



2030 Addison Street, Suite 500 • Berkeley, California 94704 • 415 540-6954

TRANSMITTAL MEMORANDUM

TO: Alameda County Health Agency  
Department of Environmental Health  
Hazardous Materials Division  
80 Swan Way, Room 200  
Oakland, CA 94621

DATE: April 6, 1989

ATTENTION: Mr. Lowell Miller

FILE: 87157.6

SUBJECT: Groundwater Study

WE ARE SENDING:  Herewith  Under Separate Cover  
 Via Mail  Via Hand delivery

THE FOLLOWING:

At your request  For your files  For your review  
 For your approval  For correction  For payment

REMARKS:

Copies to:

*Mark Milani*

Mark Milani  
Project Manager

DEPT. OF ENVIRONMENTAL HEALTH  
HAZARDOUS MATERIALS

4/7/89



ORIGINAL

2030 Addison Street, Suite 500 • Berkeley, California 94704 • 415 540-6954

March 14, 1989

87157.6

Alameda County Health Agency  
Department of Environmental Health  
Hazardous Materials Division  
80 Swan Way, Room 200  
Oakland, CA 94621

Attention: Mr. Lowell Miller

Subject: Groundwater Study  
Mill Springs Park Apartments (Formerly Livermore Superblock)  
Railroad Avenue between South P and South L Streets  
Livermore, California

#### INTRODUCTION

This report presents results of our groundwater study for the subject site. This study was performed as part of the approved final closure plan for the subject site. Aqua Resources Inc. (ARI) has provided environmental consultation and engineering services during the Phase I, Phase II and Final Site Remediation and Closure for the Mill Springs Park Apartment Site. The site is located on Railroad Avenue, between South L and South P Streets, in Livermore, California. The site is shown in relation to the city of Livermore on the Vicinity Map, Plate 1. The site was known formerly as the Livermore Superblock.

A Final Closure Plan, required by the Alameda County Health Agency, Department of Environmental Health (whenever soil contamination with hazardous materials occurs) was prepared by ARI, and presented in a report dated October 23, 1988 with addendum dated October 26, 1988. The Final Closure Plan, with addendum, was approved by the Department of Environmental Health, Hazardous Material Division on October 27, 1988. The previous environmental services provided by ARI included a limited historical review

of site usage, three subsurface investigations and observation, sample collection and review of chemical analyses during Phase I soil removal. The previous environmental services described above were presented in an interim report dated September 12, 1988. Environmental consultation and engineering services provided during Phase II removal and final closure were presented in a report dated March 14, 1989.

The groundwater study included review of selected available groundwater resource data only; no additional groundwater investigation was performed as part of this study. However, subsurface soil data obtained as part of previous environmental investigations performed by ARI was reviewed. A groundwater monitoring well was required as part of the final closure plan; the proposed well location is shown on the attached Site Plan, Plate 2. The basis for the proposed well location is detailed in this report.

#### GROUNDWATER STUDY DETAILS

Summary of Groundwater Data Sources: The Mill Springs Park Apartment site is located within the Alameda County Flood Control and Water Conservation District, Zone 7. This agency was contacted regarding available groundwater data. In addition, the Department of Water Resources Bulletin (DWRB) No. 118-2, "Evaluation of Groundwater Resources: Livermore and Sunol Valleys", June, 1974 was reviewed.

Regional Hydrogeology: The Mill Springs Park Apartment site is located within the the Livermore Valley groundwater basin. From review of the DWRB, the Livermore Valley groundwater basin is comprised of numerous groundwater subbasins. The subject site is located within the the Mocho subbasin, particularly the Mocho II province which comprises the western portion of the Mocho subbasin.

Groundwater movement in the Livermore Valley is generally in the topographic downgradient direction, and towards the longitudinal axis of the valley. Groundwater then flows along the longitudinal axis generally in a western direction towards the Bernal subbasin. The regional groundwater flow can be interpreted from the groundwater elevation contour maps, plates 3 through 5. It should be noted that although the general flow direction corresponds closely with the longitudinal axis of the valley, operation of the gravel

extraction pits does have a significant impact on both the local and regional groundwater flow regimes. However, the gravel extraction pits do not seem to have a significant impact on groundwater flow in the vicinity of the Mill Springs Park Apartment site.

Groundwater flow occurs in multiple water-bearing units. The principal water bearing units include an upper, unconfined aquifer overlying a series of semi-confined aquifers of the Valley Fill materials (recent alluvium). These units in turn are underlain by a multilayer, confined aquifer system of the Livermore Formation.

