accepted that historic controls on design and operation were not adequate to prevent the disposal and leaching of hazardous chemicals from landfills into the groundwater. At present, however, strict design, operating and monitoring requirements minimize the potential for any adverse impact to groundwater quality from new sites in the SFVB.

2.3.2.5 Other Commercial Waste Sources

This category involved an investigation of the disposal of industrial wastewaters as a source of contamination. Wastewater flows from representative points into the public sewer network and from on-site private disposal systems (PDS) were analyzed for the presence of VOC contaminants.

Qualitative analysis of samples from public sewer lines indicated that both TCE and PCE are present in wastewater flows at low concentrations. If significant exfiltration of wastewater occurs, these contaminants could have an adverse impact on groundwater quality. It was not possible to fully assess this potential impact.

A comprehensive search of public works records revealed that many commercial-industrial properties in the North Hollywood area still utilize private disposal systems, such as septic tanks, for their wastewater disposal. Effluents from these systems are typically discharged directly to the ground through leach lines, where they subsequently percolate to the groundwater table.

While these on-site systems are permitted for the disposal of domestic wastes only, there is currently no regulatory program to ensure that hazardous industrial wastes are not discharged also. Indeed, quantitative analysis revealed that a range of VOC compounds were present at potentially harmful concentrations in many PDS effluents from commercial and industrial plants.

2.4 Summary and Conclusions

Study results indicate that, at present, TCE, and to a lesser extent PCE, are present at relatively low concentrations (generally 5-50 ppb) across the south-eastern and south-central portions of the SFVB. The presence of these contaminants has placed severe restrictions on the use of approximately 13 municipal groundwater production wells.

To date, it has not been possible to fully define either the vertical and horizontal distribution of these contaminants or the factors associated with their movement, fate and dispersion in the aquifer. Since these contaminants could have been discharged as long as 2 to 4 decades ago, the relatively high velocity of groundwater flow in the SFVB could account for the wide dispersion of contaminants presently seen.

Most studies indicate that these two chemicals are not subject to any significant bio-degradation under conditions generally found in the SFVB and would be removed from the aquifer only by the continued pumping of groundwater. Some estimates have indicated that at present rates of removal, it may take as long as from 20 to 100 years to cleanse the aquifer of TCE. For this reason, the present contamination problem must be viewed as a more or less permanent condition that should be managed through the application of appropriate engineering strategies to ensure the continued safe use of the basin. These alternative engineering strategies are reviewed and evaluated in Appendix B and under Section 3.8.

In addition to controlling the current level of contaminants, it is also vital to eliminate or control any present or future sources of further contamination.

Although many potential sources of contamination were investigated, it has not been possible to identify specific sources that are contributing to current TCE contamination. Existing groundwater quality data does not correlate well with any single source of contamination. The sheer number of potential sources that were identified in the proximity of the contaminated wells, makes it difficult to draw any conclusions based solely on available water quality data.

The effort required to fully evaluate the current and historic impact of potential sources identified was well beyond the budget and time frame of this study. However, the results of these investigations do provide some general indication of the potential for contamination from these sources and the need for increased monitoring and regulation.

Based on limited monitoring, potential contaminants were shown to be present in urban runoff and drainage, private and municipal wastewater treatment systems, and landfills. In addition, certain practices utilized in the storage and disposal of hazardous materials on industrial sites were identified that could also have significant impact on groundwater quality. Specific recommendations relative to the control of these potential sources are outlined in Section 3.

The existing regulatory framework is generally adequate to provide for the implementation of these source control programs. A discussion of the existing regulatory programs and the authority for each is included in Section 3.2 There is a need, however, to direct, coordinate and, on some cases, augment the efforts of these agencies to provide for the complete protection of groundwater quality in the SFVB. Although the the general jurisdictional guidelines are well defined for these programs, there is still some need for clarifying and expanding the specific roles and authority of each agency with respect to groundwater protection. In many cases, the activities of these agencies are restricted not so much by jurisdiction as by budgetary and manpower limitations.

SECTION 3

RECOMMENDATIONS

3.0 Introduction

As a result of the investigations and conclusions of the study, eight recommendations for groundwater quality management are proposed. These recommendations are designed to address two major aspects of the contamination problem:

1. The control and regulation of hazardous materials to minimize future contamination (Sections 3.1 through 3.6), and

2. The control and management of contaminants currently in the basin (Sections 3.7 and 3.8).

Tables 3 and 4 show the expected costs and recommended funding for each of the recommendations, primary affected agencies, and a plan implementation schedule.

The benefits to be derived from the implementation of preventive measures far outweigh the associated costs. Although final standards for the concentrations of VOC's in drinking water have not yet been adopted, preliminary estimates indicate a significant increase in water operating costs for the cleanup and treatment of contaminanted groundwater. Current levels of contamination must be controlled and managed through the application of various engineering strategies to assure the safest, highest, attainable quality of drinking water. More important, however, are the future consequences of permanent or long-term damage to the groundwater basin and the diminished groundwater production capability during critical water shortages.

TABLE 3

SUMMARY OF EXPECTED COSTS AND RECOMMENDED FUNDING

	RECOMMENDATION	City: Los Angeles	Burbank	Glendale	San Fernando	Primary Affected Agency(ies)/ Funding Sources
1.	Public Education Program	$10,000	Nominal	Nominal	Nominal	Water Department/General Operating Funds-Water Revenue
2.	Regulation of Private Disposal Systems	$1,000,000/yr. for 10 yrs.	Nominal	Nominal	Nominal	Public Works Department/Property Assessment and Sewer Construction Funds; Wastewater Treatment Construction '201' Grant and Clean Water Grant Programs
3.	Augmented Enforcement Program	$100,000/yr.	Nominal	Nominal	Nominal	State and County DOHS; Industrial Waste Control Section; Fire Department/Permit and Inspection Fees
4.	Regulation of Storage Tanks, Sumps and Pipelines	Indeterminate	Indeterminate	Indeterminate	Indeterminate	RWQCB; Fire Department; State and County DOHS/Permit and Inspection Fees
5.	Small Quantity Generator Hazardous Waste Disposal Program	Indeterminate	Indeterminate	Indeterminate	Indeterminate	Indeterminate - SCAG is proposing to conduct a study to be funded under the Water Quality Management Planning Program, Section 205(j) Grants
6.	Regulation of Landfills	$15,000/yr.	Indeterminate	Indeterminate	Indeterminate	RWQCB; Water Department; Sanitation Department/Inspection Fees
7.	Groundwater Monitoring Program	$60,000 + $70,000/yr.	$24,000 + $2,000/yr.	$24,000 + $2,000/yr.	$24,000 + $2,000/yr.	Water Department/General Operating Funds-Water Revenues; Water Quality Management Planning Program
8.	Aquifer Management and Groundwater Treatment Program	$2,600,000 + $180,000/yr.	$625,000 + $40,000/yr.	$325,000 + $30,000/yr.	None	Water Department/General Operating Funds-Water Revenue; Superfund; Hazardous Substance Account and Energy and Resources Fund; California Safe Drinking Water Grant Program

TABLE 4

PLAN IMPLEMENTATION SCHEDULE

RECOMMENDATION	1983	84	85	86	87	88	89	90	91	92	93
1. Public Education Program	■	■	■	■	■	■	■	■	■	■	■
2. Regulation of Private Disposal Systems											
a. Development of Ordinance and Adoption	▬										
b. Planning and Design of Public Sewers		▬	▬	▬	▬	▬	▬	▬	▬	▬	
c. Construction			▬	▬	▬	▬	▬	▬	▬	▬	▬
d. Enforcement			■	■	■	■	■	■	■	■	■
3. Augmented Enforcement Program											
a. Institutional Arrangements	▬										
b. Inspection and Enforcement	■	■	■	■	■	■	■	■	■	■	■
4. Regulation of Storage Tanks, Sumps and Pipelines											
a. Development of Specifications and Adoption	▬	▬									
b. Inspection and Enforcement			■	■	■	■	■	■	■	■	■
5. Small Quantity Generator Hazardous Waste Disposal Program - Feasibility Study		▬	▬								
6. Regulation of Landfills	■	■	■	■	■	■	■	■	■	■	■
7. Groundwater Monitoring Program											
a. Planning and Development	▬	▬									
b. Construction		▬	▬	▬							
c. Groundwater Sampling	■	■	■	■	■	■	■	■	■	■	■
8. Aquifer Management and Groundwater Treatment Program											
a. Pilot Scale Testing	▬	▬									
b. Planning and Design of Treatment Facilities		▬	▬								
c. Full Scale Installation and Operation				■	■	■	■	■	■	■	■

■ ■ ■ Continuous Implementation

Ideally, the recommendations should be implemented on a basin-wide scale. However, there are certain critical areas of the groundwater basin where the implementation of these recommendations will provide the greatest and most immediate benefits to groundwater quality. In addition, current budgetary and staffing constraints on regulatory agencies may make it necessary to focus initial efforts primarily on these critical areas. For these reasons a three level groundwater protection priority system has been developed for the SFVB, as illustrated in Figure 7.

Priority area one includes all of the areas that overlie and have primary impact on the major wells and well fields in the south-eastern and south-central portion of the SFVB. This area is generally characterized by a high soil infoltration capacity and permeability and a high density of commercial-industrial development.

Priority area two generally includes those areas of the SFVB with high to medium infiltration capacity and permeability. These areas are somewhat separated from the major well fields by distance and/or restrictions to groundwater flow as provided by fault lines.

Priority area three includes those areas of the valley with low infiltration capacity and permeability and low to medium industrial development. Groundwater in these areas are generally confined by extensive clay deposits which may restrict the percolation of contaminants. To date, little contamination has been found in these areas.

Since these recommendations affect many different agencies and cross administrative, political and municipal boundaries, a concerted effort must be made to fully coordinate their

GROUNDWATER PROTECTION PRIORITY AREAS

FOR COMMERCIAL AND INDUSTRIAL DEVELOPMENT

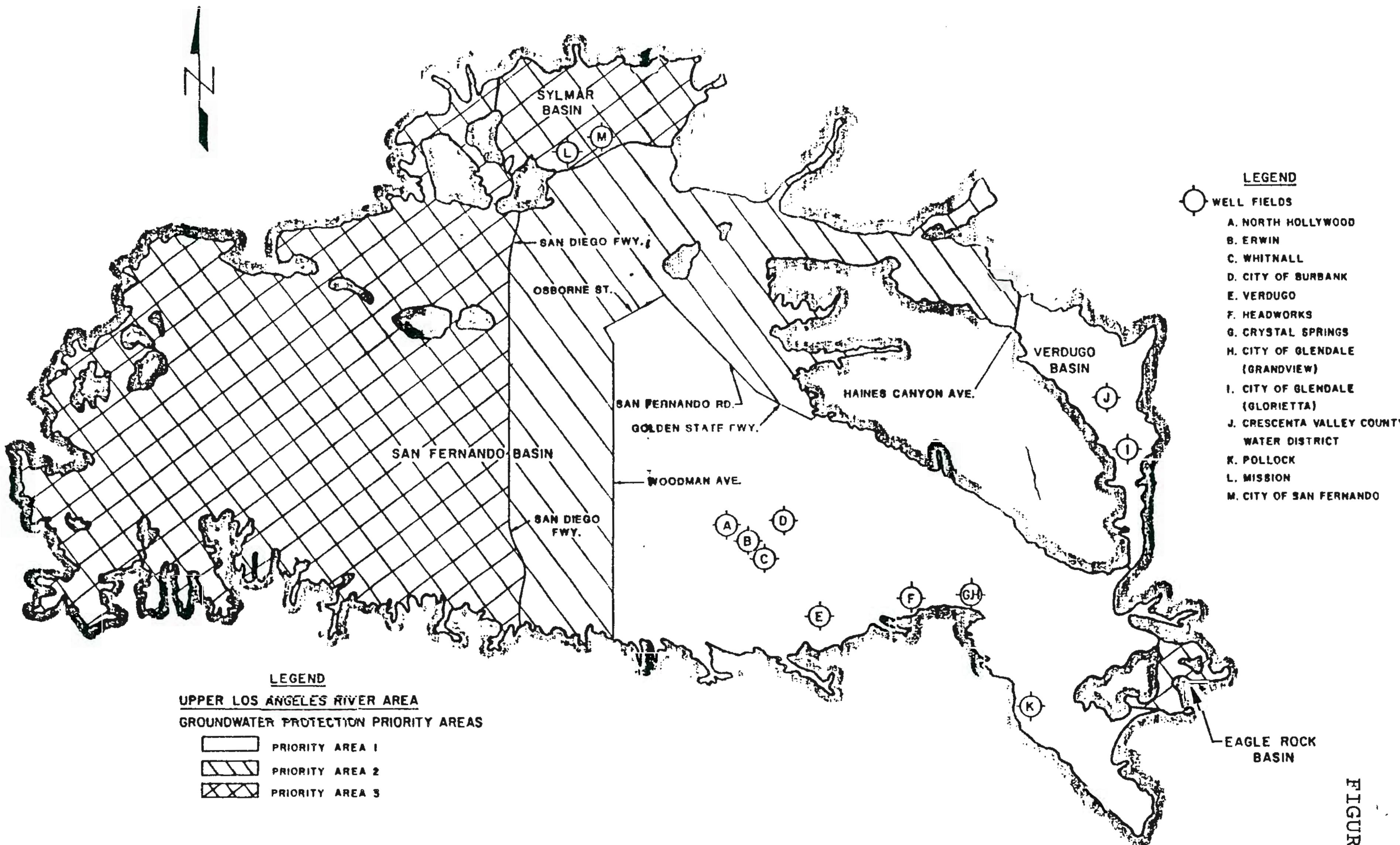


FIGURE 7

activities into a uniform implementation program. In order to ensure that the needs and concerns of all parties are met, it is recommended that representatives of these agencies form an advisory committee to coordinate and to resolve the technical, administrative and political aspects of these recommendations and ascertain orderly implementation. Such a committee could also play an important role in developing inter-city joint powers agreements or other applicable arrangements to facilitate the uniform implementation of these recommendations over the entire basin.

The following agencies should participate in this Interagency Advisory Committee.

A. Municipal water departments within the SFVB.

B. Cities of Los Angeles, Burbank, Glendale and San Fernando, and the County of Los Angeles (preferably a representative from each of the following departments: public works, fire, building, industrial waste)

C. State and County DOHS

D. RWQCB

E. Watermaster, ULARA

In general, the basic goals and recommendations of the overall groundwater quality management plan are applicable to the protection of any groundwater basin. However, the implementation of each specific recommended action will depend on the technical, administrative and political factors peculiar to each basin or region.

RECOMMENDATION NO. 1

3.1 Public Education Program

3.1.1 Introduction

3.1.1.1 Objectives

The program proposed by this recommendation is designed to inform the general public and industry of a) the importance of groundwater as a source of drinking water supply, b) the far reaching effects that improper handling or disposal of even small quantities of hazardous materials can have upon the quality of the groundwater supply, and c) that the water supplied to the public is safe to drink despite localized groundwater contamination.

3.1.1.2 Required Actions

The following actions are required to implement of a public education program:

1. Conduct a public education program to inform the general public of the current SFVB groundwater contamination problem, and how they can assist in preventing future contamination.

2. Carry out a long term education program for commercial and industrial organizations of the San Fernando Valley which will assist them in implementing the "Best Management Practices" (as defined below) for storage, handling, and disposal of hazardous materials.

   Definition: A "Best Management Practice" (BMP) is defined as those methods and procedures that protect employee and public health, and protect groundwater quality by preventing spills or leakage when storing, handling, or disposing of hazardous materials.

3.1.2 Background

3.1.2.1 Results of Industrial Surveys

The results of a recent survey of industry in the North Hollywood area of the SFVB as part of this project revealed that there is a lack of knowledge among many employees in commercial and industrial firms relating to good management of hazardous materials and the importance of preventing groundwater contamination. In addition, the County DOHS Hazardous Materials Management Program recently completed another survey of businesses using or generating hazardous materials. It was determined that a substantial majority of businesses were not in compliance with existing hazardous materials regulations. These surveys indicate that there is a need to both educate management and employees as to the impact of hazardous chemicals on groundwater quality when improper handling practices are employed.

3.1.2.2 Need for a Public Education Program

There is a need for the general public to be educated in proper methods of storing, handling, and disposing of hazardous materials in order to protect the quality of goundwater of the San Fernando Valley. Hazardous materials (such as paints, paint thinners, oil and grease "spot" removers, spent crankcase oil, etc., are in common use in virtually every household in the SFVB. Although improper disposal of these hazardous materials by an individual household may not pose a significant threat to groundwater quality, a large number of households improperly disposing of these materials could contaminate underlying groundwaters. A properly conducted public education program will make residents of the San Fernando Valley aware of the value to the community of groundwater and the harm that can result from the improper disposal of common household waste products that are hazardous to the environment.

Furthermore, since the general public and business will be asked to participate in and fund the prevention and cleanup of contamination in the groundwater, they must be made aware of the reasons for this effort if they are to support for the program. A public education program conducted through public agencies should be an effective method of securing the required support.

The general public should be informed of the fact that SFVB groundwater currently used by them meets the California Department of Health Services standards, and is safe to drink and use.

3.1.3 Implementation

3.1.3.1 Required Actions

The Public Education Program will be divided into two separate subtasks. They are: a) inform the general public, and b) inform and assist industry in implementing Best Management Practices as defined below.

General Public Education Program

Various methods of communicating groundwater protection information to the general public should be employed.

Information sheets and other literature to be distributed to the general public should be prepared under the direction of affected water agencies. The distribution of printed information should also take the form of newsletters, brochures, pamphlets and information flyers inserted into water bills.

Other methods of communication that should be considered for the public education program include open public meetings, and school, club and trade association presentations, including films and slide programs.

Periodic press releases to the media can be employed to convey to the general public the progress of the control program of the SFV groundwater basin.

Industrial Education Program

Information on methods by which industry should develop and implement BMP's for hazardous materials can be conveyed to SFVB businesses in several different ways. These include presentations to local chambers of commerce and trade associations, the distribution of printed handouts through existing local inspection programs, and by mailouts.

Existing inspection programs by local City agencies provide an opportunity for effective individual contacts with operating personnel of businesses. The inspection process could be readily expanded to encourage the implementation of BMP's. Existing inspection programs that could be adapted to the implementation of on-site educational efforts include the programs of industrial waste sections, fire departments and the health departments. Training literature for developing and implementing BMP's in industry could be distributed by industrial waste inspectors during routine plant inspections.

Management and operating personnel can be informed of BMP's for hazardous materials by the cooperative efforts of the proposed Interagency Advisory Committee and industry trade associations through their Newsletters and publications which provide contact with broad segments of commerce. Commercial and industrial organizations can be requested to assist in disseminating information on proper procedures for handling toxic materials.

3.1.3.2 Responsible Agencies

The division of responsibility in the preparation and implementation of the Public Education Program should be considered by the proposed Interagency Advisory Committee.

Suggested duties in the public education program of responsible agencies are as follows:

Water Utility	1. Prepare literature (one utility should coordinate) 2. Mail out literature in water bills 3. Send out press releases 4. Conduct public meetings
Industrial Waste Section and/or Fire Department	1. Train inspectors in methods and procedures to protect groundwater from

contamination.

2. Distribute literature, assist in helping industry implement BMP's for handling, storing, and disposing of hazardous materials.

Regional Water Quality Control Board, County & State Departments of Health Services	Provide legal, regulatory support and guidelines for agencies implementing education program.

3.1.4 Costs and Funding

3.1.4.1 Costs

The budget of the public education program should be established at an appropriate level to demonstrate the importance of the public education program and the resolve of public agencies to provide leadership in the long term solution of the problem of contamination of SFVB groundwater.

The overall cost for the general public education portion of the program should be proportioned between the cities of the San Fernando Valley in accordance with a formula that considers such factors as the value of the stored groundwater to each municipality.

3.1.4.2 Funding

The Interagency Advisory Committee should investigate through its members the availability of funding and assistance in conducting the public education program from agencies and sources beyond that available from the local SFVB cities.

Funding for on-site training programs could be included in the inspection program of the individual agency. This cost could possibly be funded through the permit and inspection fee process.

RECOMMENDATION NO. 2

3.2 Regulate Private Disposal Systems

3.2.1 Introduction

3.2.1.1 Objectives

The objective of this recommendation is to prevent future contamination of the groundwaters of the San Fernando Valley by industrial chemicals discharging from private disposal systems operated by the commercial and industrial firms.

3.2.1.2 Required Actions

A program to phase out private disposal systems in Industrial and Commercial zones will require the following activities to be carried out:

A. Institute increased inspection and monitoring of the wastewater discharging from private disposal systems to protect groundwater quality during the phase-out of these systems.

B. Expand sanitary sewers to service all industrial and commercial business presently in unsewered areas in the SFVB.

C. Phase out the use of private disposal systems by commercial and industrial firms within three years of a sewer line becoming available.

DEFINITION: Private disposal systems are on-site wastewater disposal systems that employ a septic tank, cess pool or other wastewater retention unit which discharge their effluent to the ground, usually through a network of sub-surface perforated pipes in an area referred to as a leach field. The installation of private disposal systems were permitted before sewers became available.

3.2.2 Background

3.2.2.1 Private Disposal System Study Results

A study of private disposal systems was performed in a study area in North Hollywood during this investigation.

The study revealed that many private disposal systems are located in the industrial and commercial zones which overlie the well fields that produce municipal drinking water in the eastern San Fernando Valley. A large number of private disposal systems operated by business concerns may exist in the groundwater sensitive areas of the eastern SFVB.

It was determined that the reason for the existence of the private disposal systems is two fold:

A. There are still a number of areas in the SFVB which are not serviced by sewers. These areas rely on private disposal system as the only method of wastewater disposal.

B. Current regulations in the City of Los Angeles do not require that a property owner connect to the sewer system if it is installed at his property.

Due to the lack of adequate regulatory criteria in the past, many private disposal systems may not have been properly abandoned when businesses were connected to the public sewer system. Consequently, these private disposal systems provide an unauthorized route for the disposal of liquid hazardous wastes to the groundwater basin.

The disposal of hazardous materials into an existing or improperly abandoned private disposal system is an attractive but illegal alternative to proper waste disposal such as delivery to licensed chemical recycling firms. The disposal of hazardous wastes to private disposal systems will become increasingly attractive as additional restrictions are placed on the disposal of these materials into refuse or sewers, and the cost of disposal by proper methods becomes increasingly expensive.

Sampling and analysis of the effluent from 12 private disposal systems servicing commercial and industrial establishments in the North Hollywood area during this investigation revealed significant concentrations of volatile organic compounds (averaging 6000 ppb and ranging from 300 ppb to 23,000 ppb) being discharged to the ground from each of these systems.

3.2.2.2 Status of Current Inspection Programs

Periodic inspection and testing of private disposal systems, supported by appropriate reporting of the quality of wastewater discharged to the groundwater basin, is not required by current regulations.

3.2.3 Implementation

3.2.3.1 Recommended Actions for Phase Out of Private Disposal Systems

The various city, regional, and state agencies should coordinate their activities inan Interagency Advisory Committee to phase out industrial and commercial private disposal systems in the San Fernando Valley. The Committee should oversee and direct the measures set forth in the following paragraphs.

A. Identify and prepare a computerized list of all commercial and industrial businesses in the eastern San Fernando Valley (Groundwater Priority Area No.1 See Figure 7) that discharge wastewater to private disposal systems. The committee will seek and designate a responsible agency for maintaining and updating this tabulation.

B. Propose ordinances, rules, regulations, and procedural changes to implement the elimination of private disposal systems operated by commercial and industrial firms.

C. Develop and recommend methodology for monitoring and eliminating hazardous material ground discharges from private disposal systems operated by commercial and industrial organizations located in the eastern SFVB (Groundwater Priority Area No. 1). The steps for elimination of discharges include:

   1. prioritization of existing private disposal systems to be eliminated based on wastewater characteristics and discharge volumes and location with respect to municipal water wells.

2. development of a time table for the elimination of all private disposal systems in commercial and industrial zones in the eastern SFVB (Groundwaer Priority Area No. 1) based upon availability of sewage collection facilities in cooperation with the appropriate agency(s) responsible for sewer construction.

D. An interim inspection program for private disposal systems operated by business concerns should be developed until these systems can be phased out. The inspection program should include periodic sampling and analysis of effluent. These systems in the eastern SFVB (Groundwater Priority No. 1) should be inspected on a semiannual basis. Inspections should include a determination as to whether process modifications or changes in the type of business activity have caused a businesses to become subject to the industrial waste permit system.

3.2.3.2 Implementing Agencies

The various city, regional, and state agencies listed below should implement the indicated measures to phase out commercial and industrial private disposal systems.

A. Water Agency

1. Coordinate and schedule the activities of the Interagency Committee.

2. Conduct a computer search of utility files and provide the committee with a listing of all locations in the east San Fernando Valley that

have been exempted from the city sewer service charge if applicable.

B. Engineering Department

1. Review sewer service "WYE" maps, evaluate the areawide wastewater collection network, and identify areas not serviced by public sewers.

2. Plan, schedule and implement, sewer construction to those areas relying upon private disposal systems.

C. Sanitation Department

1. Identify the location of all private disposal systems in the eastern San Fernando Valley (Groundwater Priority Area No. 1).

2. Conduct semiannual inspections at each location where a private disposal system is used by a commercial and industrial organization.

D. Department of Building and Safety

1. Cease the issuance of permits for construction private disposal systems in the eastern San Fernando Valley (Groundwater Priority Area No. 1).

2. Recommend and pursue a revision to the city code to require mandatory connection to the sewer system and proper abandonment of private disposal systems in the eastern SFVB

(Groundwater Priority Area No. 1) where sewers are available in accordance with the following schedule: a) within one year for commercial and industrial properties, and b) within three years for all other properties.

3. Review files and identify all private disposal systems abandoned in the last three years.

E. State and County Department of Health Services, Regional Water Quality Control Board

Provide regulatory and legal support and guidelines for efforts to make owners of private disposal systems connect to available sewers within the allowable period, and properly abandon the private disposal system.

3.2.4 Cost and Funding

3.2.4.1 Costs

A. Phase Out of Private Disposal Systems

A permit system should be devised and implemented for the owners of private disposal systems operated by businesses to reimburse municipalities for inspection costs in the interim period until these systems can be phased out. The inspection costs in the proper abandonment of these systems should also be included in the permit system.

The costs associated with on-site plumbing modifications and abandonment of the private disposal system that the owner must pay will vary with each case. The property owner must obtain city permits for proper abandonment of the private disposal system.

B. Sewerage System Completion

For the City of Los Angeles, the implementation of a sewer construction program in the eastern San Fernando Valley is expected to represent an ongoing, long-term project of approximately 10 years. The cost of this program, including planning, design and construction, is estimated at $1,000,000 annually.

The cost of sewers installation individual property owners will vary considerably. It is estimated that an average assessment for each property will be $100 per linear foot of property frontage. Properties will then be subject to the sewer service charge and the one-time sewer facilities charge.

The Cities of Burbank, Glendale and San Fernando have already instituted an overall plan to sewer all areas within these cities. As a result of their previous efforts, minimal additional costs appear to be required by these cities for the construction of new facilities.

3.2.4.2 Funding

A. Phase Out of Private Disposal Systems

The funding to pay for proper abandonment of a private disposal system should be borne by the property owner, since these systems were only allowed as a temporary expedient until sewer service became available to the property.

B. Sewerage System Expansion

While a small portion of this program will be financed by the sewer construction fund, major funding would rely ultimately on the sewer assessment proceedings or private developments.

Although a portion of the cost of construction of sewer facilities may quality for funding under the Wastewater Treatment Construction "201" Grants and Clean Water Grant Program, it is not known at this time whether funds from these sources will be available for plan implementation in the near future.

RECOMMENDATION NO. 3

3.3 Augmented Enforcement Program

3.3.1 Introduction

3.3.1.1 Objective

The objective of this recommendation is to insure that commercial and industrial establishments involved in the production, handling, storage and disposal of hazardous materials comply with applicable regulations and best management practices to prevent degradation of groundwater quality.

3.3.1.2 Required Actions

The following activities are necessary to achieve the objective.

A. Institute more stringent and specific regulations for the management of hazardous materials.

B. Require the issuance of permits and the performance of mandatory inspections for commercial and industrial establishments involved in the production, handling, storage and disposal of hazardous materials.

C. Provide special education and training to assure the application of best management practices for handling, storage and disposal of hazardous materials.

3.3.2 Background

Accidental and indiscriminate spills or other improper methods of disposal of hazardous materials can seriously endanger groundwater quality because these materials may pass readily through the highly permeable strata near municipal water wells.

Commercial and industrial establishments, which use or produce hazardous materials in sensitive groundwater areas, near municipal water wells are of immediate concern.

A small quantity of the hazardous materials used and generated by commercial and industrial establishments can cause a major contamination problem if these materials reach the groundwater. Accordingly, more rigorous inspection of these establishments is necessary to protect groundwater quality from the threat of hazardous materials mishandling.

3.3.2.2 Industrial Survey Findings

Improper hazardous materials management practices were observed among commercial and industrial establishments during a special survey made during the course of this investigation. The survey of commercial and industrial establishments within a 1300-acre North Hollywood study area indicated the application of best management practices (BMP's) was related to the size of the company.

In general, hazardous materials appeared to be managed satisfactorily by the larger companies because these organizations have adequately diversified staffs with the resources and expertise to properly perform this function.

On the other hand, the handling of these materials amongst the medium-sized and smaller companies was often found to be deficient because of the lack of trained staff, proper equipment and the high cost of compliance.

The following observations relating to typical instances of improper disposal of hazardous materials were reported by regulatory personnel.

- Spilled hazardous chemicals were washed into streets and storm drains or onto the soil;

- Hazardous liquid wastes were discharged to the storm drains or building sewers which were routed either to private disposal systems or the sewer system;

- Small quantities of hazardous wastes were disposed through refuse collection and subsequently into Class II sanitary landfills.

3.3.2.3 Current Inspection Programs

The current inspection effort of commercial and industrial firms does not adequately focus on the protection of groundwater. Most of the programs primarily focus on hazardous wastes without due regard for the storage and use of other hazardous materials. In general, inspections are conducted to determine compliance with outstanding permits. The lack of adequate staffing by responsible inspection agencies hampers the enforcement of regulations.

Pursuant to the Porter-Cologne Water Quality Control Act of 1969, the State Water Resources Control Board has the primary authority and responsibility for water quality control policy in the State. Monitoring, surveillance and enforcement activities are delegated to the Los Angeles Regional Water Quality Control Board (RWQCB) for this area (Region 4). Due to limited staffing, the RWQCB has but six or seven enforcement inspectors to survey a two-county area. Most of the effort of the RWQCB is devoted to administering the NPDES permit program and establishing waste discharge requirements.

The State Hazardous Waste Management Program was recently certified by the EPA. The program is administered by the State Department of Health Services which issues hazardous waste facility permits that are accordance with the requirements of the Resource Conservation and Recovery Act of 1976 (RCRA). The State program for the Los Angeles Region, which is comprised of the eight southernmost counties, includes a four-member team to conduct compliance inspections over the entire region. Only approximately 65 or 10% of the total number of hazardous waste facility permits for the Los Angeles Region are expected to be issued by September 1983. The remainder is expected to be completed by 1990. Under the hazardous waste disposal phase of the program, only hazardous wastes destined for disposal sites are required to be manifested.

The County DOHS Hazardous Waste Control Program is intended to complement the State program by monitoring all other facilities exempt from the State program. Approximately 17,000 businesses that produce hazardous wastes in Los Angeles County have been identified. Due to limited staffing, the County DOHS contemplates completing initial inspections over a two year period ending in 1984.

Existing industrial waste programs for the cities of Los Angeles, Burbank and Glendale regulate the disposal of industrial wastewaters into the sanitary sewer and storm drain systems. The purpose of the industrial waste programs is to assure the highest and best use of the sanitary sewer and storm drain systems and to prevent disruption of wastewater treatment processes. The City of San Fernando has not yet established an industrial waste program.

City fire codes require the application for permit and inspection, from the respective fire departments, for the storage and use of certain hazardous materials. The purpose of this regulatory program is the safeguarding of life and property from fire, explosion or other hazardous occurrences. The storage and use of industrial solvents and the production and disposal of industrial wastes are not normally regulated under this program.

3.3.3 Implementation

3.3.3.1 RWQCB

The RWQCB should develop and adopt a basin-wide policy for the regulation of the storage, use and disposal of all hazardous materials which could degrade and impair the quality of groundwater. The adoption of this policy would provide the impetus for all the local jurisdictions within the SFVB to implement groundwater protection measures.

3.3.3.2 Los Angeles, Burbank, Glendale and San Fernando

The Cities of Los Angeles, Burbank, Glendale and San Fernando should review the procedures and local regulations governing the handling, storage and disposal of hazardous materials and wastes.

Local ordinances should be strengthened by requiring the application of a hazardous materials permit for all commercial and industrial establishments engaged in the production, handling, storage and disposal of both hazardous materials and wastes.

A requirement of the permit should be the development and application of BMP's.

Periodic compliance inspections should be conducted for every permit issued.

Existing industrial and commercial hazardous waste inspection programs should be expanded to include all hazardous materials which could degrade and impair the quality of groundwater.

For smaller commercial and industrial establishments, special education and technical training of baseline BMP's should be conducted by the inspectors.

3.3.3.3 Coordination of Enforcement Programs

City, County and State regulatory programs should be coordinated to avoid jurisdictional conflicts and to achieve the implementation of an efficient and effective integrated control plan for all hazardous materials. If possible, the requirement for permits and inspections together with the payment of fees should not be duplicated. The County's Hazardous Materials Coordinating Committee could provide assistance in coordinating this matter.

3.3.3.4 Fines and Penalties

Appropriate fines and penalties for noncompliance and illicit practices should be imposed to establish suitable economic incentives for compliance.

The County of Los Angeles offers a $2500 reward for information "relating to the dumping of toxic material into sewers, flood control channels and other areas of the County."

The State offers a maximum $5000 reward for information "which materially contributes to the imposition of a civil penalty" or "to the conviction of a person for violating the provisions" of the State Hazardous Waste Control Law.

3.3.4 Costs and Funding

Point source control programs are generally financed through local revenue sources. Permit fees, license fees or inspection fees should be established to provide a continuous financing mechanism. Fees could be based upon program administrative costs including permit processing and inspections.

The level of additional inspection effort and resultant cost should be determined cooperatively by the proposed Interagency Advisory Committee.

The establishment of a reward system could provide an effective enforcement mechanism for the detection of illicit practices. A successful reward system could serve as a deterrent to potential violators and thereby minimize the need for inspectors and reduce program costs.

RECOMMENDATION NO. 4

3.4 Regulation of Storage Tanks, Sumps, and Pipelines

3.4.1 Introduction

3.4.1.1 Objective

The objective of this recommendation is to prevent future contamination of the groundwaters of the San Fernando Valley by industrial chemicals leaking from storage tanks, sumps, associated piping and pipelines.

3.4.1.2 Required Actions

A program to implement this recommendation should incorporate the following actions:

A. Survey, identify, and prepare a computer tabulation of all storage tank and sump facilities in the San Fernando Valley utilized for the storage, handling or disposal of hazardous materials.

B. Develop and implement a program of regular leak testing of existing storage tank, sump, associated plumbing, and pipelines used to store and transport hazarous materials.

C. Equip all storage facilities storing liquid hazardous materials with positive leak detection devices.

D. Develop and/or adopt designs and specifications that require storage tanks, sump and associated plumbing used in storing and transporting hazardous materials to utilize the best available materials and technology to protect groundwater from contamination caused by leakage.

3.4.2 Background

3.4.2.1 Vulnerability of SFVB Groundwater to Contamination

The groundwaters located in the region of municipal drinking water supply wellfields of the eastern San Fernando Valley are vulnerable to contamination from leaking tanks storing hazardous materials.

The leakage of hazardous materials due to the deteriorated condition of storage facilities and pipelines could be one of the major "avenues" through which the groundwaters of the San Fernando Valley have become contaminated.

Other communities in the United States, notably those in Suffolk County, New York, and Santa Clara County, California, found that the local groundwaters used as a domestic water well supply had been severely contaminated by liquid hazardous materials from leaking storage tanks.

In the case of Soffolk County, a comprehensive program to protect groundwater against contamination from leakage from liquid hazardous material storage facilities was adopted. Ten to twenty percent (approximately 1,000 tanks) of all storage facilities inspected and tested in the early stages of this program were found to be leaking.

Under current Suffolk County regulations, all underground tanks for hazardous materials which are found to be leaking are required to be replaced by a tank of acceptable design or removed. All existing underground tanks which do not conform to current requirements must be replaced within 15 years and leak tested annually in the interim prior to replacement.

3.4.2.3 Current Regulation of Storage Tanks and Pipelines

Storage tanks which contain flammable or explosive liquids are currently subjected to a regulatory program in the SFVB. Local fire departments are responsible for regulating these tanks in order to safeguard public health from fire danger due to leakage from these tanks.

In the City of Los Angeles, the Fire Department reviews and checks plans for flammable liquid storage tank construction and installation and inspects the tank installations. Each underground tank is pressure tested for leakage before being placed into service. Neither regular leak testing during the life of the tank, nor installation of positive leak detection devices are required by present regulations. The latter devices are designed ordinarily to produce an audio or visual alarm upon detection of leakage.

Tanks and pipelines containing non-flammable materials including halogenated solvents, are currently not subject to a monitoring program for leaks.

Pipelines passing through a city are under the jurisdiction of the utility regulating authority of the city unless delegated to an outside agency. A regulation and testing program of pipelines within the City of Los Angeles is carried out by the Department of Transportation. Current pipeline testing procedures should be reviewed to determine if they provide adequate protection of the groundwater due to pipe line leakage.

There exists a large number of storage facilities containing liquid hazardous materials in the San Fernando Valley that are not required to be equipped with leak detection equipment. Large leaks from storage tanks and associated piping are ordinarily detected by gross losses of material found during routine inventory checks, or by leakage into adjoining buildings or substructures. Small leaks generally to undetected for long periods of time.

3.4.2.3 Need for Leak Detection

It was concluded that he cost of the installation of positive leak detection equipment on hazardous material storage tanks and sumps can be justified on the basis that undetected leaks could have serious health water quality and economic consequences for those communities that use the San Fernando Valley Basin as a water supply.

3.4.3 Implementation

3.4.3.1 Area of Initial Implementation

Because of the greater vulnerability to contamination of the groundwater of the eastern San Fernando Valley, where most of the wells for municipal supply are located, it is recommended that the the remedial program proposed below be initially directed toward Groundwater Priority Area One (Figure 7). Subsequently, this program can be directed toward the remainder of the San Fernando Valley and other parts of Los Angeles.

3.4.3.2 Implementation Strategy

This recommendation can be implemented by developing a program to inspect, test, and regulate storage facilities which involve the following elements:

A. Survey of Current Storage Facilities and Pipelines

An office records and field survey should be undertaken to determine the location and characteristics of all storage tanks, sump and associated plumbing. A computerized list of these facilities would be developed as a result of this phase of the program.

B. Development of Testing Criteria, and Formulation of New Tank and Pipeline Construction Regulations

During the initial survey of storage tank, sumps and associated plumbing and pipelines in Priority Area One of the eastern SFVB, tank testing procedures for leaks can be developed. Additionally, the regulations and procedures for requiring positive leak detection devices on all existing storage tanks and sumps facilities can also be developed and promulgated. Modification of specifications for existing tank, sump, and associated plumbing to incorporate positive leak detection, and to require construction of tanks and pipelines with more corrosion-resistant materials and/or cathodic protection devices, must also be accomplished. The ordinance and code changes to provide the necessary regulatory guidelines could be patterned after the model tank testing program developed in Suffolk County, New York, or from a model program being developed in Santa Clara County, State of California.

C. Implementation of Regulations

Implement the new procedures. Issue permits for all the storage tanks and sumps tabulated during the survey. Remove, replace, or repair all storage facilities and pipelines found to be leaking in accordance with applicable regulations. Set up a time table for frequency of testing storage facilities and pipelines. Upgrade all facilities to meet new requirements.

3.4.3.3 Responsible Agencies

At the present time, there is no one agency with the proper authority, budget, or manpower to implement the actions of this recommendation. There is a need to clarify the extent of authority and responsiblity of individual agencies in the regulation of hazardous waste storage facilities.

The following agencies have been involved in the investigation of storage tanks, sumps, and pipelines in the SFVB.

RWQCB

On January 24, 1982 the Los Angeles Regional Water Quality Control Board (LARWQCB) has directed its staff to develop a program for the regulation of underground storage facilities for hazardous materials. The staff was directed to give priority attention to the San Fernando Valley and the San Gabriel Valley.

City of Los Angeles

Los Angeles City Council approved a motion directing the Bureau of Sanitation to work with the Los Angeles Fire Department to investigate and develop a tank testing program. The City is also cooperating with, and supporting the RWQCB in development of its underground tank regulation program.

State and County DOHS

The State and County DOHS may also undertake support roles for the RWQCB investigation. Their existing inspection programs could supply information on the current status storage tanks at businesses they permit.

3.4.4 Costs and Funding

The cost of this program cannot be accurately forecast at this time because guidelines and criteria for the testing program must be developed by the proposed Interagency Advisory Committee or other aency before costs can be reasonably estimated. Funds for an initial study and investigation are being made available from the RWQCB. It is expected, however, that any long term program would have to be self-supported through permit and inspection fees.

RECOMMENDATION 5

3.5 Small Quantity Generator Hazardous Waste Disposal Program

3.5.1 Introduction

The overall objective of a hazardous waste collection program is to provide an economical disposal alternative to small quantity hazardous waste generators, including homeowners. The collection program should encourage proper hazardous waste disposal practices that could otherwise result in contamination of groundwater.

3.5.1.2 Required Actions

A. Feasibility Study: An initial feasibility study of a selected high groundwater priority area is needed to assess the magnitude and nature of existing hazardous waste streams and to formulate plans for an overall hazardous waste management approach for small quantity waste generators.

B. Pilot Program and Evaluation: Based on information generated from the feasibility study, pilot operation of the recommended waste management program should be conducted and evaluated for its effectiveness.

C. Full Scale Program: The ultimate goal of the program is to establish a full scale, region wide hazardous waste management program for small quantity hazardous waste generators.

3.5.2 Background

3.5.2.1 Existing Practices

Although storage, treatment and disposal practices for hazardous wastes have improved substantially over the last decade, uncontrolled discharge and illicit dumping still are prevalent. However, an industrial facilities survey conducted by Stearns, Conrad and Schmidt Consulting Engineers (SCS) pointed out several weaknesses in current hazardous waste management practices, especially among commercial establishments that generate relatively small quantities of hazardous wastes. The SCS survey found that, in general, most large industrial facilities have instituted good hazardous waste management practices. However, many smaller facilities are not closely monitored and often do not have adequate waste disposal programs in operation.

Results of preliminary inspections by the Los Angeles County Department of Health Services (DOHS) Hazardous Waste Control Section support this conclusion. A high incidence of illicit discharge and disposal has been documented. Hazardous wastes are often discharged to sewer or storm drains, added to regular domestic garbage, or poured onto the ground.

While individually these small quantities of wastes may not pose a serious environmental threat, the collective impact of literally thousands of small volume discharges could be quite significant in terms of groundwater quality.

3.5.2.2 Reasons for Existing Practices

Lack of knowledge and proper training is one of the reasons for existing hazardous waste disposal practices among small quantity waste generators. The County DOHS Hazardous Waste Control Program has found that many individuals are unaware of existing waste disposal regulations and the waste management alternatives available to them. This problem should be addressed in the public education program (See Recommendation 1).

Another is that existing regulations and economic constraints tend to make it costly to dispose of small volumes of waste in an environmentally acceptable manner.

There are several hazardous waste hauling and/or recycling companies operating in the Los Angeles area. Although recycling operations will often pay for certain oil and solvent wastes, they generally do not accept quantities of less than one barrel of recyclable materials.

Sanitary landfill disposal and hauling costs may range from \$75 to \$250 per ton for hazardous wastes. While these fees may be acceptable on a unit cost basis, most haulers charge a minimum fee of from \$100-\$150 per load. This high cost is often prohibitive for many small companies that do not generate enough wastes to justify the cost of a separate pickup.

Under existing regulatory guidelines it may be illegal for non-licensed individuals to transport their own wastes to the landfill. The BKK Class I sanitary landfill will accept small volumes of wastes from individuals and homeowners for a reasonable fee. However, in order to accept wastes at a Class I site, the landfill operator must manifest that the wastes were delivered by a registered, licensed hauler. As defined by Department of Transportation guidelines, the vehicles that carry less than 500 lbs of hazardous wastes are not required to be registered. The State DOHS program does not recognize such an exemption but does provide for a variance to the hauler's permit requirement on a case by case basis.

3.5.3 Implementation

3.5.3.1 Feasibility Study

The initial phase of implementation will involve a preliminary feasibility study.

This study would attempt to further define the scope and magnitude of the problem and to define the specific economic requirements and institutional arrangements necessary for the implementation of a successful and cost-effective program.

A study of this nature should include consideration of the roles of local sanitation and regulatory agencies as well as those of private industry and free market forces.

Alternative technologies such as recycling and waste exchange should be emphasized whenever feasible.

All pertinent legal and regulatory restrictions with respect to the transport and storage of hazardous wastes should also be considered.

3.5.3.2 Pilot Program

As a result of the recommendations of the feasibility study, a pilot program should be developed in the study area.

Such a program could encompass a number of waste management alternatives.

One such possibility would involve a hazardous waste collection and transfer station where small quantity waste generators could deposit wastes for a nominal fee. Similar programs are already in operation in the Sacramento and Santa Barbara areas, and another is scheduled for operation in the San Diego region.

Another possibility involves the coordination of pickup routes for recycling and/or disposal of small quantities of hazardous wastes. These operations could be established either by local agencies or by the private sector. One such waste route program has been coordinated by South Coast Air Quality Management District (SCAQMD) for the collection of PCE wastes from local dry cleaning establishments.

A third possibility is a proposal that would make it incumbent on retailers and distributors of products containing hazardous materials to provide a depository for spent containers and residual products.

Whatever techniques are employed this pilot program should in turn be fully analyzed to determine their effectiveness in meeting the waste disposal needs of the community.

3.5.3.3 Full Scale Program

Successful elements of the pilot program should be instituted on a regional basis. These activities should fit the guidelines of the County Master Solid Waste Management Plan.

The overall success of any hazardous waste management plan will ultimately rely on the level of support and participation from waste generators. For this reason education and enforcement efforts of local agencies will be vital to the program. These agencies can best assure that small business are aware of existing hazardous waste disposal alternatives. The State and County DOHS Programs could coordinate information and referral of waste generators, haulers and recyclers.

3.5.4 Cost and Funding

A. Feasibility Study

Southern California Association of Governments (SCAG) has recently applied to the State under the Water Quality Management Planning Program for a grant to fund a study for the development of a cost-effective hazardous waste management plan for small quantity hazardous waste generators.

B. Pilot and Full Scale Programs

It is not known at this time what costs and funding will be necessary for the pilot and full scale programs. Ideally, these programs should be self supported through user's fees and other 'free market' funding.

RECOMMENDATION NO. 6

3.6 Regulation of Landfills

3.6.1 Introduction

3.6.1.1 Objectives

The overall objective of this recommendation is to minimize the potential adverse impact of sanitary landfills on groundwater quality in the San Fernando Valley Bason (SFVB) through specific design, siting and monitoring requirements.

3.6.1.2 Required Actions

The following activities are intended to prevent the contamination of groundwater through the release of hazardous chemicals from active, abandoned or future landfill sites.

Investigate older landfills for groundwater contamination

The long-term effects of older and recently completed landfill sites should be closely monitored on a long term basis. Many previously completed sites have little or no provisions for groundwater protection or monitoring. Where no monitoring facilities are available, observation wells should be provided to effectively assess the impact of landfills on groundwater quality in the SFVB.

Control the siting of new landfills

In accordance with the general goals of the County Solid Waste Management Plan, future siting of landfills in the SFVB should be controlled to maintain sufficient facilities to satisfy solid waste management requirements. The Regional Water Quality Control Board (RWQCB) should assign low priority the development of to landfill sites in sensitive groundwater areas in the SFVB.

Impose Design and Construction requirements on all new landfills

Whenever any landfill is to be sited in the SFVB, state-of-the-art groundwater protection measures should be employed that include provisions for leachate collection and gas migration control as well as for groundwater monitoring. Stringent inspection controls should also be required during the construction and landfilling operations to assure compliance with these design specifications.

3.6.2 Background

3.6.2.1 Historic Landfill Development

Over 60 sanitary landfills, dumps and other related waste disposal sites in the SFVB were identified in this investigation as either completed or currently in use (Plate 5). Although these landfills were permitted to accept only nonhazardous wastes, most of the older sites were designed and regulated without the benefit of current state-of-the-art knowledge on groundwater protection. Prior to 1949, the capability of hazardous materials to contaminate groundwater was generally not recognized.

The Sheldon-Arleta landfill, owned and operated by the City of Los Angeles, is a documented case of groundwater degradation occurring from the by-products of decomposing refuse. As a result of extensive water spreading activities nearby, portions of the fill became temporarily inundated.

This resulted in a localized increase in carbon dioxide and dissolved solids concentrations in adjacent groundwaters. There was no evidence, however, of volatile organic compounds (VOC's) entering the groundwater from this site.

Limited sampling of landfill gases from two recently completed landfills in the SFVB indicated the presence of TCE and other VOC's. The presence of these chemicals indicates a potential for contamination of adjacent groundwater. However, since groundwater monitoring down gradient of landfills was not required in prior years, it is not known to what extent many active or abandoned sites may have contributed to current contamination problems. Comprehensive sampling and monitoring of these sites is necessary to fully evaluate their actual and potential impact on groundwater quality.

3.6.2.2 Landfill Siting

There are currently several proposed landfill sites in the SFVB that are in various phases of the design and permit approval process. These new sites are generally proposed for the reclamation of depleted sand and gravel mining pits in the Sun Valley area. At present, landfilling is the most feasible alternative for the reclamation of these exhausted pits and complies with the City's General Plan for the area. As such, pressure to use these pits for landfilling is expected to continue for some time.

Currently the RWQCB has restricted development of landfills in the SFVB to the disposal of nonhazardous wastes only. These landfills may, under certain conditions, affect adjacent groundwaters. The latest landfill design requirements are intended to eliminate the possibility of groundwater contamination from landfill gases and leachates. However, these design features have had limited field application (5 years) in comparison to the period over which a sanitary landfill can act as a source of contamination to the surrounding environment (50-70 years). For this reason, many individuals have advocated a temporary moratorium on the development of sanitary landfills in the SFVB.

The County Solid Waste Management Board is currently in the process of updating the Master Solid Waste Management Plan for Los Angeles County.

While the previous County Plan relied heavily on the continued development of sanitary landfill sites throughout the County, the new plan (scheduled for release in 1983) will place greater emphasis on alternative technologies such as waste recycling and energy recovery systems. At present, these technologies are in a developmental stage and must undergo further testing before accurate economic and operating comparisons can be made with traditional landfill operations.

The County Plan recognizes that available landfill space is a limited commodity that should be managed for both present and future needs. As such the County Plan will attempt to guide the siting and development of sanitary landfills on a regional basis in order to stimulate the economic environment necessary for the development of resource recovery technologies. Such control would consist of defining regional 'waste-sheds' of solid waste generation, handling and disposal self-sufficiency. Ideally a given region with a high availability of landfill space should not be 'over-developed' to accommodate the short-term needs of any adjacent waste-shed. Such controls would promote the development of landfill alternatives and thus extend the practical lifetime of all existing landfill space. Similar planning controls may be available in the SFVB to pace the development of future landfill sites.

3.6.2.3 Landfill Design

Previous controls for landfills may have been inadequate to protect against groundwater contamination. As mentioned, the Sheldon-Arleta site is one known example of contamination resulting from landfill operations in the SFVB. Prior to 1978 there were no formal design requirements for the containment and management of leachates and gas migration.

At present, the RWQCB is charged with the responsibility of establishing requirements for the design and operation of sanitary landfills. Each applicant for a landfill must comply with the design, operating and monitoring requirements imposed by the RWQCB. In addition, each site plan must meet the requirements of all concerned agencies including local sanitation departments, health services agencies and others.

The RWQCB has decided to extend RCRA requirements for landfill closure and post-closure monitoring to all active Class II landfills.

In the City of Los Angeles, each site must also meet the design and inspection requirements of the Department of Water and Power (LADWP). The current LADWP requirements are designed to both minimize the production of leachates and provide for the containment and removal of any leachates and landfill gases produced. In order to assure compliance with these design objectives, the LADWP also conducts inspection and monitoring of the construction of these containment and removal systems.

3.6.3.2 Landfill Permit Code Enforcement

The Bureau of Sanitation of the City of Los Angeles has the authority to station inspectors in all Class II and III landfills in the city to ensure that only refuse which is allowed under a landfill's operating permit is placed in the landfill. This inspection authority is designed to prevent the illegal disposal of hazardous wastes into non-Class I landfills, and ensure that household refuse is not placed in Class III landfills.

3.6.3 Implementation

3.6.3.1 Site Investigation

A comprehensive survey of all landfills in the SFVB for the presence of hazardous wastes should be performed. Information from existing well data should be analyzed in conjunction with existing records on landfill depth, current and historic water levels, filling and closure dates, final cover requirements, etc. As indicated by this initial information, further investigation of individual sites may be necessary. Landfill gas sampling, exploratory soil borings, aerial surveys and construction of new monitoring wells may be required to fully evaluate the groundwater contamination potential of each site.

These investigative activities generally fall within the regulatory authority of the RWQCB and the State DOHS. The RWQCB is currently requiring such monitoring on all new landfills and has begun a program to upgrade monitoring capabilities at all active Class II sites as well.

The State DOHS is currently conducting an abandoned waste disposal site identification program as part of the California administered equivalent of the federal Resource Conservation and Recovery Act (RCRA) program. The goal of this program is to identify all industrial sites that previously allowed on-site hazardous waste disposal and to investigate these abandoned operations for the presence of hazardous wastes. Those sites that could cause public health related problems are referred to the superfund program for further detailed investigations.

3.6.3.2 Siting Controls

A general moratorium on sanitary landfill construction is not recommended at this time. However, planning guidelines of the County Solid Waste Management Plan should be used by the City Planning Department and other agencies to fully regulate the development of alternative landfill sites. The implementation of measures presented in the guidelines would make it possible to control the development of landfills in the Sun Valley gravel pits and thereby serve the best needs of the entire community.

3.6.3.3 Design Requirements

Current procedures for the review and approval of landfill design should be continued because they provide an opportunity for local agencies to influence groundwater protection features of 'the design'. It is recommended that the current LADWP landfill design guidelines and the equivalent construction inspection provisions be included in RWQCB requirements for all new Class II sanitary landfills in the SFVB.

3.6.4 Cost and Funding

3.6.4.1 Site Investigation

The State DOHS provides funding for the Abandoned Site Investigation Project through implementation of the State Hazardous Waste Control Law. Follow-up investigations of individual sites can be funded through the State Hazardous Substances Account. Whenever possible, however, testing requirements and monitoring programs for landfills should be funded directly by the landfill owner/operator.

3.6.4.2 Landfill Siting

The costs associated with the implementation of landfill siting controls has been largely borne by regulatory agencies. Permit fees need to be adjusted to transfer most of this cost to the developer.

3.6.4.3 Design

The implementation of more stringent requirements for sanitary landfill development could be achieved through the existing regulatory process. The costs of regulatory changes should be borne by regulatory agencies.

The LADWP has incurred substantial costs for past inspections of landfill construction. The City of Los Angeles is currently considering imposing a requirement by ordinance that the developer of the landfill pay the cost of these inspections. The landfill inspection costs are currently estimated at approximately $1,500 per acre of landfill area.

RECOMMENDATION NO. 7

3.7 Groundwater Monitoring Program

3.7.1 Introduction

3.7.1.1 Objective

An expanded groundwater monitoring program for the San Fernando Valley Basin is recommended in order to develop water quality information necessary to permit continuing and timely evaluation of the effectiveness of groundwater quality protection and contaminant control strategies implemented as a part of the overall groundwater quality management plan. This program will assure a continuation of water deliveries to the consumer that comply with the water quality requirements of the California Department of Health Services.

3.7.1.2 Required Action

The implementation of an expanded groundwater monitoring program requires the following actions:

A. Develop additional information concerning the occurrence and movement of organic contaminants throughout the groundwater basin.

2. Better define long-term variations in the concentration of organic contaminants in the groundwater basin.

3. Better define the relationship between the quality and quantity of recharge water and basin groundwater quality.

4. Provide information that will allow an evaluation of the impact on groundwater quality resulting from both completed and active sanitary landfills within the basin.

3.7.2 Background

3.7.2.1 Existing SFVB Monitoring Program

The present level of routine monitoring to determine the concentration of organic contaminants in extracted SFVB groundwater was developed with, and approved by, the State DOHS. In the City of Los Angeles, the frequency of sampling of SFVB production wells and the major wellwater transmission line (River Supply Conduit) is increased when the level of contaminants in the groundwater being handled by those facilities exceeds the allowable DOHS action levels. The primary purpose of this sampling and analysis program is to provide the data needed in blending operations to maintain the contaminant level in product water delivered to the customer to within allowable action levels. The water supply wells of Glendale and Burbank, which are currently maintained on a standby basis, are sampled and analyzed semiannually.

3.7.2.2 Need for Expanded Groundwater Monitoring

An adequate level of groundwater monitoring is prerequisite to effective implementation of those aspects of the Groundwater Quality Management Plan for the San Fernando Valley Basin relating to the movement and early detection of contaminants in the groundwater basin. An adequate monitoring program should include regularly scheduled samplings, collection and testing of wellwater and recharge water from representative locations. The information obtained from this monitoring will provide the basis for evaluating the effectiveness of groundwater quality protection and contaminant control techniques which were implemented as a part of the Management Plan.

3.7.2.3 Monitoring Contaminant Trends

Four well fields have been identified in the eastern portion of the SFV basin in which a high percentage of production wells are contaminated predominantly by TCE, a volatile organic compound commonly used as an industrial cleaning solvent. These well fields are located in the North Hollywood area the Crystal Springs area the Pollock well area and Crescenta Valley. Continued collection and analysis of samples from wells located in these areas should provide the necessary definition of contaminant level trends needed to implement water quality remedial work in the basin.

The Gas Chromatograph-Mass Spectrometer (GC-MS) will be employed in the analysis of SFVB contaminants because of its capability of analyzing a large number of organic compounds. This unique capability of the GC-MS analyzer should aid in the location of contaminant sources and plumes.

3.7.2.4 New Observation Wells

The construction of new monitoring wells to supplement the existing well system is needed as a part of the expanded monitoring program in those areas where groundwater quality data is currently limited or unavailable. Of special concern are groundwater basin areas upgradient from municipal supply wellfields. Data from additional observation wells, combined with data from existing observation and production wells, should allow for the identification of the quality of groundwater which is moving towards the wellfields. This water quality information could permit early detection of new contamination, and possibly aid in identifying contaminant sources.

3.7.2.5 Monitoring Recharge Water Quality

Data concerning the quality of water that percolates into and recharges the SFVB is very limited. A better understanding of the relationship between the quality and quantity of recharge water and groundwater quality is needed to adequately interpret basin water quality phenomena. A significant proportion of the water which recharges the SFVB is derived from sources which may be degraded by inadvertent or deliberate discharges of toxic materials. Sources of groundwater recharge which may intermittently contain toxic materials include the following:

A. Reclaimed wastewater used for irrigation.

B. Los Angeles River water percolating into the unlined reaches or recharged at spreading grounds.

C. Septic tank effluent discharged from private disposal systems at commercial and industrial establishments.

3.7.2.6 Monitoring the Quality Impact From Landfills upon Groundwater Quality

Landfills and dumps located upgradient to municipal well fields are of particular concern. Data from monitoring activities conducted at these locations may make possible the early detection of localized groundwater quality degradation and provide sufficient time to implement mitigation measures to minimize the impact upon municipal wellfields.

3.7.3 Implementation

3.7.3.1 Groundwater Monitoring

A. Required Action

The implementation of this recommendation requires the planning, and development of a comprehensive monitoring program that will include the construction of wells and the collection and analyses of samples of groundwater throughout the SFVB. This monitoring program will require an increased level of coordination and scheduling between water purveyors to ensure that pertinent water quality information is gathered and evaluated. The expanded program should compliment and augment current monitoring programs.

B. Responsible Agencies

It is recommended that the Interagency Advisory Committee include amongst its duties the guidance of the expanded groundwater quality monitoring program.

C. Costs

This groundwater quality monitoring program for the SFVB is estimated to require the collection and analysis of approximately 75 additional samples per month. The total cost is estimated at $60,000 per year.

3.7.3.2 New Monitoring Wells

A. Required Action

Monitoring wells should be installed at key locations in the basin at locations coordinated through the Interagency Advisory Committee. Additional monitoring wells may also be utilized which are constructed pursuant to requirements of the DOHS or the Regional Water Quality Control Board in conjunction with special investigations of individual spills or landfill sites.

B. Implementing Agencies for New Monitoring Well Construction

The Interagency Advisory Committee should direct or delegate the establishment of guidelines for the location, design and construction of the proposed observation wells.

C. Costs

The initial phase of an expanded groundwater monitoring program is expected to require approximately 11 new observation wells. The unit cost for installing new observation wells is estimated at $12,000 (1982 Cost Estimate). The need for additional observation wells should be assessed as the program progresses.

3.7.3.3 Special Monitoring Programs

A. Required Action

Special water quality investigations that should be incorporated into the expanded groundwater quality monitoring program on an intermittent basis and include the monitoring of: the Los Angeles river, private disposal system effluent, sewage in key collector lines, and water recharged in spreading basins.

B. Implementing Agencies

The Interagency Advisory Committee will establish guidelines and/or coordinate requests for these special monitoring programs.

C. Costs

The cost associated with implementing these special monitoring programs is estimated at $10,000 per year.

3.7.4 Funding

Funding for the installation of new monitoring wells is recommended to be supported by the water purveyors as part of their water quality protection efforts. Alternative funding sources for monitoring wells such as the Federal and/or the State superfund programs should be investigated by the Interagency Advisory Committee.

The sampling and analysis of monitoring and production wells could be funded by the operating budgets of each water department through water revenues.

Funding for the cost of observation wells required by the DOHS or the RWQCB in conjunction with individual spill or landfill investigations should be determined in accordance with their regulations.

The costs for the collection and analysis of samples from private disposal systems should be incorporated into the fees charged to the owner of commercial and industrial properties equipped with such systems.

RECOMMENDATION NO. 8

3.8 Aquifer Management and Groundwater Treatment

3.8.1 Introduction

3.8.1.1 Objective

The objective of this recommendation is to control and/or remove the organic contaminants contained in the groundwaters of the San Fernando Valley Basin by flow management of stored water within the basin or by the application of treatment processes to extracted wellwater.

3.8.1.2 Required Actions

The following actions are necessary to accomplish the objective of this recommendation.

A. New SFVB production wells should be sited in such a manner as to make possible the control of groundwater flow within the basin for the purpose of attenuating organic contaminant levels in the stored water by dilution or other mechanisms.

B. The use of well packer devices should be tested in production wells with suitable geology and casing configuration as a means of preventing degradation of the quality of wellwater by contaminated water from upper zones.

C. Continue or institute a program of blending groundwater containing between five and 20 ppb TCE with water from other sources to produce a product water that complies with State DOHS water quality requirements.

D. Conduct a three phase program of organic contaminant removal from extracted SFVB groundwater by aeration methods so that the most cost effective equipment and procedures can be developed and employed.

3.8.2 Background

3.8.2.1 Organic Contaminants in SFVB Groundwater

Approximately 45 percent of a total of the 109 SFVB municipal supply wells owned by five water purveyors produce water containing organic chemical contaminants in excess of the allowable action levels of five and four ppb, respectively, for TCE and PCE respectively as established by the California Department of Health Services (DOHS).

3.8.2.2 Contaminant Migration

As a result of existing groundwater flow patterns in the SFVB induced by pumping, groundwater contaminants tend to be held within the developed cones of water table depression in the three major well fields of the basin. Accordingly, basin-wide contaminant migration is restricted as long as established well field pumping practices continue.

Significant changes in the flow characteristics of groundwater (and dissolved contaminants) within the basin is possible if new SFVB production wells are sited at suitable distances away from existing wells. By changing the direction and distance that groundwater must travel prior to extraction, the level of wellwater contaminants may be attenuated by dilution and mixing with uncontaminated water within the basin.

3.8.2.3 Groundwater Blending

A water quality blending operation is currently practiced by the Los Angeles Department of Water and Power (LADWP) in the SFVB that involves the mixing of the output of wells producing water exceeding the allowable TCE action level with other well water whose contaminants are within the action level. The capability of a water distribution system of a well field to perform a blending operation is dependent upon the availability of adequate quantities of uncontaminated water for blending and the hydraulic carrying capacity of the system. Operational data collected over the past three years indicates that, despite the variable nature of contaminant levels in production wells, blending can be effectively practiced for wells producing water containing TCE at concentrations up to approximately 20 ppb (mean annual of monthly values). The majority of SFVB wells exceeding the TCE action level produce water within the TCE range suitable for blending (5-20 ppb).

3.8.2.4 Pumping Constraints Due to Contamination

During periods of surplus water inventory, surface water is diverted to the groundwater basin by utilizing the spreading grounds of the SFVB. This operation builds up the stored groundwater supply which can be used during times of water shortages. However, without some type of treatment to remove contaminants which are introduced into the water within the basin from various sources, it may not be practical to retrieve the added water, due to excessive levels of groundwater contamination that limit the use of many wells. Presently, the use of approximately 13 SFVB wells has been severely restricted or discontinued due to excessive contaminant levels.

3.8.2.5 Groundwater Treatment

The application of appropriate treatment processes to groundwater from contaminated wells can accomplish the following:

A. Restore contaminated wells to full production of acceptable quality water.

B. Remove contaminants from the basin which could migrate and contaminate other down-gradient wells.

C. Regain the use of well facilities and the associated capital investment which are not fully utilized when a well is taken out of service or its production restricted because of excessive levels of contaminant.

D. Restore normal operating flexibility and capacity of the affected groundwater supply required to meet the public demand.

Based upon a preliminary investigation of such factors as costs, proven performance reliability, treatment equipment compatability with existing water system operations and environmental constraints, the packed aeration tower appears to be the most effective treatment method for removing TCE, PCE and a broad range of other volatile organic compounds from contaminated groundwater.

The feasibility and cost effectiveness of the aeration process for organic contaminant removal from water sources has been verified in demonstration and full scale applications within the water supply industry.

The level of emission of TCE and/or PCE from aeration towers is subject to regulation by the South Coast Air Quality Management District (SCAQMD). At this time, the air quality criteria for acceptable levels of tower emissions are under development by state authorities and the SCAQMD. The result of this effort could significantly impact the cost of aeration treatment proposals. For instance, if the finalized air quality criteria require that aeration tower emissions be treated to remove or reduce contaminants, the additional treatment equipment could have a major effect on treatment costs.

3.8.2.6 Groundwater Disposal

The provisions of the SFVB adjudication do not provide for the pumping and disposal of groundwater to the storm drain system as a method for purging the basin of contaminants. Additionally, the disposal of contaminated groundwater to the storm drain system is contrary to the policies of the Regional Water Quality Control Board and, presently is not considered a viable contaminant control alternative.

3.8.2.7 Emerging Groundwater Contaminant Control Techniques

Several groundwater contaminant control techniques, which presently are in the developmental stage, may be effective for controlling or removing of volatile organic compounds in water produced from contaminated wells. These include air-lift pumping, and in certain special well strata the use of well packers. These techniques have good potential as cost effective control alternatives to packed aeration towers and should be investigated further to evaluate their overall suitability for controlling organic contaminants in the basin.

3.8.3 Implementation

3.8.3.1 Blending

A. Required Action

Where possible, the water produced from wells containing between 5 and approximately 20 ppb TCE should be blended with other water sources in order that delivered water supplies comply with applicable drinking water requirements for volatile organic contaminants. Information developed from the recommended expanded groundwater monitoring program (Recommendation No. 7) will assist in the development of a more effective long term groundwater blending program.

B. Responsible Agencies

The LADWP is presently conducting a blending program and should continue this practice as the most cost effective water quality control method for wells producing water in the range of 5 to 20 ppb TCE or PCE. If necessary Glendale could pursue a blending program with limited distribution system modifications. Burbank would have to incur major expense for system changes to employ blending in its water supply program.

C. Costs

The cost of implementing the LADWP blending program involves minimal cost because major modifications to the distribution system or significant increases in manpower are not needed. An increased level of system monitoring is required in order to assure adequate water quality control over blending operations.

3.8.3.2 Treatment

A. Required Actions

Planning, development and installation of aeration treatment facilities is required at those wells or groups of wells which produce water containing TCE and/or PCE at levels in excess of the level that can be satisfactorily blended. Above concentrations of 20 ppb of TCE and PCE, blending becomes impractical because of limitations in the availability of satisfactory quality blending water and system hydraulic carrying capacity.

Because both aeration treatment technology and SCAQMD policy on contaminant emissions from treatment facilities are currently under development, the implementation of the aeration proposal of this recommendation should proceed in three phases. SCAQMD approval of proposed emissions during each phase will be required in advance of actual testing.

The recommended three phase aeration program involves the following:

Phase 1 -

Pilot scale test of candidate aeration processes;

Phase 2 -

Demonstration test of the most effective Phase 1 process in a full scale treatment unit at one SFVB well containing an elevated level of contaminants.

Phase 3 -

Formulate and implement aeration treatment in the SFVB based upon Phase 1 and 2 findings.

B. Responsible Agencies

Implementation of water treatment measures should be the responsibility of the affected water departments. The coordination necessary to achieve an effective basin wide program should be undertaken by the Interagency Advisory Committee representing all affected agencies.

C. Costs

Several factors will significantly affect the determination of the total project costs. The following important factors are included. First, the extent and severity of contamination in the groundwater at individual wells frequently exhibits broad variations with time. This dynamic condition makes it difficult to determine the exact level of treatment necessary to produce high quality drinking water. Second, it is possible that regulatory guidelines developed by the EPA for volatile organic chemicals in drinking water may change in the future. These changes could significantly alter the level of treatment necessary. Finally, the feasibility and effectiveness of emerging groundwater contaminant control techniques must be fully demonstrated so that the most cost-effective combination of treatment alternatives is employed.

Based upon current data, the best estimates of the cost for the implementation of packed aeration tower units at 11 SFVB wells is approximately $300,000 per unit initial capital cost and $22,000 per unit annual operating cost.

3.8.3.3 Aquifer Management

A. Required Actions

The siting of SFVB production wells should be modified over the long term to allow for the implementation of a program of preferential basin pumping in such a manner as to minimize the effect of localized areas of groundwater contamination upon water supply operations. In addition, the selection of production wells with suitable geology and casing configuration for the installation of well packer devices should be completed. These devices should be installed to prevent degradation of wellwater by contaminated water from upper strata zones.

B. Responsible Agencies

The LADWP has initiated a SFVB aquifer management project to investigate the construction of a new major wellfield north of the present North Hollywood production area in order to increase its areal extraction flexibility within the City of Los Angeles. The Interagency Advisory Committee should oversee the investigation of the need for additional wellfield capacity in other parts of the basin to facilitate aquifer management for water quality purposes.

The Interagency Advisory Committee should investigate the effectiveness of well packer devices in other wells than LADWP North Hollywood No. 24 as a means of improving the quality of SFVB groundwater supply.

C. Costs

The new wellfield being investigated by the LADWP, consisting of approximately 20 new production well and collecting lines to be installed for aquifer management purposes, is estimated to cost approxiamtely $10 million. The cost of additional wells in other parts of the valley will depand on many factors including well capacity and the length of collecting lines.

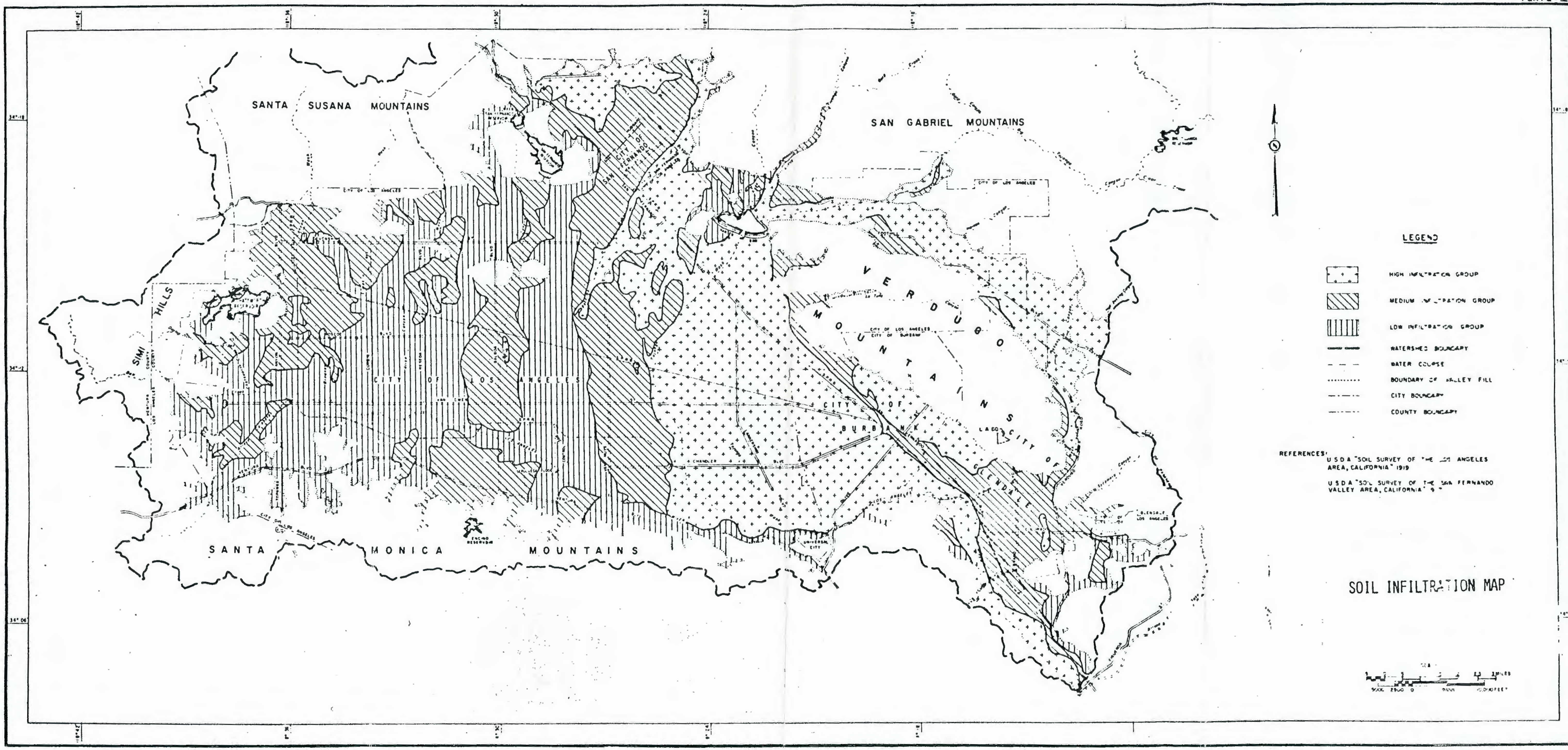
The cost of the installation of a well packer device on a production well is estimated to vary from $1,000 to $7,000, depending upon whether the device is installed during regular pump maintenance or installed at any other time.

3.8.4 Funding

Water treatment costs may be funded through increased water rates.

The Interagency Advisory Committee should investigate other possible funding sources including the Superfund, Hazardous Substance Account, Energy and Resources Fund, and the California Safe Drinking Water Grant Program. Federal and/or state assistance in financing the water treatment program may require legislative changes before funding is possible.

In the event that specific sources of contamination are determined, it may be possible that individual spill or site clean-up costs could be funded privately by the responsible parties, or through State or Federal Superfund programs as currently defined.



SOIL INFILTRATION MAP

PLATE 2

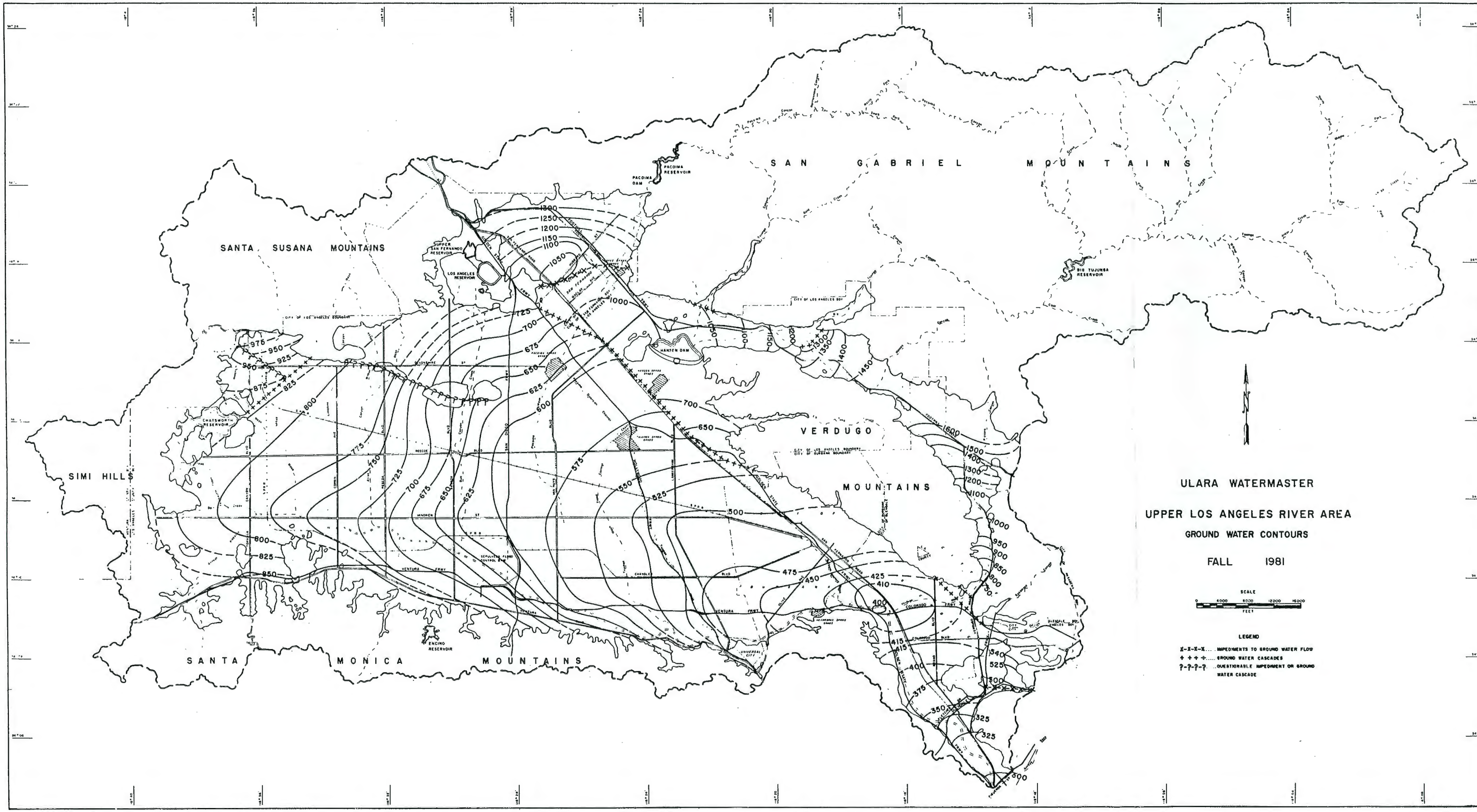
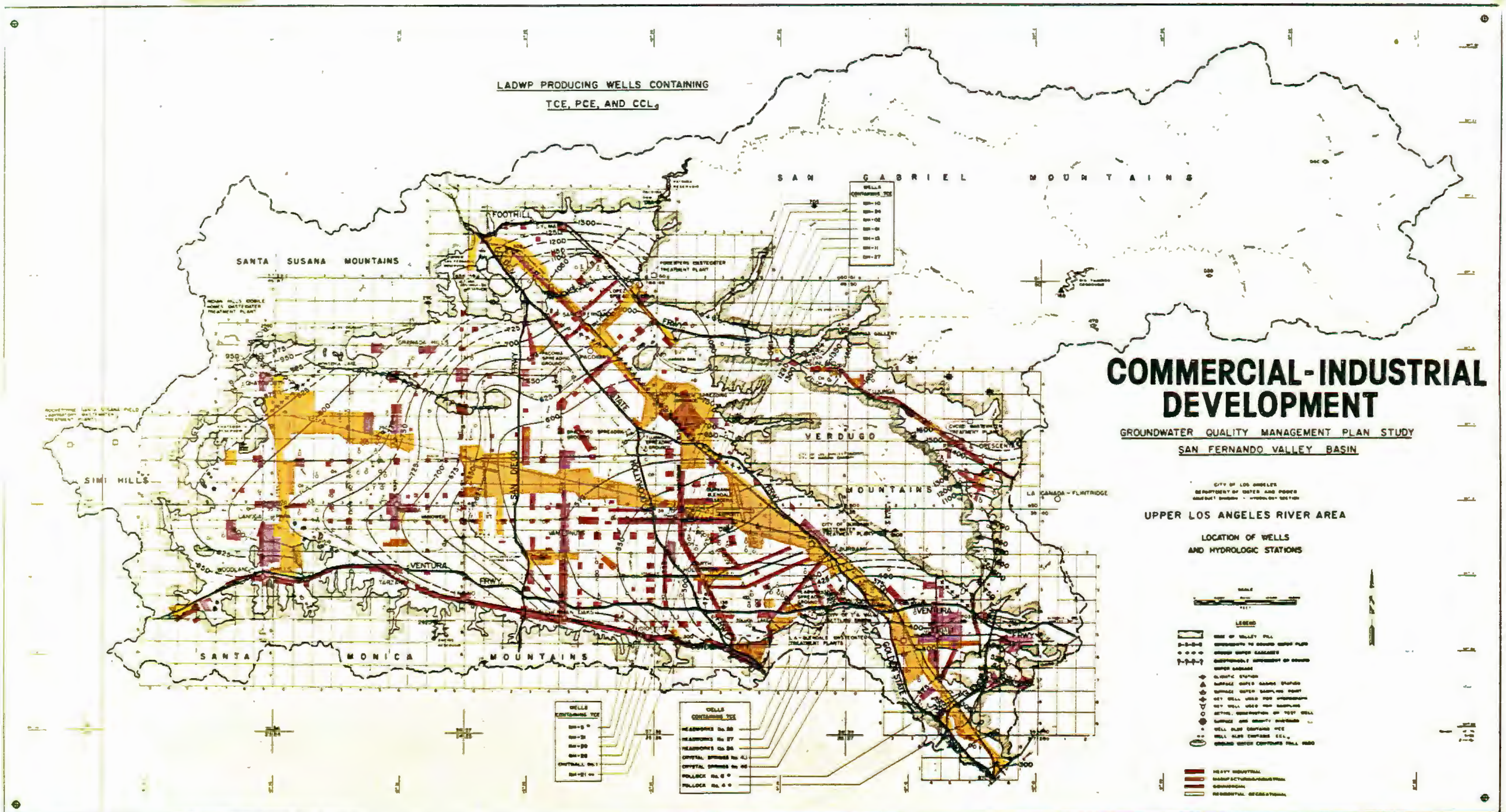

SAN GABRIEL MOUNTAINS
SANTA SUSANA MOUNTAINS
SIMI HILLS
VERDUGO MOUNTAINS
SANTA MONICA MOUNTAINS
PACOIMA RESERVOIR
PACOIMA DAM
HANSEN DAM
BIG TUJUNGA RESERVOIR
CHATSWORTH RESERVOIR
ENCINO RESERVOIR
LOS ANGELES RESERVOIR
ULARA WATERMASTER
UPPER LOS ANGELES RIVER AREA
GROUND WATER CONTOURS
FALL 1981
SCALE
0 4000 8000 12000 16000
FEET
LEGEND
X-X-X-X.... IMPEDIMENTS TO GROUND WATER FLOW
+ + + +..... GROUND WATER CASCADES
?-?-?-?. ..QUESTIONABLE IMPEDIMENT OR GROUND WATER CASCADE

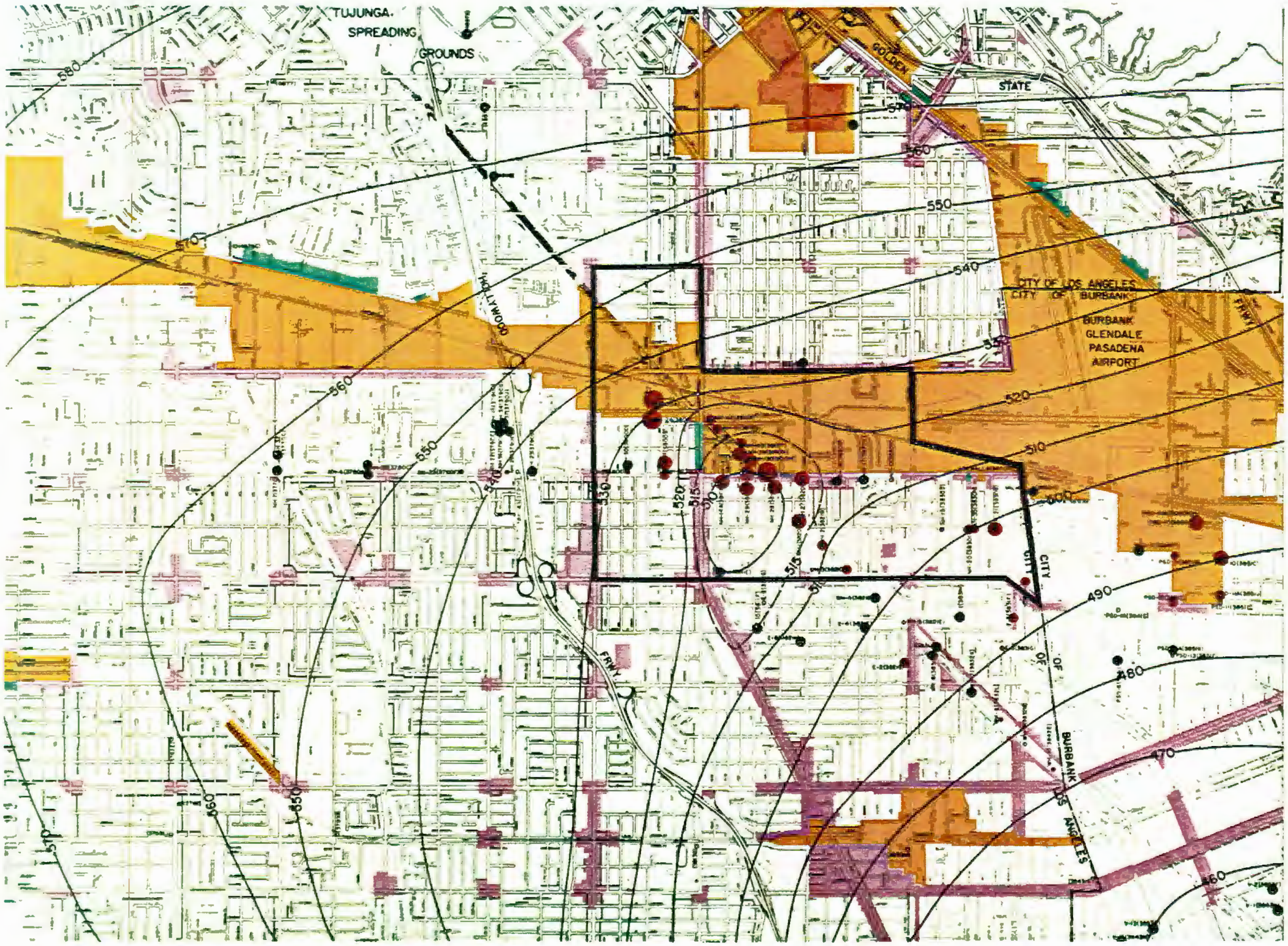
PLATE 3



LADWP PRODUCING WELLS CONTAINING
TCE, PCE, AND CCL4
SAN GABRIEL MOUNTAINS
SANTA SUSANA MOUNTAINS
SIMI HILLS
VERDUGO MOUNTAINS
SANTA MONICA MOUNTAINS
LA CANADA - FLINTRIDGE
COMMERCIAL-INDUSTRIAL
DEVELOPMENT
GROUNDWATER QUALITY MANAGEMENT PLAN STUDY
SAN FERNANDO VALLEY BASIN
UPPER LOS ANGELES RIVER AREA
LOCATION OF WELLS
AND HYDROLOGIC STATIONS

PLATE 4

COMMERCIAL AND INDUSTRIAL DEVELOPMENT



GROUNDWATER QUALITY MANAGEMENT PLAN
SAN FERNANDO VALLEY BASIN

NORTH HOLLYWOOD AND VICINITY
WELL AND STREET LOCATIONS

PLATE 5

LANDFILL LOCATIONS AND LADWP PRODUCING WELLS CONTAINING TCE, PCE, AND CCL_4

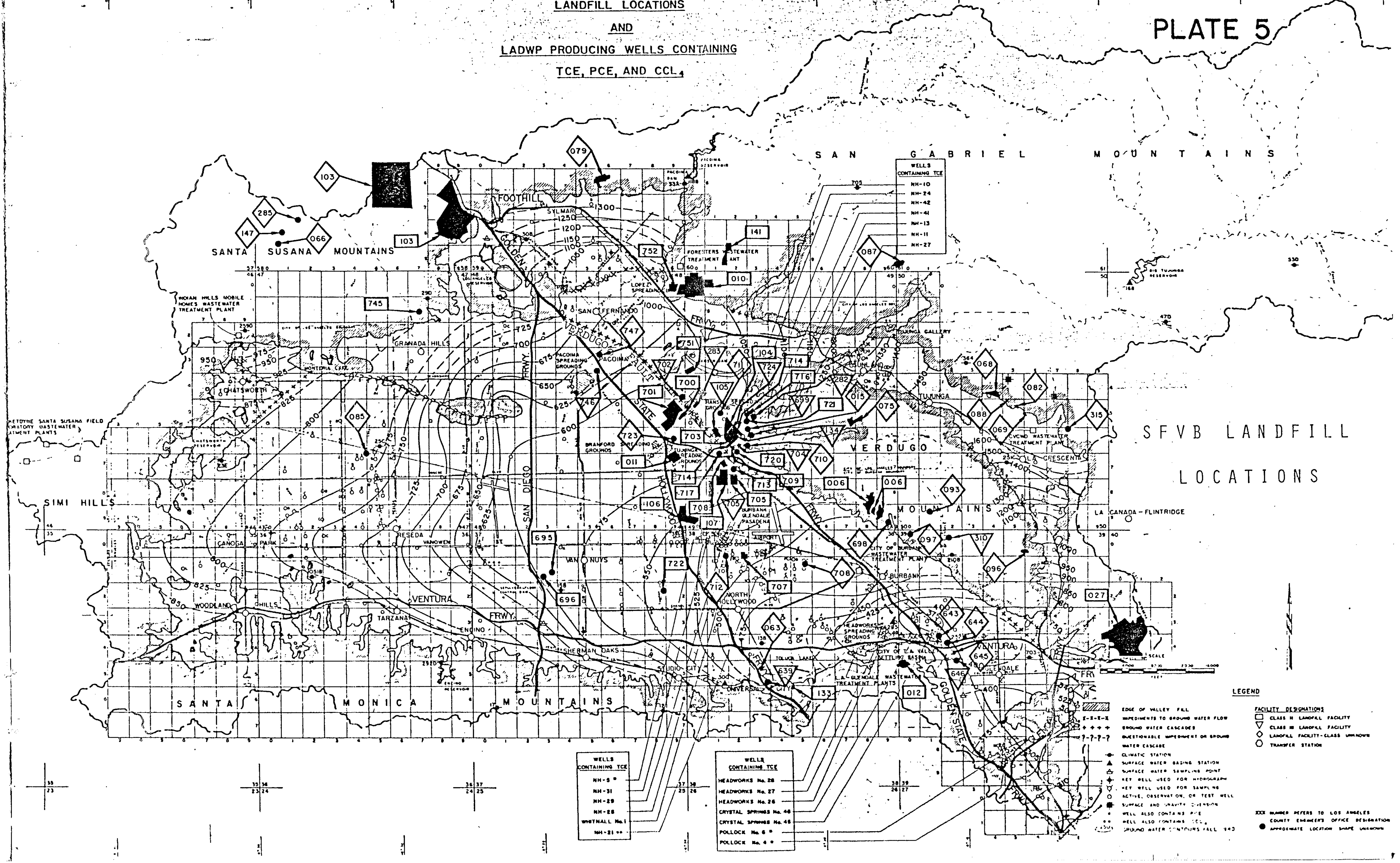


PLATE 6

LOCATIONS OF BUSINESSES THAT USE PRIVATE DISPOSAL SYSTEMS

GROUNDWATER QUALITY MANAGEMENT PLAN

SAN FERNANDO VALLEY BASIN

CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER
SANITARY ENGINEERING DIVISION - SOURCE WATER QUALITY SECTION

NORTH HOLLYWOOD AND VICINITY

WELL AND STREET LOCATIONS

SCALE

FEET

LEGEND

- WELL LOCATION
- CITY BOUNDARY
- PRIVATE STREET
- FUTURE STREET
- RAILROAD
- PARK AND RECREATION CENTER
- GROUNDWATER CONTOURS FALL 1980

●-PRIVATE DISPOSAL SYSTEM

+-WELLS EXCEEDING DOHS ACTION LEVEL FOR TCE

DATE 5-20-82

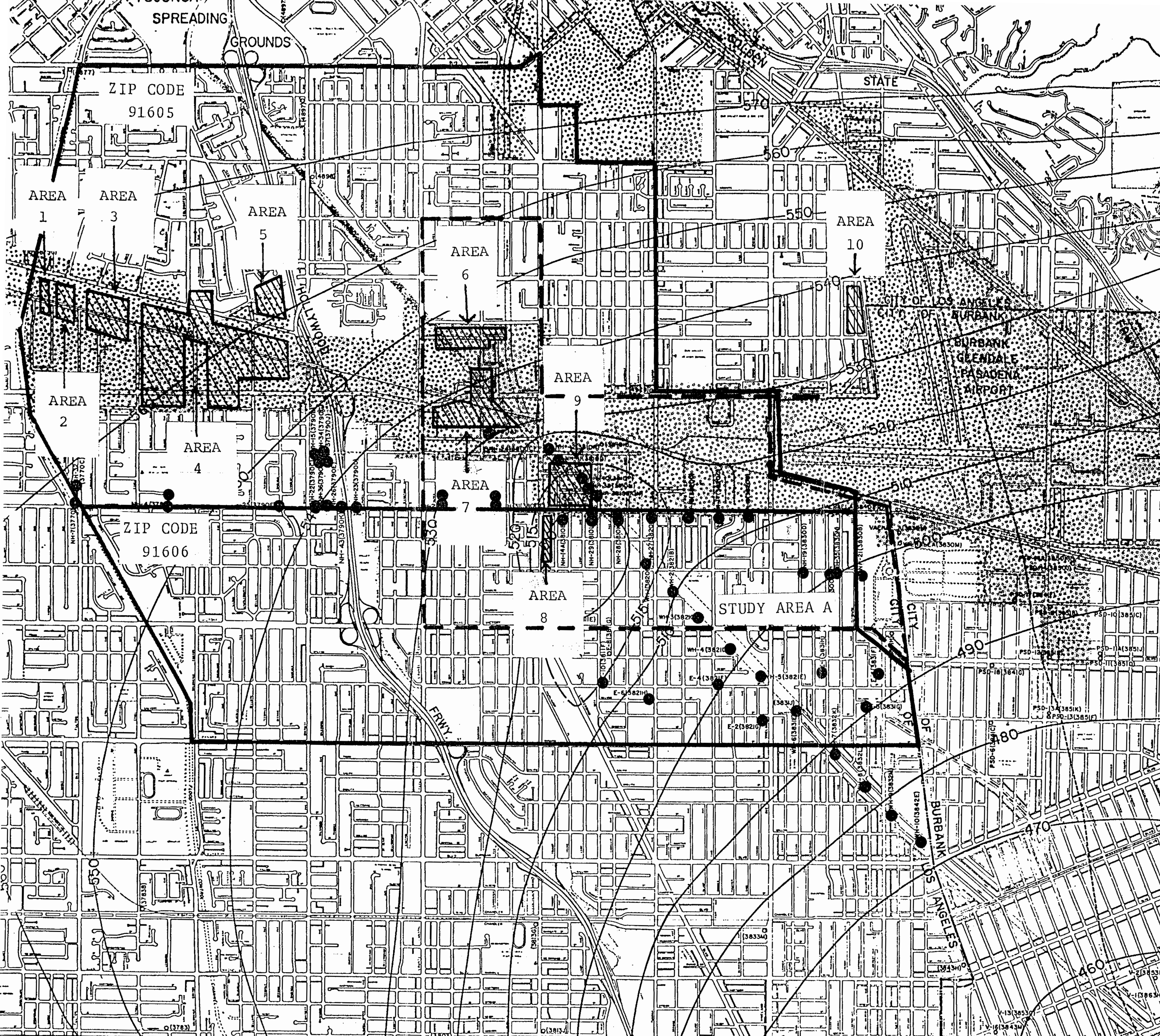


PLATE 7

AREAS NOT SERVICED BY SANITARY SEWERS

GROUNDWATER QUALITY MANAGEMENT PLAN

SAN FERNANDO VALLEY BASIN

CITY OF LOS ANGELES
DEPARTMENT OF WATER AND POWER
SANITARY ENGINEERING DIVISION – SOURCE WATER QUALITY SECTION

NORTH HOLLYWOOD AND VICINITY

WELL AND STREET LOCATIONS

SCALE

1000 500 0 1000 2000 3000

FEET

N

LEGEND:

- WELL LOCATION
- CITY BOUNDARY
- PRIVATE STREET
- FUTURE STREET
- RAILROAD
- PARK AND RECREATION CENTER
- INDUSTRIAL ZONES
- AREAS THAT DO NOT HAVE ACCESS TO SANITARY SEWERS
- 550 GROUNDWATER CONTOURS FALL 1980

DATE 5-20-82

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APPENDIX

TASK I

INVENTORY AND ANALYSIS OF AVAILABLE INFORMATION

Introduction

The objective of this task series is to accumulate and evaluate all pertinent information on groundwater geohydrology and quality in the SFVB. Supplemental collection and analysis of groundwater quality data, especially data concerning organic contaminants, was conducted to refine the identification of groundwater quality problems and problem areas within the basin. In addition, information on industrial toxic waste generation and associated practices, such as handling, storage and disposal of toxic wastes, was gathered and evaluated in order to assess the impacts which these activities have on SFVB groundwater quality.

This information provides background for other task investigations and serve as the basis for the recommended plan formulation phase of the GWQMP-SFVB project.

Task I is divided into four subtask investigations which include the following: Groundwater Geohydrology/Quality (I-A), Industrial Survey (I-B), Survey of Other Waste Sources (I-C) and Survey of Government Regulations (I-D). Completion of the specific elements in the task required extensive review of applicable industrial waste discharge regulations, industrial waste discharge locations, identification of landfills in the basin, review of historical toxic material spill reports, dry weather urban drainage, and the establishment of an extensive network of groundwater monitoring stations for subsequent analysis of toxic materials in SFVB groundwaters.

Each subtask is divided into several subordinate elements. For convenience in report preparation, some of these elements were combined together or with other task reports as follows: Groundwater Flow Patterns/Water Levels and Groundwater Usage (I-A-1 and I-A-2); Source Identification, On-site Industrial Waste Management Plans, Augmented Enforcement Programs, and Best Management Practices (I-B-1, I-B-3, II-B and IV-B); and Dry Weather Urban Drainage and Dry Weather Urban Drainage Controls (I-C-1 and II-C).

A summary of the all Task I subtask reports are presented in the following sections.

SUBTASKS I-A-1 AND I-A-2

GROUNDWATER FLOW PATTERNS/WATER LEVELS AND WATER USAGE

Objectives

I-A-1

To investigate groundwater flow patterns in the study area; to establish water levels in conjunction with present and projected groundwater use plans.

I-A-2

To gather pertinent information on all forms of groundwater usage in the study area, including normal and emergency water supply (pumping operations) conjunctive use of State Project and other imported waters, and industrial uses of groundwater.

Investigation

Background

In order to accomplish the objectives of Subtask I-A-1 and I-A-2, a broad study was made of those factors which influence and control groundwater flow patterns, water levels and groundwater usage in the San Fernando Valley Basin. Pertinent hydrologic data on the SFVB was collected from the files of the Los Angeles Department of Water and Power.

Scope

Available information was evaluated in order to determine the following: velocity and direction of groundwater flow, areas of the SFVB most vulnerable to the infiltration of contaminants because of the permeability of the subsurface strata; the impact of faults and other geologic features on groundwater movement; the use of modeling techniques; aquifer characteristics; and testing needs.

Water uses which most significantly affect SFVB groundwater quality were also investigated. Particular attention was directed toward the effect of long-term groundwater extractions upon the contours of the groundwater table, both before (1955) and after (1968 to present) the adjudication of the San Fernando Valley Basin. The role of the Watermaster in controlling groundwater usage in accordance with the provisions of the water rights judgement was reviewed in detail.

Conclusions Groundwater Flow Patterns/Water Levels

1. Geohydrology of the San Fernando Valley Basin

A. Description of the San Fernando Valley Basin

The San Fernando Valley Basin is part of the Upper Los Angeles River Area (ULARA). The ULARA encompasses all the watershed of the Los Angeles River and its tributaries above a point in the river designated by the Los Angeles County Flood Control District (LACFCD) Gaging Station F-57C-5, near the junction of the Los Angeles River and the Arroyo Seco. The ULARA encompasses 328,500 acres composed of 122,800 acres of valley fill, referred to as the groundwater basins, and 205,700 acres of hills and mountains. The 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 Basin; and on the west by the Simi Hills.

The valley fill area of the ULARA is divided into four hydrologic basins: San Fernando, Sylmar, Verdugo, and Eagle Rock. Each of these basins is defined on the basis of the existence of an apparent impairment of groundwater flow from one to the other caused by man-made, physiographic, or geologic features. The boundaries of the various basins are shown on Figure 1.

The San Fernando Basin is the largest of the four basins, comprising 91 percent of the total valley fill area. The western portion of the San Fernando Basin is generally composed of materials derived from the surrounding sedimentary rocks. The materials are generally fine-grained with high clay content and transmit water at a relatively slow rate. In addition, the presence of extensive clay layers make the western portion of the San Fernando basin, for all practical purposes, a confinced aquifer system.

Conversly, the eastern portion of the SFVB is generally an unconfined aquifer which is composed of sedimentary deposits of sand and gravel. The deposits have been eroded from the granitic rocks of the San Gabriel Mountains and transmit water at a relatively rapid rate. This eroded debris is generally very coarse; in places boulders up to three feet in diameter are relatively common. In addition to being composed of very permeable sedimentary basin is laced with clay lenses of varying and extent thickness. These layers have effects on the aquifer varying from causing high water table conditions due to perching, to causing localized semi-confined conditions.

The sand and gravel deposits of the eastern San Fernando basin constitute about one-third of the surface area of the groundwater reservoir and contain approximately two-thirds of the groundwater storage capacity, about 3 million acre-feet. It is in this area that the majority of the SFVB groundwater extraction and collection system is located. To a lesser degree, groundwater extraction wells are also located in the verdugo, Sylmar and Eagle Rock basins. The verdugo basin is similar to the San Fernando basin in that it is an unconfined aquifer. However, the Sylmar and Eagle Rock basins are confined aquifers except in the forebay areas where recharge occurs.

B. <u>Sources of Groundwater Recharge</u>

The sources of groundwater recharge in the Upper Los Angeles River Area are percolation of rainfall of the valley fill, surface runoff from hill and mountain areas, spread waters, imported waters, and possibly, some underground flow of water from the mountain masses to the alluvium. Removal of the supply is by export, evaporation from reservoirs, consumptive use, surface runoff, and by underflow out of the ULARA at Gage F-57 in the Narrows area.

2. Water Levels and Flow Patterns

A. Water Levels

A groundwater contour map of the SFVB, prepared for the ULARA Watermaster Report, indicates water levels throughout the basin for 1980 (Figure 2). Contour lines are dashed where insufficient data was available for accurate detail.

B. Groundwater Flow Direction and Velocity

The general direction of groundwater flow in the San Fernando Basin is from the recharge areas on the alluvial fans, along the edges of the valley fill, toward the discharge area within the Los Angeles River Narrows (Figure 3). Well tests and observations have shown that flow velocities in the eastern half are much greater than in the western portion of the basin. Horizontal velocities in the western half of the San Fernando basin have been estimated to be between 5 and 100 feet per year versus 300 to 500 feet per year in the eastern half (Figure 3). This difference is attributed primarily to much higher soil porosities in the eastern San Fernando basin area.

C. <u>Flow Changes Resulting from Pumping</u>

Two cones of depression are apparent on the 1980 water level map (Figure 2). Pumping large quantities of water for municipal uses has greatly modified the predevelopment conditions in the eastern portion of the San Fernando Basin with respect to the depths to water, hydraulic gradients, and direction of groundwater movement. An examination of contour maps for the ULARA, from 1930 to 1980, reveals the gradual development of cones of depression in each of the well field areas. The largest and earliest to develop is located at the bend of the Los Angeles River where the river begins its southerly course through the narrows area.

<u>Conclusions Groundwater Usage</u>

Water in excess of all demands remains in the SFVB, percolates to the water table, and results in increased groundwater in storage. Conversely, water must necessarily come from groundwater storage if all demands in excess of other supplies are to be met. The resultant change of groundwater in storage is indicated by rising groundwater levels as water goes into storage and falling levels as water comes out of storage.

1. Use of the Water Supply

There are six general types of water use in the ULARA.

A. Domestic - use for residences, including incidental irrigated garden and orchard.

B. Industrial - use by a manufacturing or service industry which requires water to be used directly in the manufacturing process or service.

C. Commercial - use by dry manufacturing and other commercial establishments whose primary water requirement is the lavatory needs of employees and clients and includes incidental irrigation of ornamental plants.

D. Irrigation - use for irrigated agriculture including incidental stockwater and domestic use.

E. Recreation - use for swimming, boating, hunting, or fishing.

F. Municipal - use for domestic, industrial, commercial, irrigation, and recreation purposes; including fire protection and use for other municipal functions of entities services by a municipality, public utility or district.

2. Place and Character of Water Use

The major portion of the water delivered within the Upper Los Angeles River Area is served by six agencies: the Cities of Burbank, Glendale, San Fernando, and Los Angeles; Crescenta Valley County Water District; and the La Canada Irrigation District. In all of these service areas, the water delivered is a mixture of imported water and local groundwater. However, the western portion of the SFVB received services from the City of Los Angeles, with the water primarily imported from the Owens Valley area. The City of San Fernando receives primarily groundwater.

3. Present and Future Pumping Controls in the San Fernando Basin

Pumping in the San Fernando Basin was essentially uncontrolled until 1968. Approximately 37,000 acre-feet/year were overdrafted for the period 1955 to 1968, with some 520,000 acre-feet of water removed from storage. This period of overdraft brought about an overall lowering of the water table in the eastern portion of the San Fernando basin. This caused an increased flux of higher TDS groundwaters from the western into the eastern portions of the basin. The ULARA was placed under Watermaster control in 1968. The Judgement, entered on January 26, 1979 after trial by court in the California Superior Court, provided for supervision of the ULARA.

4. Extraction Rights of Parties

The adjudicated extraction rights established by the Supreme Court on August 1, 1975 were finalized in the Judgment entered on January 26, 1979. Additionally, the Final Judgment includes provisions and stipultions regarding the calculation of return flow (recharge) credit of imported water, stored water credit, and physical solutions for certain parties as recommended by the Supreme Court.

Recommendations

The following recommendations should be considered to further refine the hydrogelogical factors that influence and control the movement of groundwater in the SFVB.

1. Additional aquifer tests will be needed to better understand the groundwater flow patterns in the study areas. Several individual and multiple well tests are planned.

2. It is also planned that some experiments will be conducted on deep wells in the contaminated areas using well packers. The purpose of these experiments would be to isolate various water extraction zones between layers of impervious materials to determine the presence or concentration of contaminates. This kind of information will be helpful in analyzing the flow paths of the contaminantes.

3. More experimenting with groundwater models will be useful in analyzing the pumping schemes, and the effect of time on the development and collapse of pumping cones in the contaminated areas.

4. Additional and more detailed studies may be required as the study procedes and more information becomes available. Any additional studies undertaken or recommendations for extensive study after this project is completed will be included when the final report is completed.

SUBTASK I-A-3

GROUNDWATER QUALITY

<u>Objectives</u>

To determine or estimate the extent and severity of groundwater quality problems in the study area; to identify long-term groundwater monitoring needs.

Investigation

Background

All available data, as well as related studies and reports, on groundwater quality in the area was collected and analyzed. In addition, an area-wide groundwater monitoring program was developed and implemented to determine the present status of groundwater quality in the study basin.

Scope

The major focus of this investigation involved a survey of SFVB groundwater supplies for 36 volatile organic compounds with particular emphasis on trichloroethylene (TCE), tetrachloroethylene (PCE) and carbon tetrachloride (CTC).

Conclusions

The extent and severity of groundwater contamination in the SFVB was determined from the results of analyses of more than 600 samples collected from 135 wells located throughout the basin.

The following paragraphs summarize the water quality data collected either previous to or in accordance with the Groundwater Quality Management Plan for the San Fernando Valley Basin.

1. Results of studies performed by the Department of Water and Power over the years indicate that groundwater quality in the study area declined steadily in the Period 1950-1974. Three major reasons for this decline have been theorized: (1) exclusive groundwater extractions from the eastern half of the basin prior to implementation of safe-yield pumping in 1968 created an increased west-to-east groundwater gradient, resulting in the influx of naturally-occurring, poorer-quality supplies from the eastern half; (2) heavy agricultural, industrial, and urban development introduced chemical contaminants to the Basin's groundwaters through urban runoff, surface percolation, and surface disposal of industrial chemical; and (3) the same development created the need for expanded solid waste disposal facilities, which were subsequently provided in the form of open dumps and trash pits constructed and operated prior to the inception of local regulatory controls. Contaminants from these sites are suspected of having entered the Basin's groundwater reservoirs. Groundwater quality (as measured by average TDS levels) in the study area has improved since 1974, presumably because of the benefits of safe-yield groundwater extractions and continuous efforts by regulatory agencies regarding waste impoundment.

2. In general groundwater quality has been within the recommended limits of the United States Public Health Service Drinking Water Standards, except perhaps for a few wells located in the western portion of the SFVB having excess concentrations of sulfate and

those in the upper part of the Verdugo Basin having abnormally high concentrations of nitrate.

3. Based on the results of laboratory analyses of water samples from selected wells, TCE and PCE were identified as the major contaminants affecting groundwater quality in the SFVB. Other volatile organic compounds were detected in only a few wells and at relatively low levels.

4. TCE and PCE were detected in samples from wells located generally in the southeastern and south central portions of the SFVB. PCE alone has also been detected in samples from wells in the Verdugo basin.

   A. The levels of TCE detected in samples from 135 wells in the SFVB were generally less than 20 ppb. Samples from 16 production wells have had concentrations of TCE exceeding 20 ppb. Analyses of samples from five production wells, in the North Hollywood and Burbank well fields, indicated concentrations of TCE greater than 100 ppb. (Table 2)

   B. Chemical analyses of samples from wells in the SFVB have indicated the levels of PCE were generally less than 4 ppb. Samples from two wells, located in the North Hollywood and four wells in the Verdugo Basin fields, had concentrations of PCE greater than 20 ppb. (Table 3)

Recommendations

Interpretation of the results of the groundwater quality investigation has indicated the need for long term monitoring in the SFVB. Collection and analysis of water samples from original sampling sites, plus sites not previously sampled, would supply data which could be used in continued assessment of the nature of the groundwater quality problem. The following paragraphs summarize the recommendations for long term monitoring.

1. Forty-three wells were sampled for priority pollutants, and most of the wells were located in the southeastern and south central portions of the basin. Further sampling for priority pollutants is recommended, especially for private wells located in the vicinity of the LADWP Valley Steam Plant, in the central portion of the SFVB, which have not been sampled previously.

2. Continued analysis of samples from wells located in areas where contamination has already been indicated would allow better definitition of the trends inthe the concentrations of contaminants, whether increasing or decreasing. Additional GC-MS anaslyses for volatile organics would allow monitoring for any changes in the type of contaminants. Information on the trends in/or types of contamination might aid in identification of sources and also may indicate recent contamination.

3. Construction of several new observation well is recommended. These observation wells would be installed in areas where groundwater quality data is currently unavailable. Of special concern are areas up gradient from municipal water supply wellfields.

Data from these recommended observation wells would allow monitoring of the quality of groundwater which is moving toward a wellfield. Also of concern are areas down gradient from landfills. Data from these observation wells would aid in the assessment of the impacts of landfills on groundwater quality.

SUBTASK I-A-4

TOXIC MOVEMENT STUDY

Objectives

To determine the movement, dispersion and ultimate fate of selected in-ground priority pollutants, especially TCE and PCE.

Investigation

Background

The effects of the parameters of movement, dispersion and ultimate fate of priority pollutants upon the quality of the groundwaters in the San Fernando Valley Basin (SFVB) were investigated. Natural groundwater basin processes that can affect the magnitude of these parameters were also investigated.

Scope

The study focused on developing criteria for engineering measurements and tools that can be used in the water quality management of the SFVB.

Conclusions

At the present time, a number of factors make direct evaluation of rate of movement, dispersion and ultimate fate of pollutants in the groundwater basin of the SFVB infeasible. An engineering solution is proposed to predict toxic movement.

1. Pollutant vs. Groundwater Movement

   The rate of movement of pollutants through a groundwater basin is not only dependent upon the rate of flow of the groundwater that is physically transporting the pollutants but depends upon the natural attenuation processes which remove or restrain the pollutants contained in the moving groundwater. The average rate of pollutant movement appears to be specific for each basin, and for each pollutant.

2. Retardation Factors

   The rates of movement of the groundwater and the accompanying pollutants have been determined by investigators for other basins. From these measurements, it is possible to determine a very useful water quality parameter which is designated as the Retardation Factor. This factor is calculated as the ratio of groundwater to pollutant velocities in a basin. The Retardation Factor provides an indication of the effectiveness of the various difficult-to-quantify natural attenuation processes in diminishing the rate of movement of pollutants through a groundwater basin. This factor is ordinarily determined in laboratory soil columns because of the technical complications and cost of field measurements.

Recommendations

1. Determination of Retardation Factors in SFVB

In order to provide additional information for water quality management, it is recommended that the Retardation Factors for the four most prevalent priority pollutants detected in SFVB groundwater be investigated by a qualified technical organization, especially for locations around the well water production area of North Hollywood. This information will provide the water quality manager with the ability to predict pollutant paths more accurately and to make more effective corrective action decisions in cases where improper waste disposal practices are identified.

2. Measuring System North Hollywood Well Field

An independent investigation should be conducted by LADWP on the technical and economic feasibility of developing a system that is capable of more precise and timely measurement of groundwater flow and direction for use in interpreting groundwater quality data. If the results of this investigation are favorable, the system can be developed and installed as a water quality control tool.

SUBTASKS I-B-1, I-B-3, II-B AND IV-B

INDUSTRIAL SURVEY

Objectives

I-B-1 Source Identification

Survey types of industrial chemical use in the study area; itemize discharges according to type of industry, chemicals used, and wastes generated.

I-B-3 On-Site Industrial Waste Management Plans

Collect data on existing waste management practices by industry in the study area, including Best Management Practices (BMP's); evaluate the effectiveness of these practices in view of groundwater quality protection.

II-B Augmented Enforcement Programs

Identify and explore waste control plans that utilize augmented on- and off-site inspection, surveillance, effluent monitoring, and reporting strategies on a cooperative basis with appropriate local, state, and federal agencies.

IV-B Best Management Practices

Determine the cost effectiveness of existing or identified industrial BMP's for toxic substances handling, storage, and disposal.

Investigation

Background

A survey of all businesses generating or disposing of toxic materials was conducted in a two-square mile study area in North Hollywood. The study area was limited due to budgetary and manpower constraints. Lists of businesses were prepared based on EPA and local agency hazardous waste user records.

Scope

Toxic chemical handling and/or toxic waste disposal was surveyed at each business establishment. Current management practices in handling and disposing of toxic materials were assessed. Plans to enable better handling and proper disposal of toxic materials were developed to assist businesses. Current regulatory guidelines and the effectiveness of enforcement activity in regulating toxic material use and disposal was evaluated. The cost effectiveness of existing or proposed BMP's was determined.

Conclusions

Based on a limited survey of 301 companies in the North Hollywood area which were identified as either toxic chemical users or toxic waste generators, conclusions on the combined investigations for Subtasks I-B-1, I-B-3, II-B and VI-B are presented as follows:

1. Process Chemicals

A total of 6.0 million gallons of liquid chemicals are used per year in the study area, while the use of solid chemicals equals 1.1 million pounds per year.

A. Liquid Chemical Usage

Over half of all toxic liquids used in the study area were categorized as gasolines. Chromium solutions and alcohols were the two next largest categories, with annual quantities totaling 31.4 and 9.2 percent, respectively. Other types of chemicals utilized in large quantities included liquid petroleum products (1.8 percent), aliphatic solvents (1.7 percent), and cutting oils (1.2 percent). All other categories contributed a combined total of 2.3 percent to annual liquid chemical usage.

Halogenated compounds were of particular concern in relation to groundwater quality. The categories of halogenated liquids found in the study area yielded a total combined usage of 24,000 gallons per year. Tetrachloroethylene, which comprised 66 percent of this total, was utilized by seven companies in five industry groups. Seventy percent of the annual usage, totaling 16,000 gallons, was attributable to three aircraft and parts manufacturers, while a chemical manufacturer and a metal coating company each contributed 13 percent. Pentachlorophenol, with 6,000 gallons per year (26 percent of the total for halogens), was used by a furniture manufacturer (57 percent) and a chemical manufacturer (43 percent). Yearly halomethane usage totaled 900 gallons, while annual usage of various insecticides, herbicides, and fungicides totaled 700 gallons. The other two halogenated chemical categories used in the study area were 1,1,1-trichloroethylene (300 gallons per year) and mixed or unspecified halogenated solvents (200 gallons per year).

Utilization of toxic liquid chemicals in the study area was highest in the service station industry (SIC Code 554), which accounted for 49 percent of the total liquids used annually. Aircraft and parts manufacturing companies (SIC Code 372), utilizing 33 percent of this total, surpassed the alcoholic beverage wholesalers (SIC Code 518), which utilized 12 percent, the chemical manufacturers (SIC Code 28), which utilized 3 percent, and public warehousing companies (SIC Code 422), which utilized 1.5 percent. All other industry groups combined contributed 1.5 percent annually to the total use of toxic liquids.

B. Solid Chemical Usage

Solid petroleum products constituted 94.8 percent per year of all toxic solid process chemicals and products. Use of zinc compounds totaled 3.2 percent, while lead compounds totaled 0.9 percent. The eight other categories of toxic solids collectively contributed 1.1 percent to the annual usage of toxic solids.

The chemical manufacturing industry (SIC Code 28) used almost 96 percent of all toxic solids inventoried. Chemical wholesalers (SIC Code 516) utilized 2.8 percent; manufacturers of instruments, photographic equipment, and optical goods (SIC Code 38) utilized 0.6 percent; and the metal coating industry (SIC Code 347) utilized 0.5 percent. The other industries collectively used 0.1 percent of the total.

2. Process Chemical Management

A. Process Chemical Storage

Gasoline, the highest volume chemical used in the study area, was stored primarily in underground tanks at service stations. Six percent of the gasoline used in the area was stored in aboveground tanks either inside or outside of the facility.

All of the chromium solutions used in the study area were kept in tanks or other containers, located inside the facility on concrete floors. Most of the solution was supplied as liquid concentrate, and was stored in corrosion-resistant containers. Process solutions made from the concentrate or solid chemicals were maintained in process tanks. Spills from these tanks were caught by floor drains and directed to the wastewater discharge system.

Ninety-eight percent of the alcohols used or produced in the study area were stored by one company and kept in large stainless steel tanks inside the facility. The company representative indicated that there had never been a spill incident.

Approximately 13 percent of all of the cutting oils (soluble and insoluble) were stored outside, generally on asphalt or concrete; in 90 percent of the cases, they were stored uncovered. Corroded drums and spilled oils were common. Most companies maintain some type of absorbent (sand, sawdust, kitty litter, etc.) for use on the spills. However, 93 percent of the insoluble cutting oils stored outside were stored on dirt.

Slightly over one quarter of the petroleum distillates used annually were stored outside uncovered. Again, corroded drums were in evidence, but most drums were stored on concrete or asphalt with no direct access to the soil.

Nearly 50 percent of the paints and lacquers (non-water-based) were stored outside on concrete or asphalt. All of the outside storage was uncovered. However, 75 percent of these paints were products manufactured at facility with a fairly quick turnaround time. Consequently, individual containers were seldom left outside long enough to weather significantly.

With the exception of pentachlorophenol and halomethanes, all of the halpgenated organic compounds were stored inside on concrete or asphalt. Fifty-seven percent of the pentachlorophenol and 88 percent of the halomethanes were stored outside on concrete or asphalt. The halomethanes were stored uncovered, and the drums were subject to corrosion. Methylene chloride, for example, is slightly soluble in water, and can be readily washed into surrounding soil or the storm drains.

About 16 percent of the ketones and toluene were stored outside of the facility. The majority was uncovered, and approximately 10 percent was stored on dirt.

Eighty-two percent of the kerosene was stored outside. Over 90 percent was uncovered, but virtually all of it was stored on concrete or asphalt.

Over 90 percent of all remaining toxic liquid process chemicals were stored inside on concrete or asphalt. All solid process chemicals were stored inside the facility.

Most of the companies involved in outside storage had 26 to 75, 151 to 500, or over 1,000 employees. Smaller companies seldom stored chemicals in such quantities that inside storage space became a problem. Overall, 80 percent of the companies surveyed utilized inside storage of process chemicals exclusively. These companies used approximately 99 percent of the chemicals in the study area.

Among the surveyed companies that used drummed chemicals, less than 10 percent utilized drum cradles or stands. However, most used spigots or pumps to remove liquids from drums. Only a few companies transferred liquids by tipping the drums and pouring.

B. Spill Contingency Planning

Most of the companies with 76 or more employees were aware of the need for spill control or contingency plans. Most indicated that they would call the fire department in the event of a serious spill. Only about 5 percent of the companies actually had formal written contingency plans. None of these plans was directed toward preventing groundwater contamination. Rather, they were either OSHA-related, or dealt only with fire/explosion hazards. Only one company had a formal system of moats and dikes around its chemical storage areas to contain spills.

3. Toxic Wastes

A total of almost 5.0 million gallons of toxic liquid wastes are generated annually, while only 15 pounds per year of toxic solid wastes are produced. Discrepencies between quantities of certain process chemcials (particularly cutting oils, and certain solvents) and related wastes are indicative of use patterns in the study area. Cutting oils burn away in use, or adhere to parts and scaps. Solvents are allowed to evaporate during use.

A. <u>Toxic Liquid Wastes</u>

Almost 58 percent of the total toxic liquid wastes generated in the study area were chromium solutions. Wastes solutions containing mixed or unspecified heavy metals constituted another substantial portion of this total (23.8 percent), while zinc solutions totaled only 6.8 percent. Other categories of wastes liquids included cyanide solutions (2.0 percent), copper solutions (1.8 percent), nickel solutions (1.8 percent), waste oils (1.5 percent), and halomethanes (0.7 percent).

Halogenated compounds were of special concern in relation to groundwater quality. A total of 56,000 gallons per year containing these toxic waste chemicals were generated in the study area. Halomethanes were the major category of halogenated compounds, with 52,000 gallons per year generated by a single miscellaneous machinery manufacturer (SIC Code 359), employing 11 to 25 workers. Two medium-sized companies (26 to 75 employees) generated mixed or unspecified halogenated solvent wastes, which totaled 3,700 gallons annually. Minor categories of halogenated compounds consisted of 1,1,1-trichloroethane (360 gallons per year), insecticides (120 gallons per year), and tetrachloroethylene (110 gallons per year).

B. Toxic Solic Wastes

Toxic solid wastes formed a very minor part of the overall waste generation in the study area. Of the two solid waste categories measured, petroleum product wastes totaled 10 pounds annually, while waste beryllium totaled only 5 pounds.

4. Toxic Waste Management

A. Toxic Waste Management - Metal Coating

Wastewaters containing chromium, copper, cyanide, mickel, zinc, and other metals constituted the largest waste streams in the study area. These were generated by six companies involved with plating or other metal coating. All of these companies imployed some type of on-site treatment (usually neutralization/clarification) before discharge to the sanitary sewer system, and all had Bureau of Sanitation Industrial Waste Permits. Only tow of these companies admitted that their treatment processes generated toxic sludges which required disposal. The other companies indicated that their operations produced some sludge, but in such small quantities that, even after several years of operation, sludge removal still had not become necessary.

Four other companies in other industry groups produced toxic sludges. All of the companies producing such sludges used commercial sludge pumpers and waste haulers to remove the wastes to appropriate disposal facilities.

B. Toxic Waste Management - Photographic Processing

Spent photographic processing wastewaters comprised the second major toxic wastewater discharged in the study area. Eleven companies generated p=spent processing chemicals, which were discharged directly to the sanitary sewer system without treatment. None of these companies had Industrial Waste Permits.

C. Toxic Waste Management - Paint Stripping

The other major wastewater was water contaminated with halomethanes from paint stripping operations. One campany produced over 50,000 gallons annually, all of which was washed directly into the sewer system without treatment.

D. Toxic Waste Management - Pest Control

Although pesticide-containing wastewaters were not generated in large volumes, approximately 180 gallons of unused pesticide mixtures and application equipment rinsate were generated annually. One-third of this volume was contaminated with chlordane. All of the pesticide wastes were discharged into gravel-filled pits, purportedly under direction of the US Department of Agriculture.

E. Toxic Waste Management - Cutting Oils

Waste oils comprised the largest volume of non-wastewater toxic waste in the study area. Waste oils were produced primarily from auto service and machine shop operations. Waste oils from machine shops may be contaminated with solvents, heavy metals, or TCE. One company produced 48 percent of the total waste oils generated. This waste was picked up by commercial hauler and transported to a disposal facility. Forty-none percent of the waste oils, generated by 92 companies, were picked up by commercial waste oil recyclers. Eleven companies, producing 0.5 percent of the waste oils, either buried their wastes on site or disposed of it with the regular refuse.

F. Toxic Waste Management - Solvents

Solvent use in the study area did not produce large volumes of wastes. Most solvent was allowed to evaporate, leaving no wastes. Only about 9,000 gallons of solvent wastes were produced annually in the entire study area. Approximately 16 percent of the waste solvents were recycled. Some solvent suppliers collected contaminated solvents, re-refined them, and sold them back to the customer at a reduced price. A number of companies use a closed, recirculating solvent wash system for small parts (auto, aircraft, etc.). The system was provided and serviced periodically by Safety-Kleen. Contaminated solvents were removed, and fresh solvent added. Most of the remaining solvent wastes were collected by commercial haulers and transported to disposal facilities. A small fraction was either disposed of with the conventional refuse, poured in a sink, or poured on the soil.

G. Toxic Waste Management - Based on Company Size

With the possible exception of Miscellaneous Fabricated Metal Products (SIC Code 349), no industry group could be singled out for improperly treating or disposing of its wastes. Rather, improper management (e.g., uncontrolled discharge to sewer, dirt, etc.) seemed to be a function of company size. Approximately 25 percent of the companies with 1 to 25 employees, and 33 percent of those with 75 to 150 employees, treated or disposed of their wastes improperly. Fewer than 11 percent of all other companies did so.

H. Toxic Waste Management - Unsuitable Practices

There was evidence, however, of more illicit dumping than was admitted by company representatives during the survey. Stained pavements in streets and parking lots, and spots of dead grass could indicate improper disposal. There was also some evidence that several companies wash grease, oil, solvents, etc., off of equipment or parts with a hose, and allow the water to run into the streets.

The potential for illicut dumping is very high. There are three major areas of open land in the study area: the DWP powerline right-of-way, the railroad track right-of-way, and the fields under the airport landing pattern. Approximately tow-thirds of the companies generating wastes in the study area border on one of these open areas.

Uncontrolled septic tank discharge is another potential problem of uncertain magnitude. No company admitted to discharging to septic tanks, but at least six companies discharge to "sumps" that may actually be connected to leach fields.

I. Toxic Waste Management - Waste Storage

Less than 2 percent of the total waste volume generated in the study area was stored on site for more than 90 days. Most companies had wastes collected from 2 to 24 times per year. On-site toxic waste storage was carried out less carefully than process chemical storage. Overall, less than 25 percent of the companies surveyed utilized inside storage of wastes. Sixty percent of the wastes were stored in underground tanks or sumps. These were not monitored for leaks. The remaining toxic wastes were stored outside, uncovered, half on dirt, and half on concrete or asphalt.

5. BMP Enforcement

A. In general, standard handling practices necessary to comply with OSHA, fire department, or general safety guidelines are sufficient to prevent most groundwater contamination. However comprehensive spill control measures and continency planning would eliminate much of the potential for contamination from process chemical storage and handling practices.

B. It is necessary to develop a method by which to identify companies that are subject to management guidelines. Mass mailings of instructions and voluntary responses are generally ineffective. Many companies will not read the mailer; others will either misunderstand it or choose to believe it does not apply to them.

C. Company management and all employees involved in toxic chemical or waste handling must be educated as to the true hazards of these materials, the importance of protecting the groundwater, and their role in this effort. Many people, including those who handle toxic substances, are unaware of the real hazards posed by these materials.

D. Industry personnel critically need to be educated in the potential hazards of toxic chemicals to groundwater supplies in the event of poor management. Many are unaware of what constitutes a toxic chemical, what good management is, or what their role is in preventing groundwater contamination.

Recommendations

The following recommendations should be considered to provide more information on toxic material management practices with the study area and to initiate changes in these practices, that would improve them.

1. Better spill/contingency planning and control practices need to be encouraged among the companies in the study area.

2. An attempt should be made to locate all septic tanks in use in the area.

3. Monitoring should be initiated at all undeground storate tanks.

4. In the future, a different approach to this type of survey might prove more efficient. An initial walking tour of the survey area, while more labor-intensive, could save time and effort in the long term.

SUBTASK I-B-2

ACCIDENTAL/UNINTENDED RELEASES

Objectives

To determine possible/probable effects of hazardous material spills, fire control runoff and realted unintentional releases on groundwater quality within the study area.

Investigation

Background

The records of the Department of Water and Power, the Los Angeles City Bureau of Sanitation, the Los Angeles City Fire Department, the Los Angeles County Flood Control District and the Los Angeles County Department of Health Services were searched for information relating to past incidents that resulted in the release of hazardous materials to the environment. Such releases result from transportation accidents, industrial storage and pipeline leaks, equipment failures and overflows, mishandling of materials, fire control operations in commercial and industrial fires, and removal by washdown. An accidentally released hazardous material will go into the ground or the drainage system if it is not properly confined to the premises by planned containment.

Scope

The Subtask I-B-2 investigation required an examination of the groundwater system, including groundwater recharging facilities, well field operations and the entire urban drainage system, in order that the potential means of access for contaminants to enter the groundwater basin could be determined.

Conclusions

1. Record Keeping

The most common incident of accidental release occurs during the transport by truck as documented by the case studies presented in this report. Major spills, resulting from accidental and unintentional releases where the public health or safety is threatened, are recorded along with the corrective action taken to contain, clean up or remove the hazardous material. While it is believed that there are many instances where small quantities of hazardous materials are accidentally released to the environment, the impact of such spills is not known since there is no requirement for the reporting of such incidents.

2. Vulnerable Areas

Spill incidents occurring over the eastern portion of the San Fernando Valley Basin are more likely to impact groundwater quality due to the proximity of the well fields and because of the greater permeability of the soil in the eastern portion. The combined impact of greater permeability and the intense industrial activities within and adjacent to the well fields increases the probability of a significant effect on groundwater quality resulting from accidental and unintentional releases of hazardous materials.

3. <u>Response to Accidential Releases</u>

The impact of a hazardous material spill on groundwater quality depends upon whether the material exists in sufficient quantities to cause harmful effects. Much of the harmful effects which could result from a spill incident are mitigated by the implementation of spill contingency plans. Quick action response to a spill incident and the implementation of proper containment and removal procedures are usually sufficient to prevent the potential contaminant from entering the groundwater system.

<u>Recommendations</u>

1. <u>Spill Contingency Planning</u>

Since hazardous material spills are a common occurrence in the Los Angeles area, the preparedness of the responding agencies is the single most important factor to the successful conclusion of a spill incident. Spill contingency plans should be reviewed periodically to ensure the development of the best spill contingency planning. All spill incidents should be better documented either by a single agency or by the general use of standard spill report form. This would reduce difficulties in retrieving spill information and will assure that the necessary information is being documented.

2. Further Evaluation

Although the areal extent of the groundwater contamination problem over portions of the San Fernando Valley Basin has been determined, with respect to TCE and PCE, it has not been possible to trace the contaminants to any point source. Through an evaluation of well sampling data, zones of contamination appear to be concentrated in the immediate vicinity of the well fields, which lie within or immediately down gradient from industrial land uses. The results of the Industrial Survey, Subtasks I-B-1 and I-B-3, should further aid in determining whether industrial spills and leaks of hazardous materials are a significant factor contributing to the groundwater contamination problems in the San Fernando Valley Basin.

SUBTASKS I-C-1 AND II-C

DRY WEATHER URBAN DRAINAGE

Objective

I-C-1 Dry Weather Urban Drainage

To survey quantities and patterns of urban (dry weather) drainage in the study area.

II-C Dry Weather Drainage Controls

To recommend a program of action for the control of dry weather urban drainage flows having significant levels of priority pollutants.

Investigation

Background

A system of dry weather flow sampling points was established upstream of groundwater recharge areas (spreading grounds, Los Angeles River and tributary channels, etc.). The results of these chemical analyses would determine the level of impact on groundwater quality.

Scope

This data will be used to determine whether or not a need exists for the control of dry weather flows. If the problem is deemed acute, various control measures would be investigated.

Conclusions

1. Groundwater Recharge

Dry weather flows in the Los Angeles River (LAR) during the months of April through October provide a portion of the recharge to the San Fernando Valley grundwater basin which becomes available for extraction at the nearby SFVB well fields. The LAR waters reach the well field aquifers by percolation at the LADWP Headworks Spreading Grounds or at the three unlined reaches of the River in the Narrows area. (Plate 1)

2. Further Evaluation

A limited field survey of the River water quality with respect to priority pollutants was conducted as part of this subtask. (Appendix 4 and Table 1) As a result of this survey, it was determined that the concentration of TCE and PCE in the LAR east of the Tujunga Wash on the days sampled was lower than the state DOHS action level of 5 ppb for TCE and 4 ppb for PCE. Additional analyses of the LAR are necessary to verify this data and determine daily and seasonal trends, if any.

3. Potential Contaminant Sources

The introduction of volatile organic priority pollutants into the River is attributed in part to industrial and wastewater discharges authorized under the NPDES system, and partly to urban runoff, unauthorized discharges, and possibly to rising water that originates from the groundwater basin and enters the River along its lower valley reaches.

The effluents from Water Reclamation Plants (WRP) discharging into the LAR after completion of the SepulvedaWRP could amount to over 80 percent of the dry weather flow in the river and this effluent could possibly contain TCE, PCE or other priority pollutants which could be deleterious if introduced into groundwater.

4. Well Fields Adjacent to the LAR

Examination of analytical records of the Los Angeles Department of Water and Power indicate that the volatile organic compounds, TCE and PCE, have been found in the water produced by the well fields adjacent to the LAR at average concentrations of 1.0 to 8.4 ppb since sampling and analysis began in 1980. (Tables 1 and 1a)

The well fields adjacent to the unlined sections of the LAR are an important water resource for the Cities of Los Angeles and Glendale. Protection of the water quality of these well fields requires sufficient monitoring to assess the levels of pollutants in the River and in the well fields. The attenuation of the contaminants, if any, as they move from the River to the well fields may be quantified with adequate sampling and analysis. Future attention should also be addressed to the presence of volatile organic priority pollutants other than TCE and PCE, in the LAR and the well field adjacent to the LAR.

Recommendations

1. LAR and Water Reclamation Plant Effluent Quality Monitoring

   The following recommendations relate to further investigations of the impact of dry weather urban drainage on groundwater quality in the SFVB.

   A. The effluent from the Los Angeles - Glendale WRP (LAGWRP), the Burbank WRP and the LAR at locations shown in Plate 1 should be sampled monthly for a two-year period and analyzed for TCE and PCE.

B. The LAGWRP and Burbank WRP effluent and the LAR should be sampled and analyzed for 30 volatile organic priority pollutants (Appendix 3) quarterly for a two-year period.

C. At the end of each six months during the two-year period, a summary of the analytical data obtained in this sampling program will be evaluated by the proposed Ground Discharge Identification and Correction (GDIC) Committee for evaluation. (Refer to Subtask I-C-2 for details on this committee)

2. Establish Water Quality Standards for WRP Effluents

It is recommended that the GDIC Committee (the establishment of this committee is recommended in Subtask I-C-2) evaluate the above data along with other pertinent information, and make recommendations as to specific numerical NPDES limits for WRP effluents for the volatile contaminants TCE and PCE. The limits should reflect the consideration of volatilization which may occur in surface flow. The need for limits for other priority pollutants should be considered and recommended by the committee, if necessary.

SUBTASK I-C-2

OTHER COMMERCIAL WASTE SOURCES

Objectives

To assess overall groundwater quality impacts due to infiltration of local commercial wastes.

Investigation

Background

In assessing the overall groundwater quality impacts due to the infiltration of local commercial and industrial liquid wastes, particular attention was addressed to identification of the commercial and industrial waste producers whose wastewater disposal methods could cause organic chemical wastes to enter the SFV groundwater basin and, secondly, to identification of the "avenues" by which these commercial wastes may enter the groundwater system.

A limited area of the San Fernando Valley Basin was chosen for study because of project limitations of time, manpower and funding.

Scope

The following list indicates the work performed during the course of this investigation:

1. review of LADWP water service accounts which are exempt from the sewer service charge;

2. review of sewer service maps;

3. review and inspection of underground discharge permit holders;

4. review of the City of Los Angeles plumbing code;

5. determination of TCE and PCE levels in North Hollywood sewers.

Conclusions

In the eastern San Fernando Valley, the discharge of organic chemical commercial wastes to the groundwater basin by way of private disposal systems or other sources has a high potential for contaminating the groundwater in this productive water supply area.

A summary of available data on the numer of commercial waste sources in the study area that are capable of discharging to the groundwater basin is presented below. This pilot data only represents a partial status of the total number of waste sources in the study area based upon current records. A door to door survey would be necessary to determine the complete status of ground discharges in the area. The following list indicates the types and numbers of commercial waste sources.

1. Sewer Exempt Disposal Systems (LADWP): 75.

2. Commercial Parcels without Sewer Service: 10.

3. Permitted Industrial Waste Discharges (for ground discharge): 4.

The "avenues" by which commercial wastes may enter the groundwater basin and impact groundwater quality are as follows:

1. Percolation of wastewater from private disposal systems such as sumps, septic tanks, cesspools and seepage pits.

2. Exfiltration of wastewater from leaking sewer lines.

Recommendations

1. A Ground Discharge Identification and Correction (GDIC) Committee is recommended, to be formed by representatives from theLADWP Sanitary Engineering Division, the Los Angeles City Bureau of Sanitation, the Los Angeles City Department of Building and Safety, the Los Angeles City Bureau of Engineering, and the Los Angeles City Fire Department. The committee should hold bimonthly meetings to accomplish the following goals:

    A. Identify and prepare a list of all commercial and industrial businesses in the eastern San Fernando Valley that discharge effluents to private disposal systems.

    B. Develop and recommend methodology for corrective action to eliminate ground discharges from private disposal systems located in the eastern SFVB.

C. Propose rules, regulations, ordinances and procedural changes to implement an improved program of groundwater protection.

2. Revise Section 94.2119 of the Los Angeles City Plumbing Code to include abandonment procedures for septic tanks, dry wells and waste holding sumps.

   In order to protect groundwater supplies in the SFVB, a recommendation pertaining to private disposal system users follows.

3. Require annual inspection for all commercial and industrial businesses located in the eastern San Fernando Valley that utilize private disposal systems.

   In order to protect groundwater quality and prevent adverse impacts due to possible sewer exfiltration, recommendations are presented as follows.

4. Conduct a semi-annual monitoring program to determine volatile organic chemical concentrations at selected locations in the sewerage system.

SUBTASK I-C-3

LANDFILLS

Objectives

To assess the overall groundwater quality impacts of existing or abandoned landfills, rubbish dumps, trash pits and related sites of solid or liquid waste discharge; to determine the severity and extent of identified problem areas.

Investigation

Background

In assessing the impact of landfills and dumps on the quality of groundwater in the San Fernando Valley Basin, the following factors were evaluated:

1. the locations of all active and completed landfills and dump sites, in the San Fernando Valley Basin;

2. the areas where groundwater contamination is known to exist, based on collecting and testing groundwater samples from existing production and observation wells;

3. the production and observation wells that had locations downgradient to the landfill sites and areas of know groundwater contamination.

Conclusion

1. A search of records to determine the locations of waste disposal sites, disposal practices, and waste materials disposed of, revealed a limited amount of information. Past regulations of solid waste disposal practices did not emphasize the protection of groundwater quality and only a limited provision was made to facilitate monitoring. Recently developed concepts of sanitary landfill design relating to groundwater elevations, elevation of pit

depths of landfills and drainage provisions were not practiced in the past.

2. Collecting and analyzing a limited number of groundwater samples from production and observation wells, with locations suitable for monitoring landfill sites, revealed traces of TCE, PCE and other pollutants. Groundwater samples collected from several monitoring wells downgradient of landfill sites indicated groundwater degradation resulting from carbon dioxide.

3. The examination of available information on landfill locations, areas of known groundwater contamination and samples from monitoring wells, did not indicate that landfill sites are a major source of the present groundwater contamination problem in the SFVB. However, the construction of wells that will effectively monitor landfill sites may result in different findings.

Recommendations

1. Observation Wells at Landfills

   In concurrence with the recommendation contained in the Subtask I-A-3 report on SFVB Groundwater Quality, there is a definite need for the planning and construction of more observation wells to effectively monitor in the impact of landfills and dump sites on groundwater quality. It is recommended that observation wells be provided downgradient of selected landfill and dump sites suspected of posing a significant threat to groundwater quality in SFVB.

It is important to be able to determine if any landfill site may be a contributing source to the groundwater quality problem. The effects of groundwater contamination resulting from landfill activity may be long term and costly to remedy. The potential landfill problem sites identified in this report could be used as a basis of establishing a network of observation wells to monitor these sites. The exact locations and specifications for the observation wells will be included in a future program.

2. Further Evaluation of Privately Owned Landfills

It is also recommended that further efforts be expended to obtain additional information on privately operated waste disposal sites in the SFVB. Since information on some of these sites was not readily available, the effort of the subtask investigation was directed to compiling data on other sites. Nevertheless, information regarding the exact location, bottom elevation, types of wastes, and other operational data is needed for a complete assessment of the contamination potential of these sites.

SUBTASK I-D

SURVEY OF GOVERNMENT REGULATIONS

Objectives

To survey and document regulations administered by local agencies regarding the handling, storage, treatment and disposal of toxic wastes; to evaluate the effectiveness of current regulations in preventing or controlling the contamination of surface waters and groundwaters in the study area.

Investigation

Background

The following sections discuss the existing enforcement alternatives available for the control and regulation of potential sources of contamination to the SFVB. Each major agency that has authority, or conducts activities, relative to the regulation or control of hazardous materials is discussed. The scope and effectiveness of these programs are discussed in relation to their application to the protection of groundwater resources.

Existing Regulatory Structure

a. Federal/EPA

The US Environmental Protection Agency (EPA) admininsters both Water Quality programs pursuant to the Clean Water Act, and Hazardous Waste Control programs pursuant to the Resource Conservation and Recovery Act. Both of these laws provide for the delegation of enforcement authority to individual states when it can be shown that the state program is at least as stringent as the federal guidelines.

The Clean Water Act sets forth a National Strategy for controlling water pollution. The National Pollution Discharge Elimination System (NPDES) is the primary enforcement mechanism provided in the Clean Water Act. In California authority for this program has been delegated to the state and is administered by the State Water Resources Control Board.

The Resource Conservation and Recovery Act (RCRA) sets forth a National Strategy for the cradle-to-grave regulation of Hazardous Wastes through permitting of the storage, transport and disposal of Hazardous Wastes. In California, Phase I interim authorization has been granted to the state, and the program is administered by the State Department of Health Services.

b. State Water Resources Control Board

The State Water Resources Control Board (SWRCB) is responsible, under California's Porter-Cologne Act, for the formulation and adoption of a state-wide policy for the control of water pollution.

In addition to administering the Federal NPDES permit program, the SWRCB is also the designated administrator of the financial assistance program for water pollution control projects.

The SWRCB is also responsible for developing minimum guidelines for the design and siting of sanitary landfills. To this end, the board has developed a system of classifying solid waste sites on the basis of allowable waste streams.

Class III sites are permitted to accept Group 3 wastes that includes only non-biodegrable materials such as fill dirt or demoliton debris.

Class II sites can accept Group 3 wastes as well as nonhazardous, biodegrable Group 2 wastes including traditional domestic refuse.

Class III sites can accept both Group 2 and Group 3 waste materials as well as Group 1 hazardous wastes.

The design and operating requirements of these sites are progressively more stringent and closely monitored.

Administration of the SWRCB requirements is further delegated through 9 Regional Water Quality Control Boards (RWQB) throughout the state. The SFVB falls within the jurisdiction of the Los Angeles RWQB.

c. Regional Water Quality Control Board

In addition to implementing the State policy for Water Quality Control, the Los Angeles Regional Water Quality Control Board (RWQCB) is responsible for the development of a regional water quality control plan that establishes the policies and goals necessary to ensure that the beneficial uses of the State's water resources are preserved.

The LARWQCB administers over an area including most of Los Angeles and Ventura Counties with a staff of approximately 30. As part of its regulatory function, the RWQB issues waste discharge requirements for some __________ NPDES permits. The RWQCB may issue cease and desist or clean-up orders for violations of any waste discharge requirement, and may seek issuance of court orders and/or fines for noncompliances.

The LARWQCB has also recently initiated a study to assess the use and impact of underground storage tanks, sumps and pipelines on groundwater quality.

d. State Department of Health Services

The State Department of Health Services (DOHS) has specific statutory authority for public health aspects of water supply, hazardous waste handling and disposal, and toxic substances control.

The Hazardous Materials Management Branch of the State DOHS currently issues hazardous waste facility permits under the California equivalent of the Federal RCRA program. The DOHS (a) permits facilities that transport, treat, store or dispose of hazardous wastes as defined in Title 22 of the California Administrative Code and (b) administers the "cradle to grave" manifest system for hazardous wastes. The state does not require manifesting of wastes that go to recycle or reclamation operations.

The Los Angeles Regional Office is currently processing Interim Status Documents for some 570 Hazardous Waste Facilities. Final permits for these facilities are scheduled for completion by 1990. The LA Regional office maintains a full time professional staff of 9 personnel assigned to permit processing and approximately 4 personnel for on-site inspections of these facilities.

Other activities of the State DOHS include the Abandoned Site Project and the 'Superfund' program. The goal of the Abandoned Site Project is to identify all abandoned landfills and on-site disposal facilities that may be contaminated by hazardous wastes. The Superfund office, in turn, conducts investigations of these sites and determines if any clean up actions are required based on public health considerations. When no financial responsibility for clean up can be established, the state may recommend that a site be added to the funding priority list for either Federal or State Superfunds.

e. County Department of Health Services

The Los Angeles County Department of Health Services currently conducts a Hazardous Waste Control Program to regulate the handling, storage and disposal of hazardous wastes. This program is designed to complement the existing state program by providing regular annual inspection of those facilities that produce hazardous wastes but are not covered under the operating guidelines of the State DOHS program. The county relies heavily on the State manifest system to support its enforcement activities.

The County program, which was initated in May of 1982, is supported by a Hazardous Waste Generator's license fee levied on all industries within broad SIC codes. The County currently maintains a man professional staff for the regulation of an estimated 15,000 sites.

f. South Coast Air Quality Management District

The South Coast Air Quality Management District (SCAQMD) is responsible for the development of a regional air quality management plan that establishes the policies and goals necessary to attain compliance with provisions of the Clean Air Act.

The SCAQMD regulates and permits all stationary emissions of air pollutants. The SCAQMD currently requires permits on all facilities for the storage of potential air pollutants including gasoline, solvents and other volatile organic compounds. SCAQMD controls on discharges may indirectly provide for the protection of groundwater quality.

g. City and Local Government Agencies

City and local governments may provide groundwater quality control benefits through a variety of activities involfing water works, public works, public safety and welfare, industrial waste control, and land use controls. These activities are customarily performed by the following departments: water, public works, sanitation building and safety, fire and planning. These services are also supplied by the County in both unincorporated areas or, by contract to smaller cities that do not have the resources to develop their own programs.

Water Department

The water department is responsible not only for the operation and maintenance of the water system, but also for the delivery of a safe water supply. The protection of the groundwater, therefore, is of utmost concern to the water department. However, the water department has very little or no regulatory authority and can only act in an advisory role in regard to pollution control measures.

Public Works Department

The public works department plans constructs, operates and maintains public improvements such as sewers, storm drains, and streets. Although not intended for groundwater quality control, these facilities will sometimes restrict the infiltration of hazardous materials to the underground from other sources such as private disposal systems.

Sanitation Department

The Sanitation department is usually charged with the responsibility for industrial waste control. The purpose of the industrial waste control program is to detect and prevent the disposal of industrial wastes to waters of the state. The goal of the industrial waste control program is to promote the best use of the sewer and storm drain systems. However, this protection could also be extended to include the regulation of Private Disposal Systems for the protection of the groundwater basin.

Another function of the sanitation department is to regulate the use and fill of sanitary landfills for the protection of groundwater quality.

Building and Safety Department

Building and Safety departments are responsible for developing and enforcing minimum design, construction, and maintenance requirements that protect community property and safeguard the health and safety of the public. Many of these provisions can be directly or indirectly beneficial to the protection of groundwater resources.

Fire Department

Fire departments conduct on site inspection of commercial facilities to acquire information concerning the use and storage of certain hazardous chemicals. The purpose of these inspections is to assure compliance with health and safety codes related to hazards during fire fighting operations. Although activities of individual fire departments vary in each jurisdiction, they may also require testing and inspection of storage tanks for the detection of leaks. These activities may indirectly result in protection of groundwater quality through the control of release of contaminants to the aquifer.

Planning Department

Planning departments are responsible for developing general plans and the general guidelines used to regulate and direct development within a region. The planning department utilizes zoning and land use controls to promote the best possible use of existing resources and to protect the long term interests of the entire community.

E. Alternative Plans for the control of In Situ Contaminants

1. Investigations

Several engineering management techniques were investigated for the control of existing contamination problems. This analysis attempted to quantify the relative effectiveness of each operating strategy to reduce or remove contaminants in drinking water, or to otherwise control the effects of in situ contaminants on groundwater quality in the SFVB. The following alternatives were considered in this analysis:

a. Preferential Pumping,
b. Groundwater Level Management,
c. Blending,
d. Treatment,
e. Removal/Disposal,
f. No Project.

a. Preferential Pumping

Preferential pumping involves the controlled use of production wells to pump groundwater from selected zones of the aquifer. Preferential pumping is designed to allow the continued use of high quality groundwater and to control the migration of contaminated groundwater.

First, by pumping wells from less contaminated zones, wells and can continue to produce high quality groundwater from the SFVB. Special well packers may be used in some contaminated wells to fully exploit the distribution al aspect of pollutants and the confining effects of localized clay lenses. The well packer has been shown, under certain circumstances, to be an effective way to isolate and partially contain the contaminants in the upper zone of a semiconfined aquifer. The packer can then be used to allow the pumping of relatively unpolluted waters from the remaining lower zone of the well. The packer could also be used to isolate zones of heavy contamination for subsequent removal and treatment or disposal.

The movement of contaminants can also be controlled to some extent by manipulation of pumping schedules. By maintaining localized pumping holes it may be possible to contain contaminant plumes or retard the migration of pollutants to nearby and downstream wells.

b. Groundwater Level Management

Groundwater level management is a technique used of to prevent the inundation of landfills and the infiltation of other potential contaminants held in the soil. Maintaining the water table levels below these potential sources help to minimize the leaching of contaminants into the aquifer.

c. Blending

Blending is a technique used to reduce the concentration of pollutants in drinking water through dilution. By carefully diluting slightly polluted waters with clean water from uncontaminated sources, a safe, blended mixture of water can be achieved that meets the recommended State DOHS requirements for drinking water. Blending is limited only by the amount of celan water available to dilute the existing contaminants below harmful levels.

d. Treatment

Treatment is used to permanently remove contaminants from pumped groundwater in order to maintain a water supply that meets accepted water quality guidelines.

Packed tower air stripping was determined to be the most cost effective treatment alternative available at this time. Air stripping involves the transfer of VOC's from water into air where they are vented to the atmosphere. Air quality considerations may in turn require that these contaminants be removed from the air by carbon adsorption techniques.

Treatment costs for air stripping are estimated at approximately $____ per acre foot. If pretreatment of the air before discharge is required, this cost would increase to approximately $____ per acre foot.

e. Removal/Disposal

Removal and disposal is an aquifer rehabilitation technique designed to permanently remove highly contaminated groundwater from the aquifer for disposal to nearby drainage systems.

To be effective, removal must result in some substantial improvement to the overall quality of groundwater in the SFVB. Initial estimates, however, indicate that relatively large volumes of water must be removed in order to affect any significant decline in the present concentrations of TCE in the SFVB.

The high cost of replacement water makes disposal unacceptable at this time. In addition, there is at present no acceptable method for the disposal of these large volumes of water since existing regulations do not allow the discharge of TCE polluted water.

It may be possible, however, to safely accomplish some reclamation of this water on a limited, short term basis without incurring pretreatment costs. Through conjunctive use efforts at the existing Headworks spreading grounds, limited quantities of water could be reclaimed after disposal to the Los Angeles river. The natural stripping of TCE and other VOC compounds during open channel flow in the river could be exploited to render this water safe for spreading operations.

f. No Project

The no project option is an arbitrary engineering scenario in which none of the above management actions are taken for the control of existing contamination. Under the no project option, highly contaminated wells would be abandoned and alternative MWD supplies would be used to replace the production capacity lost by contamination.

The no project option was considered an unacceptable strategy due to the high cost of replacement water and the loss of capital invested in existing wells. MWD replacement rates are estimated at some $____ per acre foot. Under the No Project Scenario, pollutants would remain in contaminated regions and ultimately spread to other wells in the Valley thus requiring even further abandonment and loss of water resources.

2. Proposed Actions: Aquifer Management and Rehabilitation Program

TCE contamination in the SFVB is in general, widespread over an extensive region of the aquifer. At the same time, this contaminant is present at faily dilute concentrations in most cases. Since no distinct, concentrated sources have been identified to date, it is not possible to effectively utilize some traditional aquifer rehabilitation techniques designed to purge contaminants from the aquifer.

Some estimates have indicated that at present rates of removal, it may take as long as from 20 to 100 years to cleanse the aquifer of TCE. For this reason, the present contamination problem must be viewed as a semi-permanent condition that must be managed in order to facilitate the contined best possible use of this valuable water resource.

To meet this need, a coordinated program of Aquifer Management and Rehabilitation techniques should be implemented. This program would include the effective elements of preferential pumping, groundwater level management, blending, treatment and perhaps to a limited extent, removal/disposal.

The primary objectives of this program are as follows:

- Allow the continued delivery of water below the State Action level of5 ppb.

- Control the migration of contaminants.

- Permanently remove contaminants from highly degraded areas.

- Maintain groundwater storage at levels designed to minimize further leaching of contaminants.

To meet these objectives, the following specific actions have been proposed.

- Blending

Based on present basin wide TCE levels and available dilution sources, the DWP can effectively provide for the safe blending of well waters with TCE at concentrations of from 5-20 ppb on a long term basis.

At this time, the Cities of Glendale and Burbank do not have any substantial blending capabilities.

- Treatment

Those wells that can not be safely blended on a long term basis should be treated to allow their continued use.

At present, there are roughly ____ wells that should be considered for the application of treatment measures. ___ of these are in DWP wellfields, ___ in Burbank and ___ in

Glendale. No treatment is necessary at present in San Fernando.

° <u>Well Packers</u>

Initial tests on North Hollywood Well #24 showed that the well packer is an effective means of controlling the concentration of TCE in pumped water. Similar packer studies should be conducted on other wells where applicable.

° <u>Removal/Disposal</u>

Removal/Disposal may be an available alternative for certain wells when combined with reclamation efforts. Removal would be most effective when used in regions of high TCE concentration, such as may be isolated by well packers.

Disposal is also the only presently available technique to allow the sampling of highly contaminated wells without impacting drinking water supplies.

° <u>Replacement Wells</u>

New wells are installed regularly by the DWP as replacement for decommissioned wells and to expand available groundwater pumping capacity

These new wells should be located in areas of low TCE concentration. One possible area is to the North of the North Hollywood wellfields.

In addition, the design of all new wells should take advantage of existing clay lenses an the vertical distribution of contaminants. By perforating wells below the contaminated regions it may be possible to further reduce the level of pollutants in pumped water.

° Maintain Existing Pumping Cones

The existing large pumping cones in the North Hollywood and Crystal Springs areas should be maintained through the continued pumping of both contaminated and uncontaminated wells. This will help to limit the migration of contaminants from these areas to downstream wells in the SFVB. Blending or treatment can be used to allow the continued use of these wells.

° Groundwater Levels

In order to minimize leaching and inundation of landfills, groundwater levels should not exceed 1959 levels. This level will maintain a safe distance between the water table and landfills, and also minimize the outflow of water from the basin through the LA narrows area.

Other considerations will also influence the actual level of implementation of each of these actions. For example, pumping schedules should also consider the effects that extended pumping will have on the long term inorganic quality of the basin. Heavy pumping in the western most wells of the North Hollywood wellfield could result in an increased flow of higher TDS waters from the western half of the basin.

Other factors will determine the actual level of treatment required to maintain a high quality supply. The use of packers may prove to be effective in reducing both the number of wells and the volume of water that will require treatment measures. Possible future changes in the regulatory requirements for TCE and other VOC's in drinking water will also effect the operating parameters of deliver water.

Conclusions

1. While federal regulations are discussed at length in this report, the regulations most pertinent to the study area are state and local regulations. This is particularly so because on June 4, 1981, California received Phase I interim authorization from the US Environmental Protection Agency (EPA) to operate its own hazardous waste management program.

2. The Department of Health Services has been designated as the lead agency in administering the State hazardous waste management program. The State Water Resources Control Board and the nine Regional Water Quality Control Boards, because of their responsibility for State water quality standards, also have jurisdiction in this area.

3. Rule and regulations administered by local government agencies are generlaly based upon traditional roles of protecting public health, safety and welfare. Most, while indirectly applicable to protection of groundwater resources, are basically designed to address other goals such as safety in the work place, maintenance and protection of public sewer faciliites, and fire prevention.

4. Within the boundaries of the San Fernando Valley groundwater basin, the County of Los Angeles and the cities of Burbank, Glendale, Los Angeles and San Fernando have jurisdictional authority. The Los Angeles County Health Department is charged with administering and enforcing regulations promulgated by the State Department of Health Services and has

proposed a program to implement these tasks. Within each city, agencies with regulatory authority over the storage, handling, or disposal of hazardous materials are the Public Works, Fire, and Building and Safety Departments.

TASK II

DEVELOPMENT AND EVALUATION OF ALTERNATIVE PLANS FOR EXISTING SOURCES OF WASTES

Introduction

The objective of this task series is to devleop alternative plans for controlling toxic wastes materials in the identified groundwater quality problem area. This investigation focuses primarily on the development of waste handling, storage and discharge regulations which will be effective in controlling or preventing illegal of improper manipulation of toxic wastes with the SFVB. Local land use performance standards, augmented enforcement programs and dry weather urban drainage controls are explored as potential avenues for the implementation of alternative toxic waste control plans.

Task II is divided into three subtask investigations as follows: Local Government Land Use Performance Standards and Local Enforcement (II-A); Augmented Enforcement Programs (II-B); and Dry Weather Urban Drainage Controls (II-C). Subtasks II-B and II-C were combined with other Task Subtask investigations and are presented in the Section on Task I.

SUBTASK II-A

LOCAL GOVERNMENT LAND USE PERFORMANCE STANDARDS AND LOCAL ENFORCEMENT

Objectives

To identify local land use standards and related regulations for potential use in implementing waste control enforcement plans.

Background

Reviews of local standards (zoning, building codes, etc.) will be used to determine standards and regulations applicable to formulated enforcement plans.

Scope

Determine whether these plans could be employed to discourage future undesirable land uses or to strengthen enforcement plans as applied to existing waste sources.

Conclusions

Based on a review of local land use standards and enforcement techniques the conclusions regarding the utilization of land use management or other strategies for the implementation of groundwater quality protection measures are presented as follows:

1. In the San Fernando Valley case, the preservation of open space lands does not appear to be the most reasonable or effective means of protecting groundwater quality through land use restriction. This is because very little vacant land exists in the industrially zoned areas of the eastern SFVB and open space does not necessaily insure protection as dumping is actually encouraged by the existance of scattered and unattended vacant lots.

2. Down zoning industrially zoned land to the level of current use has some overall merit in reducing the potential for contamination of groundwater by precluding future industry from locating in the area. However in so doing, the economic development needs of the involved cities must be taken into consideration.

3. Special assessments can be utilized to fund activities directed at the enforcement and monitoring

of best management practices. However, City, County and State regulatory programs should be coordinated to avoid jurisdictional conflicts and to achieve the implementation of an efficient and effective integrated control program for all hazardous materials in the SFVB. If possible, the requirement for permits and inspections together with the payment of fees should not be duplicated.

4. Economic law enforcement appears to have good potential for aiding the implementation of programs involving the enforcement of environmental regulations. Economic law enforcement techniques such as recapture standards, economic civil assessments, surety devices and progression of steps make compliance with environmental regulation just as profitable for firms that comply as it makes noncompliance unprofitable for those firms that do not. It is equitable and objective, therefy giving reglators minsterial authority to use it quickly without having to go to court.

5. Land uses within the cones of influence of public water supply wells can be regulated through "well field protection" ordinances. Restrictions on types of development and activities involving the use of hazardous materials would be based on the computed groundwater travel time between the proposed development and the water supply well.

   This type of ordinance is geared primarily towards developing areas. However, fully developed areas would also be helped through intensified enforcement and public information efforts which are concentrated on businesses located within the indentified cone of influence.

Recommendations

1. "Cone of influence" zones should be established, through an ordinance, to provide speical provisions for land use development around well-fields. These provisions could include such measures as:

   A. Banning development immediately adjacent to a well;

   B. Restricing new development by:

      i. Limiting new development to those activities which would not present a threat to the groundwater supply through the use of hazardous materials, or

      ii. Requiring such new development to meet certain building and performance standards to insure that the activity would not pose a threat to the groundwater supply.

   C. Requiring presently existing development to meet similar performance standards within a specified time limit;

   D. Restricting or banning landfills within the "cone of influence zone"; and

   E. Subjecting industries already located in such zones to a more rigorous monitoring and enforcement program. The lower portion of the Verdugo basin and the eastern portion of the San Fernando Valley basin are of ctitical concern because of unconfined aquifer conditions, high soil infiltration rates, rapid groundwater movement and the location of a large number of active public water supply wells.

2. The economic concept of recaptive should be investigated further in order to ascertain its potential applicability as a mechanism for the implementation of hazardous materials control plans.

TASK III

DEVELOPMENT AND EVALUATION

OF ALTERNATIVE PLANS FOR IN SITU CONTAMINATION

Introduction

The objective of this task series is to formulate plans for the control, removal and/or treatment of contaminated groundwaters in the study area using information obtained from previous project tasks. The overall goal of the task is to facilitate the beneficial use of SFVB groundwaters while concurrently mitigating the water quality impacts of In Situ contamination.

In Situ Contaminants are defined here as those toxic substances that have either reached the underlying groundwater reservoirs or are enroute in the unsaturated zone. These substances are dispersed throughout identified contamination zones in varying concentrations. Their presence may be the result of past or very recent disposal practices; in the case of a continuous point discharge, the materials may be present in the form of a plume or continuous slug moving in the direction of groundwater flow.

Alternative plans are focused primarily on control strategies for the volatile organic compounds trichloroethylene (TCE) and tetrachloroethylene (PCE) because California Department of Health Services criteria presently limit the usability of groundwaters containing these two compounds. It is assumed, however, that the alternative plans will provide an equivalent level of control for other identified In Situ contaminants which are not presently regulated by the DOHS but, whose control is desirable.

Task III is divided into six subtasks as follows: Prefertial Groundwater Pumping (III-A); Water Level Management (III-B); Groundwater Blending (III-C); Groundwater Extraction/Treatment (III-D); Groundwater Removal/Disposal (III-E); and No Project (III-F).

For each subtask, brief summary of the objectives, investigations performed, conclusions and recommendations are presented.

SUBTASK III-A

PREFERENTIAL GROUNDWATER PUMPING

Objectives

To develop preferential groundwater pumping plans designed to contain or limit the spread of identified bodies of contaminated groundwater.

In order to accomplish the objective of this subtask a well packer and areal extent test were conducted. The purpose of the well packer test was to evaluate the effectiveness of clay layers in limiting the vertical movement of groundwater contaminants. The purpose of the area extent test was to further evaluate and verify aquifer characteristics in the North Hollywood area and; to gain a more precise understanding of the response of horizontal groundwater movement to changing pumping patterns.

Investigations

Background

Prior to the initiation of the well packer and areal extent test, an engineering evaluation of existing information including the geohydrological setting, well logs, pumping patterns and groundwater quality data for the North Hollywood area was performed.

Scope of Well Packer Test

A well packer was installed at the midpoint of a 37-foot thick clay layer in North Hollywood Well No. 24 which is perforated both above and below the clay lense. The concentration of TCE and PCE in the well discharge, water levels and pumping rates were observed before and after the packer was inflated. Comparison of the two sets of data allowed the following:

1. An evaluation of the packer's effectiveness in restricting water containing organic contaminants from entering the discharge flow from this well; and

2. An evaluation of well performance, aquifer transmissivity, storage coefficient and the changes in each of these parameters resulting from the elimination of well perforations above the clay layer when the packer is inflated.

Scope of Areal Extent Test

The areal extent test involved:

1. Controlled pumping of NH-24, with and without the well packer inflated along with several other North Hollywood area wells;

2. Measurement of the corresponding charge in water levels occuring in a network of surrounding observation wells; and

3. Measurement of TCE levels in the discharge from pumping wells.

This information was then correlated with known distances between the wells in order to:

1. Define the magnitude and areal extent of drawdown or cone of depression under the various pumping conditions; and

2. Evaluate the effect changing pumping patterns have on TCE levels.

Conclusions

From an examination of the measurements and data collected during the packer and areal extent test, the following conclusions and observations can be made:

Packer Test

1. Organic contaminates are effectively contained by clay lenses.

2. The use of a well packer in NH 24 prevented much of the organically contaminated water in the upper zone from reaching the pump suction located in the lower zone. During the 24-hour pumping period with the packer inflated, TCE dropped from over 300 ppb to only 7 ppb.

3. The packer has continued to be effective. The average TCE concentration over a five-month period from February to July 1982 was 9 ppb.

4. Transmissivity of the well was reduced by sealing off the upper zone, but the flow rate decreased only minimally.

5. The high transmissivity characteristics of the North Hollywood area aquifer were again verified to be over 1,000,000 gpd/ft., based on values calculated for the North Hollywood observation wells.

6. Storativity coefficients of .0005± indicate that the aquifer is semiconfined in the North Hollywood area.

7. The upper zone water levels changed by only 1.2 feet in the upper zone during the 24 hour pumping period with the packer inflated, while the peizometric surface changed 24.8 feet in the lower zone.

8. Comparing the two similar 24-hour pumping periods, drawdown increased by over 10 feet with the packer inflated.

Areal Extent Test

1. The areal extent of the North Hollywood 24 hour pumping cone of depression expands rapidly and reaches somewhere betwen 4000 to 5000 feet from each pumping well.

2. After 24 hours of pumping, the cone of depression is established and expands at a very slow pace.

3. Within the pumping well, drawdowns are increasing one to two feet per day. At a distance 2000 feet from the pumping well, drawdowns are increasing by less than one-tenth of a foot per day. At the fringes of the cone of depression, drawdown is occurring at an even slower rate.

4. Based on the water quality data collected from the North Hollywood Wells No. 24, 38, 39, 40, 41 and 42, these wells provide an ideal site for experimenting with moving contaminated water from one location to another by pumping different wells and observing changes in TCE contamination.

5. Groundwater contaminants tend to be held within eveloped cones of depression which are centered around the three major areas of groundwater extraction. These cones of depression will be maintained, and hence contaminant migration restricted, so long as seasonal pumping practices continue. Therefore, contaminants held in the cones of depression will inevitably be pumped out of the basin and the only way to effectively deal with the situation is to blend and/or provide treatment for groundwaters from contaminated wells.

Recommendations

As a means of controlling and reducing the amount of TCE and PCE contamination in the North Hollywood, Crystal Springs, and Pollock study areas, the following are recommended:

1. Pump highly contaminated wells for long durations (minimum of several months) to attenuate the concentration by dilution and sorption, and pump the remaining contaminants out of the aquifer.

2. Locate new wells several miles away outside of existing zones of contamination and alternate pumping of the new wells with the old, moving cone of depression back and forth. In the process, the contaminated water will be either attenuated or pumped out of the wells.

3. The packer test should be continued to determine:

   A. Its long-term suitability as a possible solution to groundwater contamination problems.

B. The operation and maintenance cost associated with the use of inflatable well packers.

4. Where possible, the casing of future wells should initially be perforated below a sufficiently thick clay lense so that it can act as a filter for TCE and PCE.

TASK III-B

WATER LEVEL MANAGEMENT

Objectives

To establish maximum desirable groundwater levels in the study area to prevent leaching or inundation of known or suspected areas of toxic waste containment in the non-saturated zone.

The goal of this subtask was to develop operating criteria for the SFVB based on water level fluctuations in relation to groundwater storage and extraction.

Investigations

Background

In order to accomplish the goals and objectives of Subtask III-B, investigations focused upon an engineering review of the historical upper and lower water levels and pumping activities that most significantly affect groundwater quality in the SFVB.

Scope

Bottom elevations of landfills were compared to historic high water levels to determine potential sources of contamination due to innudation by groundwater. Low water levels were examined in relation to increasing salts and total dissolved solids (TDS) as the water table drops. In addition, low water level restrictions imposed by the SFVB groundwater judgment were reviewed.

Conclusions

From a review of data and information collected for Subtask III-B the follwoing conclusions relative to upper and lower groundwater levels can be made:

Upper Levels

1. There are three areas of concern in the San Fernando Valley that need to be carefully observed for groundwater innudation of a landfill.

   A. Sun Valley Hansen Dam Vicinity

   This area has a high density of operating and completed landfills. Heavy spreading at the Hansen Spreading Grounds and the Verdugo Fault have a significant impact on water levels below landfills in this area.

   B. Crystal Springs Vicinity

   In periods of high runoff the water table should be monitored closely because the E.L. Flemming and Colorado Boulevard Dump pit buttons, located in this area, are below the 1969 high water levels.

   C. Strathern Landfill

   Based on 1981 water levels and 400,000 Acre Feet of recharge to the SFVB over a six year period, a computer simulation has demonstrated that wet cycle fluctuations of the water table would cause inundation of the proposed Strathern landfill.

2. It is important to continue pumping activities at the Pollock well field in order to keep water levels down and to intercept groundwaters that would otherwise flow out of the SFVB in the form of 3000 to 4000 acre-feet/year surface drainage, originating as rising water and, 500-1000 acre-feet/year groundwater underflow.

Lower Levels

1. Judgment restrictions on groundwater extractions set lower water levels at the 1968 and 1977 storage levels.

2. Lower water levels promote an increase in the migration of higher TDS groundwaters from western portions of the basin into areas of groundwater extraction.

Recommendations

As a means of protecting the groundwater basin from additional water quality problems, the following water table limits are recommended:

1. The upper limit should fluctuate at about eh 1955 water levels since they allow for water level increases during wet cycles, keep rising water to a minimum, reduce pumping lifts, and provide protection against inundation of landfills, except in the Crystal Springs area.

2. Water levels in the Crystall Springs area should be maintained below the base of local landfills by localized pumping.

3. The lower limit is essentially restricted to the 1977 water levels by the San Fernando Basin Judgment.

4. If a conjunctive use program is implemented, caution should be exercised in regulating water levels below the proposed Strathern Landfill.

SUBTASK III-C

GROUNDWATER BLENDING

Objectives

To formulate plans for the blending of pumped groundwater supplies having excessive or objectionable levels of priority pollutants with suitable supplies of pumped, surface and/or imported waters.

The purpose of this subtask was to evaluate the capabilities and limitations of each SFVB water system for blending the discharge from highly contaminated wells with noncontaminated water in order to reduce the level of TCE or PCE contamination to within acceptable limits as established by the DOHS.

Investigation

Background

Background information for Subtask III-C was obtained during a series of meetings held with water system representatives for the cities of Burbank, Glendale, San Fernando, Los Angeles and the Crescenta Valley County Water District. The meetings were held in order to determine well locations, production rates, points where well flows enter the distribution system, availability of import water and seasonal water demand for each water system. For each SFVB production well, TCE and PCE water quality data were compiled and the annual mean of monthly values calculated.

Scope

This information was then combined to establish the capabilities and limitations on blending for each SFVB water system. Schematic diagrams of system configurations for SFVB groundwater collection systems affected by TCE and PCE contamination were also developed.

Conclusions

From a review of data and information collected for Subtask III-C, the following conclusions on blending capabilities and limitations can be made:

1. The requirements for blending appropriate for each SFVB water system are as follows:

   A. The water systems serving the City of San Fernando and the Crescenta Valley County Water District do not have to employ additional processing in order to deliver acceptable quality water.

   B. Water systems serving the cities of Burbank, Glendale, and Los Angeles were determined to be candidates for utilizing blending as a method to reduce TCE levels in delivered water.

2. Based on normal operation during periods of high groundwater demand, the capabilities and limitations on a blending program for those water systems where it can be successfully employed are as follows:

   A. Cities of Los Angeles and Glendale

Facilities currently exist that allow for the blending of acceptable quality groundwater or imported surface water with groundwater containing excessive levels of TCE. Based on past operating experience, however, only wells with average (mean of monthly values) TCE or PCE levels no greater than 20 ppb can be successfully blended.

B. City of Burbank

Facilities currently exist that allow for the blending of higher quality groundwater with groundwater containing excessive levels of TCE but, the capability for blending imported water is not possible at the present time. Because of this limitation, only wells with average TCE or PCE levels no greater than 10 ppb can be successfully blended.

3. Dependance solely on a blending program to control the level of TCE in delivered water may cause either water quality or water supply problems during a drought situation. Under drought conditions, demand for increased groundwater production occurs concurrent to the loss of wells which would normally be blendable but, due to a reduction in the supply of imported water required for blending, cannot be operated.

Recommendations

1. City of Los Angeles

As a means of putting contaminated SFVB groundwater supplies to beneficial use while concurrently meeting water quality standards established by the DOHS, the recommendations on groundwater blending are presented as follows:

A. The current practise by LADWP of blending SFVB well water containing action levels with noncontaminated groundwater or surface water supplies should be continued as the most cost effective water quality control method for those wells producing water in the range of five to 20 ppb TCE.

B. For groundwater with a long term average analysis in excess of 20 ppb TCE, other treatment methods in addition to blending are recommended.

C. In order to develop a more effective long term program of groundwater blending in the SFVB for the control of water quality in the delivered water supplies, it is recommended that a monitoring program be designed and implemented that includes observation wells be installed in the North Hollywood and Headworks-Crystal Springs areas of the SFVB around the well fields.

2. <u>Other Eastern SFVB Water Systems</u>

Recommendations are not proposed in this report relative to the use of blending by the water systems of the eastern SFVB other than LADWP (i.e. Burbank, Glendale, San Fernando and the

La Crescenta Valley County Water District) for the following reasons:

A. Burbank and Glendale are currently doing very little pumping of groundwater because they are storing their water in the basin for pumping in case of a drought. Both Glendale and Burbank have limited capacity to blend some of their contaminated wells with uncontaminated wells.

B. La Cresenta Valley County Water Distrit reduces the volatile organic chemicals (VOC) levels to acceptable levels in their groundwater during the course of present carbon dioxide removal treatment.

C. San Fernando does not have a VOC contamination problem.

SUBTASK III-D

GROUNDWATER EXTRACTION/TREATMENT

Objectives

To formulate plans involving the treatment of contaminated groundwaters.

The purpose of Subtask III-D was to evaluate processes that will allow contaminated groundwaters to be extracted from the SFVB, treated and then put to beneficial use.

Treatment methods studied for the removal of volatile organic contaminants (VOC's) from well water included packed tower aeration, spray aeration, diffussed aeration, adsorption by Granular Activiated Carbon (GAC) and adsorption by synthetic resins.

Investigations

Background

Cost estimtes and process evaluations were developed from information collected in an extensive review of technical literature. Based on this evaluation, the alternative plan deemed to be the most cost effective treatment method for removing TCE and PCE from contaminated SFVB groundwater was developed and is recommended for consideration.

Scope

The formulation and evaluation of alternative plans for the treatment of contaminated groundwater involved the following:

1. An analysis of treatment technologies, currently available for removing identified contaminants from cource water in order to facilitate the selection of the most cost effective process.

2. An analysis of the physical arrangement and operational flexibility of the groundwater collection systems affected by contamination and the identification of wells targeted to receive treatment.

3. An estimate of the unit production cost for each treatment technology.

4. Ther operational aspects of each alternative such as the required maintenance, treatment process stability, efficiency and impact on existing water system operation.

Conclusions

From an evaluation of published data, technical reports and water quality evaluations for SFVB goundwater supplies, the following conclusion on treatment, processes and costs can be made.

1. There are approximately 18 SFVB wells containing TCE at a long term average level of 20.0 ppb or greater

which require some form of treatment in order to be operated without raising contaminant levels in delivered water above DOHS action limits.

2. This investigation concludes that it is economically feasible, and, under current DOHS limitations for TCE and PCE in drinking water, is desirable to provide treatment for wells containing high levels of TCE and/or PCE. Long duration extraction and treatment of groundwater from contaminated wells could accomplish the following:

   A. Reclaim contaminated groundwater which is presently unusable.

   B. Remove contaminants from the basin which could migrate and affect other wells.

   C. Regain the use of the capitol investment in well facilities which is not utilized when a well is taken out of service because of contamination.

   D. Restore normal operational flexibility of the grounwater collection system.

3. Based on this Subtask III-D evaluation, packed tower aeration is the most cost effective treatment method for removing VOC's from contaminated SFVB wells.

4. Diffused aeration and GAC treatment processes were considered infeasible because of higher estimated treatment costs.

5. Air-lift pumping/aeration, preferential pumping and the use f well packers are several emerging groundwater contaminant control techniques which presently are in the developmental stages while the reliability and effectiveness of these methods has yet to be demonstrated on a large scale, results from a limited amount of pilot scale testing indicate that each has good potential to be a cost effective contaminant control alternative and should be investigated further.

6. Due to variability in the geoligic conditions, level of contamination, locations of perforations, and pumping rates for each well affected by groundwater contamination, the set of available contaminant control options are unique for each well. Accordingly, optimum contaminant control methods should be selected on a case by case basis.

Recommendations

Based upon the findings of the Subtask III-D investigation, the recommendations on cost effective plans for treating contaminated SFVB wells are as follows:

1. A preliminary list of SFVB wells that are designed as candidates to receive treatment if below:

   City of Burbank
      Public Service Department Well No. 14A

   City of Glendale
      Grandview Well No. 6

City of Los Angeles
North Hollywood Wells Nos. 5, 11, 13, 21, 28, 29, 31 and 40

2. A three phase treatment program is recommended for consideration in the final recommendations of the GWQMP-SFVB. This program involves the employment of aeration treatment in the following phases.

Phase 1 Pilot test of packed tower aeration and units air-list pumping/aeration at one well.

Phase 2 Full size treatment unit using the best process from Phase 1 at a single SFVB production well.

Phase 3 Based upon Phase 1 and 2 findings, formulate and implement treatment for the candidate wells listed in number 1 above.

SUBTASK III-E

REMOVAL DISPOSAL SUMMARY

Objectives

To formulate plans for the selective disposal of degraded groundwaters.

Investigation

Background

The capacity of two facilities within the SFVB were considered for the disposal of contaminated waters;

1. The sanitary sewer system, and

2. The storm drain system and Los Angeles River (LAR).

In addition, consideration was given to the potential for reclaiming disposal waters from the LAR for groundwater recharge at existing spreading grounds.

Finally, regulatory considerations that would permit removal/disposal were surveyed.

Scope

This report is an engineering evaluation of the feasibility of removing and disposing of contaminated groundwaters and is part of the overall analysis of management options for the control of groundwater contamination.

Conclusions

1. There are several considerations that currently make the removal-disposal option unacceptable and/or difficult to implement. 1) long term water supply considerations combined with the high cost of replacement water makes it impractical to dispose of the large quantities of contaminated groundwater necessary to effect any long term benefits to groundwater quality in the SFVB. 2) there is currently no legal provision in the SFVB groundwater rights adjudication that allows for the disposal of groundwater. Further, existing regulatory

constraints prohibit the disposal of the TCE contaminated water.

2. From the above considerations, removal-disposal would be an acceptable alternative only if disposal water could be safety reclaimed and recycled. Some reclamation and recycling of limited quantities of disposal water from the LA DWP's North Hollywood well field may be possible by utilizing the existing storm drain/LAR network. Natural volatilization of TCE from the LAR should render the water suitable for groundwater recharge at the downstream Headworks spreading grounds without causing any subsequent adverse impact on the LAR or groundwater quality.

3. Current LARWQCB and LA County Flood Control guidelines prohibit the disposal of water to the LAR that does not meet drinking water guidelines.

4. No specific statutory authority exists in the SFVB water rights adjudication to allow and regulate this removal, disposal and reclamation operation.

Recommendations

1. While long term disposal is not a feasible alternative at this time, selective disposal, especially if combined with reclamation, might be implemented on a temporary, limited basis until other management techniques, such as treatment, could be implemented. In addition, disposal is often the only way to accomplish testing of highly degraded wells.

2. If this option is to be considered further, provisions would have to be made through the various regulatory agencies to overcome those obstacles that currently prohibit removal-disposal.

SUBTASK III-F

NO PROJECT ALTERNATIVE

Objectives

Determine the effects of the no-project alternative on groundwater quality.

Investigation

Background

Data on current contamination levels and current water system operations was compiled. Costs of replacement supplies of water for SFVB groundwater were determined.

Scope

An analysis of the impact of replacing SFVB groundwater with MWD water was performed, and an examination of groundwater quality impacts within the SFVB aquifer was considered.

Conclusions

Based upon an evaluation of available data and current water operations, the present contaminant levels will have a significant impact on the water systems for the Cities of

Los Angeles and Burbank. Eleven City of Los Angeles wells and three City of Burbank wells will be decommisioned as a result of high contaminant levels and become unavailable for groundwater production. Although current water operations are able to tolerte the loss of groundwater production capability under normal operating conditions, the future impact on the water systems will vary due to changing supply and demand conditions. At the very least, the Cities of Los Angeles and Burbank can anticipate higher water production costs as a direct result of the No Project Alternative.

1. The loss of capital invested in equipment will result from the unavailability of the wells for groundwater production. The equipment losses are estimated at $2,300,000 for the City of Los Angeles and $630,000 for the City of Burbank. These amounts will also be the approximate costs for the construction of new replacement wells at alternate locations.

2. The loss of groundwater production capability may necessitate additional purchases of water from the Metropolitan Water District of Southern California (MWD) The current cost for groundwater, which is based primarily on pumping costs is approximately $35 per acre-foot. For the City of Los Angeles, the cost for MWD water as a replacement for groundwater is $121 per acre-foot. Since the City of Burbank utilizes groundwater only under emergency conditions, the cost for MWD water as a replacement is $325 per acre-foot. Based upon current projections, however, the MWD water rates could increase to two and a half times the present rates by 1990.

<u>Recommendations</u>

1. The No Project Alternative is not a remedy to the groundwater contamination problem in the SFVB. No Project instead will prevent the removal of contaminants from the aquifer as a result of water quality considerations, and thereby allow the contaminants to disperse. Any delays in resolving the immediate problem will only result in the implementation of more costly solutions.

2. It is recommended not only that a more positive solution to the groundwater contamination problem be pursued but also that future planning for water supply wells in the SFVB consider groundwater quality as one of the primary concerns. Since recent developments may significantly limit the ability of the MWD to provide a sufficient supply of water, it is imperative that reliable alternative groundwater supply wells of uncompromisable quality be developed.

SUMMARY OF SUBTASK IV-A

Objectives

To determine the cost-effectiveness of groundwater quality control measures including aeration, preferential pumping, blending and disposal.

Investigation

Background

The findings and recommendations of the various Task III reports on the different control/treatment techniques for managing in situ contaminants in the SFVB were examined to determine the costs and benefits that could be derived for each strategy.

Scope

Cost analyses were performed on the different toxic waste control/treatment strategies that were recommended for use by the Task III reports. The value of many of the benefits for all of the alternative plans could not be readily quantified due to a lack of data on their actual value. The cost-effectiveness of each alternative was determined using the developed costs and benefits.

Conclusions

Various Task III recommendations that provide for the control and treatment of toxic wastes found in the groundwaters of the SFVB have been determined to be cost-effective. Those alternatives that could be implemented concurrently to facilitate the cleanup of the groundwater of the SFVB were combined into a corrective action plan.

The treatment alternatives relating to Removal and Disposal, and No Project (Subtasks III-E & III-F) were deemed not to be cost-effective because of regulatory restrictions and the high cost of purchasing replacement water.

Recommendations

Preface

With the exception of the Removal/Disposal and No Project Alternatives, which were not recommended for adoption in Task

III, the remaining alternatives presented in the subtasks of Task III are considered to be desirable for upgrading the quality of groundwater of the SFVB. Recommendations are proposed in the following sections for those Task III alternatives for which adequate cost data is available or can be estimated.

1. It is recommended that the use of well packers, blending and aeration be included in the Task VI Final Plan as Recommended Alternative Methods for Upgrading groundwaters of the SFVB. Sufficient information is available to validate the cost-effectiveness of these methods for upgrading groundwater in the SFVB as compared to purchasing replacement water or constructing replacement facilities in uncontaminated areas of the basin.

2. The performation of future well casing in zones below clay lenses is recommended as a cost effective procedure since it involves minimal additional cost, and provides added protection to the quality of the groundwater supply.

3. When new wells are installed, they should be located in uncontaminated areas of the SFVB.

4. Adopt the proposed Blending and Treatment recommendations of Subtasks III-C and III-D respectively.

SUBTASK V

FINANCIAL, INSTITUTIONAL AND MANAGEMENT PLANNING SUMMARY

Objectives

The overall objective of Task V of the GWQMP-SFVB study is to develop an organized framework for the successful implementaiton of the recommended plan. The final work plan for the GWQMP-SFVB study states the objectives of this task as follows:

A. "To identify actual and potential sources of funding for continuous project implementation";

B. "To identify and evaluate alternative institutional and management arrangements for project implementation";

C. "To develop candidate financial/institutional approaches for the continuous (or phased) implementation of project strategies".

Investigation

As a result of previsou subtask investigations, 8 specific study recommendations were identified. These recommendations were designed to both increase source control of contaminants and to mitigate the effects of in-situ contamination.

The product of this task is a proposed implementation plan for use by the affected agencies. The proposed implementation plan is designed to identify primary agency responsibilities, and financial and institutional arrangements necessary to achieve the goals of the recommended plan. An evaluation of funding alternatives and of the existing institutional framework as it relates to overall planning, management, operating and regulatory functions is also presented in this report.

Conclusions

Based on the findings of this Subtask V investigation the conclusions relative to the implementation of the proposed recommendations are presented as follows:

1. The proposed organizational framework assigns the major responsibility for the implementation of the recommended groundwater quality management plan to local agencies. It acknowledges the existence of the local structureand attemps to complement and to reinforce existing roles and activities. Although no new agency is proposed, local institutional roles and responsibilities, primarily in terms of enforcement, permit issuance, inspection and funding should be reevaluated.

2. The institutional framework for the primary affected agencies are shown in Table 1. Those agencies or departments within the local agencies that are assigned lead roles, have the major responsibility or authority. The agencies or departments assigned support roles conduct related activities which may require a coordinated effort. The agencies or departments assigned advisory roles provide technical assistance in program planning and development.

3. Table 2 presents a summary of the financial arrangements for each city. An estimate of the funds required for the implementation of each of the final recommendations is also included.

4. A proposed plan implementation schedule is presented in Table 3. A time schedule for each of the final recommendations is shown. Successful implementation, however, is contingent upon the availability of funds.

Recommendations

In order to implement a successful groundwater quality protection program, the following recommendations are presented for consideration.

1. Since the implementation of the recommended plan relies primarily on the activities of various local agencies, interagency coordination should be encouraged to consolidate management arrangements, to avoid interagency conficts, and to assure continuous implementation.

2. State and County agencies should participate in the planning and developmental phase to assure compliance with the objectives of the recommended plan on a regional basis. State and County agencies could also provide additional support in the enforcement of regulations for the prevention and control of groundwater contamination.

3. Local agency commitment for the implementation of the recommended plan depends upon the availability of funds. Because of diminishing financial resources, funding appears to be the major obstacle. Where applicable, service charges, user fees and permit fees are recommended as the primary funding sources. Federal and state funds should be pursued to the

maximum extent, but are expected to be of limited availability.

TASK VI

FORMULATION OF RECOMMENDED PLAN

Introduction

The formulation of a recommended, or select, plan involves the evaluation and analysis of previously identified waste control measures in view of constraints such as cost effectiveness and overall environmental impact. Subsequent to this analysis is the tanking of attractive waste control plans in order of overall feasibility as identified in Tasks IV and V. Acceptable plans are evaluated on the basis of ease of implementation and estimated degree of achieved solution.

Formulation of the recommended plan was carried out in three phases including Preliminary Draft Plan Development and Impact Assessment, Preliminary Draft Plan Review and Formulation of the Recommended Plan. The conclusions and recommendations of this Task series is the recommended plan which is presented as the eight recommended actions in the body of this report.

Objectives

the overall objective of Task VI is to develop a recommended plan of action for the protection of SFVB groundwater quality and for the correction of existing groundwater quality problems in the basin. The specific objective of Task VI as stated in the GWQMP-SFVB Final Work Plan are as follows:

1. To evaluate control strategies detailed in Tasks II and III for feasibility ranking; to develop a preliminary draft plan consisting of candidate control measures; to evaluate the environmental, social and financial impacts of the draft plan.

2. To distribute the draft plan to participating agencies for cooperative review and comment; to incorporate reviews into the plan for the development of a Final Recommended Plan.

3. To transmit the recommended plan to participating agencies for conditional approval.

Investigation

Background

Plans of action for the protection of SFVB groundwaters and for the control of existing contamination were developed by the LADWP from information presented in previous Task investigtions. Based on an evaluation of alternative toxic material control plans, the draft plan was formualted and is recommended for adoption.

Scope

The formulation of the draft plan by the LADWP involved the following:

1. Assessment of alternative control plan performance and effectiveness in providing real solutions based on facility requirement, design, construction, operation and maintenance, interagency monitoring and enforcement requirements, and environmental impact,

2. Selection and further development of feasible toxic material control measures into a draft plan based on auticipated effectiveness of selected alternative systems, costs of treatment processes and facilities, and interagency cooperative procedures for plan implementation,

3. Distribution of the draft plan for review and comment to SCAG, the participating agencies and committees, and to the general public at a public meeting,

4. Preparation of a report which documents and responds to each draft plan comment received and revision of the draft plan based on this report, and

5. Preparation of a final recommended plan for transmittal to SCAG for formal 208 plan update and to the particpating agencies for conditiona approval.

TASK VIII

PUBLIC PARTICIPATION

<u>Objectives</u>

The goal of the public participation program is to educate, inform and provide access for public and industry support, input and comment to the final plan.

Several specific activities and goals of the program, as defined in the final work plan, are described below.

1. <u>Public Information</u>

   To provide readily understandable information, on a periodic basis, to the cnsumer population and the general public regarding project tasks, findings and plan recommendations; to collect and evaluate public input to the project.

2. <u>Industry Information</u>

   To provide industry in the study area with increased awareness of the interrelationships of groundwater quality and toxic contaminants; to provide written information to industry in the form of project data, brochures and leaflets describing the need for proper toxic waste containment and disposal and urging industry to practice good on-site housekeeping.

3. <u>Local Advisory Group</u>

   To provide representatives from the general public, industry, public interest groups and agencies in the Staff Advisory Committee for the purpose of assisting SCAG in specific phases of the public participation program.

4. Evaluation of Public Input and Integration into Plans

To evaluate the input from the public participation program and to incorporate public inptu and comments into the public participation program.

Investigation

Background

Local groundwater supplies of the Department of Water and Power typically account for about 15 percent of the total water supply of the City of Los Angeles. These supplies serve, on the average, aout three-quarters of a million people. The Department's water customers fully expect their water supplies to be of the highest possible quality. Recently, however, mush concern has arisen nationwide over the observed contamination od drinking water by substances suspected of being carcinogenic or otherwose deleterious to general health. The Department has by no means escaped the consequences of this concern by its customers. It is therefore a paramount interest to the Department that the public be fully aware of all the facts concerning the quality of the water supply, as well as those actions being taken by the Department in dealing with identified or suspected water quality problems.

Scope

The overall public participation process will actually involve three groups: 1) the potentially affected consumer population and related concerned interest gorups; 2) the general public in the study area; and 3) industrial waste dischargers whose activities are identified as or suspected of having adverse impact on the quality of groundwaters in the study area. This approach will thereby directly involve the region's consuming population and the industries that may be directly affecting the quality of the groundwater supplies.

Conclusions

The general public and industry will be asked to bear the financial burden in cleaning up the SFV groundwater reservoir and for an incrased level of enforcement of current hazardous waste disposal regulations. In order to protect and safeguard SFVB groundwaters, the entire community must become involved and educated to the causes and solutions to the groundwater contamination problem.

Recommendations

1. Public participation efforts should be continued to encourage continued awareness of groundwater protection needs in both industry and the general public.

APPENDIX C

LANDFILLS AND DUMP SITES IN THE SAN FERNANDO VALLEY

DESIGNATION*	SITE IDENTIFICATION	LOCATION	WASTE CLASSIFICATION	STATUS	OWNER/OPERATOR
010	Lopez Canyon Landfill	North of Van Nuys Blvd.	2	Active	Los Angeles
011	Sheldon-Arleta	8700 Arleta Avenue	2	Inactive	Los Angeles
012	Toyon-Griffith Park	Griffith Park Drive	2	Active	Los Angeles
014	Griffith Park Landfill	--	U	Planned	Los Angeles
027	Scholl Canyon Landfill	7546 North Figueroa St.	2	Active	LACSD
066	Burbank Reclamation Project	1801 North Bell Aire Dr.	2	Active	City of Burbank
103	North Valley Refuse Center	14747 San Fernando Road	2	Active	North Valley Land Dev. Corp.
104	Bradley Pit Landfill	9351 Tujunga Avenue	2	Active	Conrock
105	Livingston-Graham Landfill	11670 Wicks Street	2	Planned	Livingston-Graham Corp.
106	Hewitt Pit	7245 Laurel Canyon Blvd.	2	Inactive	Valley Reclamation
107	Penrose Pit	8251 Tujunga Avenue	2	Inactive	L.A. By-Products
133	Universal City Studios Landfill	100 Universal City Plaza	2	Active	Universal City Studios
134	Pendleton Street Dump	11251 Pendleton Street	2	Inactive	California Materials Co.
141	Kagel Canyon Landfill	--	2	Planned	--
147	Morman Canyon	Easterly of Brown Canyon and Morman Canyon	U	Planned	--

DESIGNATION*	SITE IDENTIFICATION	LOCATION	WASTE CLASSIFICATION	STATUS	OWNER/OPERATOR
282	Pendleton Street Landfill	11000 Pendleton Street	3	Active	LADWP
283	Valley Steam Plant Landfill	9430 San Fernando Road	3	Active	LADWP
310	Brand Park Disposal Site L. F.	North of Childs Canyon Debris Basin	3	Active	Glendale
639	--	Bluffside Dr.-Willowcrest	3	Inactive	Los Angeles
643	Grand Central Airport Dump	1101 Airway	U	Inactive	Glendale
644	Kellogg Avenue Dump	630 Kellogg Avenue	U	Inactive	Glendale
645	E. L. Flemming Dump	W. of 5431 San Fernando Rd.	U	Inactive	Glendale
646	Colorado Boulevard Dump	500 Feet West of	2	Inactive	Glendale
695	Valley Brick Dump	6151 Kester Avenue	2	Inactive	Valley Brick & Supply Co.
696	L.A. City Department of Public Works	15145 Oxnard Avenue	2	Inactive	Los Angeles
698	Unknown	--	U	--	--
700	Valley Transfer Station	9501 San Fernando Rd.	2	Inactive	
701	Branford Street Dump	Branford Street at San Fernando Road	2	Inactive	
703	Cal-Mat Dump	9228 Tujunga Avenue	2	Inactive	California Materials Co.
704	Akmadzich Dump	11201 Randall Street	3	Inactive	P. J. Akmadzich
705	Strathern Landfill	8001 Fair Avenue	2	Proposed	L.A. By-Products
706	Tuxford Pit	8501 Tujunga Avenue	2	Inactive	L.A. By-Products
707	L.A. By-Products	Victory Boulevard at Vineland Avenue	3	Inactive	L.A. By-Products
708	Lockheed Aircraft	1705 Victory Boulevard	U	Inactive	Lockheed Aircraft

DESIGNATION*	SITE IDENTIFICATION	LOCATION	WASTE CLASSIFICATION	STATUS	OWNER/OPERATOR
709	Benz Dump	11666 Pendleton Street	3	Inactive	Valley Iron & Metal Co.
710	DeGarmo Pit	9135 DeGarmo Avenue	2	Active	L.A. By-Products
711	Wicks Place Dump	Wicks Street at Glenoaks	2	Inactive	(See #104)
712	Kittridge Dump	11400 Kittridge Street	U	Inactive	Unknown
713	Newberry Pit (Razarian Dump)	8250 Tujunga Avenue	2	Inactive	L.A. By-Products
714	Bradley Pit	9050 Bradley Avenue	U	Inactive	California Materials Co.
720	Morris Pit Dump	9116 Norris Avenue	2	Inactive	Valley Iron & Metal Co.
721	Valley Iron & Metal Dump	Pendleton Street (North of Glenoaks Blvd)	2	Inactive	Valley Iron & Metal Co.
722	--	12800 Oxnard Street	2	Inactive	Ludvig Grudt and
723	Bright Realty Dump	Laurel Canyon at Jerome	U	Inactive	Bright Realty Co.
724	Tujunga at Peoria Dump	--	2	Inactive	California Materials Co.
745	L.A. City Department of Public Works	Zelzah Avenue at Lerdo Ave.	2	Inactive	Los Angeles
746	San Fernando City Dump	Sharp Avenue at Paxton St.	2	Inactive	City of San Fernando
747	Ledger Dump No. 2	Glenoaks Blvd at Montoque St.	2	Inactive	Robert Ledger
752	Russell Moe Dump	Lopez Canyon Road	2	Inactive	Russell Moe Inc.

*Corresponds with County Engineer's Office designation as shown on Plate 4.

WASTE CLASSIFICATION

2 - Chemically or biologically decomposable materials which do not include hazardous substances nor those capable of significantly impairing the quality of usable waters.

3 - Nonwater soluble, nondecomposable inert solids.

U - Unknown