Both vertical and horizontal groundwater flow restrictions occur in the aquifer system. Faults, lithologic variations and permeability variations affect horizontal groundwater movement, particularly in the Valley Fill materials. Faults primarily control the hydraulic continuity between individual subbasins. Vertical groundwater movement is often restricted due to internal stratification of the aquifer materials. Vertical movement between the Valley Fill and Livermore Formation appears to be limited to areas where the Livermore Formation is in direct contact with overlying stream channel deposits (along the Arroyo Valle and Arroyo Mocho stream channels), and to some extent where existing wells penetrate both aquifers.

Mocho Subbasin: The Mocho subbasin is the largest subbasin in the Livermore Valley groundwater basin, and also is one of the most important. The principle streams draining the Mocho subbasin include the Arroyo Seco and the Arroyo Mocho. The Mocho subbasin is bounded to the east by the Tesla Fault, to the west by the central zone of the Livermore Fault, to the north by the Tassajara Formation and to the south by non water bearing marine rocks.

As mentioned earlier, the Mocho subbasin has been divided into two provinces: Mocho I (eastern) and Mocho II (western). The subject site is located within the Mocho II province; consequently, only the Mocho II province will be discussed. In addition, the DWRB states that the near surface materials in both provinces appear to lack lateral hydraulic continuity.

The Valley Fill materials in the Mocho II province consist of sand, gravel and cemented gravel separated by interbeds of silt and clay. The Valley Fill reportedly extends to depths of about 30 feet along the Arroyo Mocho to over 150 feet along the longitudinal axis of the valley. The underlying Livermore Formation consists of sandy gravel and cemented gravel. Individual aquifers are generally separated by aquitards consisting of silty clay and clayey gravel.

Local Groundwater Occurrence and Movement: The Alameda County Flood Control and Water Conservation District, Zone 7 monitors numerous wells within the Mocho subbasin as well as other subbasins for both water level and water quality. From their monitoring program, Zone 7 has also prepared water level contour maps for selected years. Copies of the available water level contour maps for years 1983, 1986 and 1987 are presented on Plates 3 through 5. Based on these data, water levels in the Valley Fill aquifer system in the vicinity of the site have dropped from an elevation of about +460 feet, mean sea level datum (msl) to about +430 feet msl from 1983 to 1987. Although the water level has dropped, the hydraulic gradient appears to have been relatively consistent, with groundwater flowing to the northwest on a local basis.

#### CONCLUSIONS AND RECOMMENDATIONS

Borings drilled previously by ARI at the site did not encounter free groundwater to the depth explored (maximum depth about 32 feet). The 1987 water level contour map indicates that the free groundwater level should be at an elevation of about +430 feet, msl. The average surface elevation at the subject site, based on review of the grading plan, is about +475 feet, msl. Based on this, the free groundwater level should be between 45 feet and 50 feet below existing grade. Likewise, despite the nearly 30 foot drop in water level from 1983 to 1987 and operation of the gravel extraction pits to the west, the hydraulic gradient has been rather consistent, flowing to the northwest.

Based on the above conclusions, ARI believes that only one monitoring well is necessary. The monitoring well should extend to a minimum depth of 50 feet but no deeper than 70 feet. The monitoring well should be terminated

when a suitable aquitard is encountered between 50 feet and 70 feet, and confirmed by a minimum five foot penetration into the aquitard in conformance with Alameda County and RWQCB guidelines. Based on the gradient and location of the concrete vault structure (previously removed and backfilled) with respect to the planned development, the proposed location of the monitoring well is shown on Plate 2.

ARI also believes that the monitoring well should be sampled and analyzed once after initial well development is completed, and again about three months after the first sample interval. Water samples would be analyzed for Total Petroleum Hydrocarbons (TPH, EPA Method 5030) and for BTX & E (EPA Method 602). Provided the contaminant levels (if found) are below established maximum contaminant levels, the well would be destroyed in conformance with regulatory requirements.

#### LIMITATIONS

Our groundwater study is based on review of available groundwater data. No subsurface groundwater investigation was performed as part of this study. The conclusions and recommendations contained herein are professional opinions derived in accordance with the current standards of professional practice. No other warranty, expressed or implied, is given.

It has been a pleasure to provide you with this information. If you have any questions regarding the above, please do not hesitate to contact the undersigned.

Respectfully submitted,  
AQUA RESOURCES INC.



Mark Milani, P.E.  
Project Manager

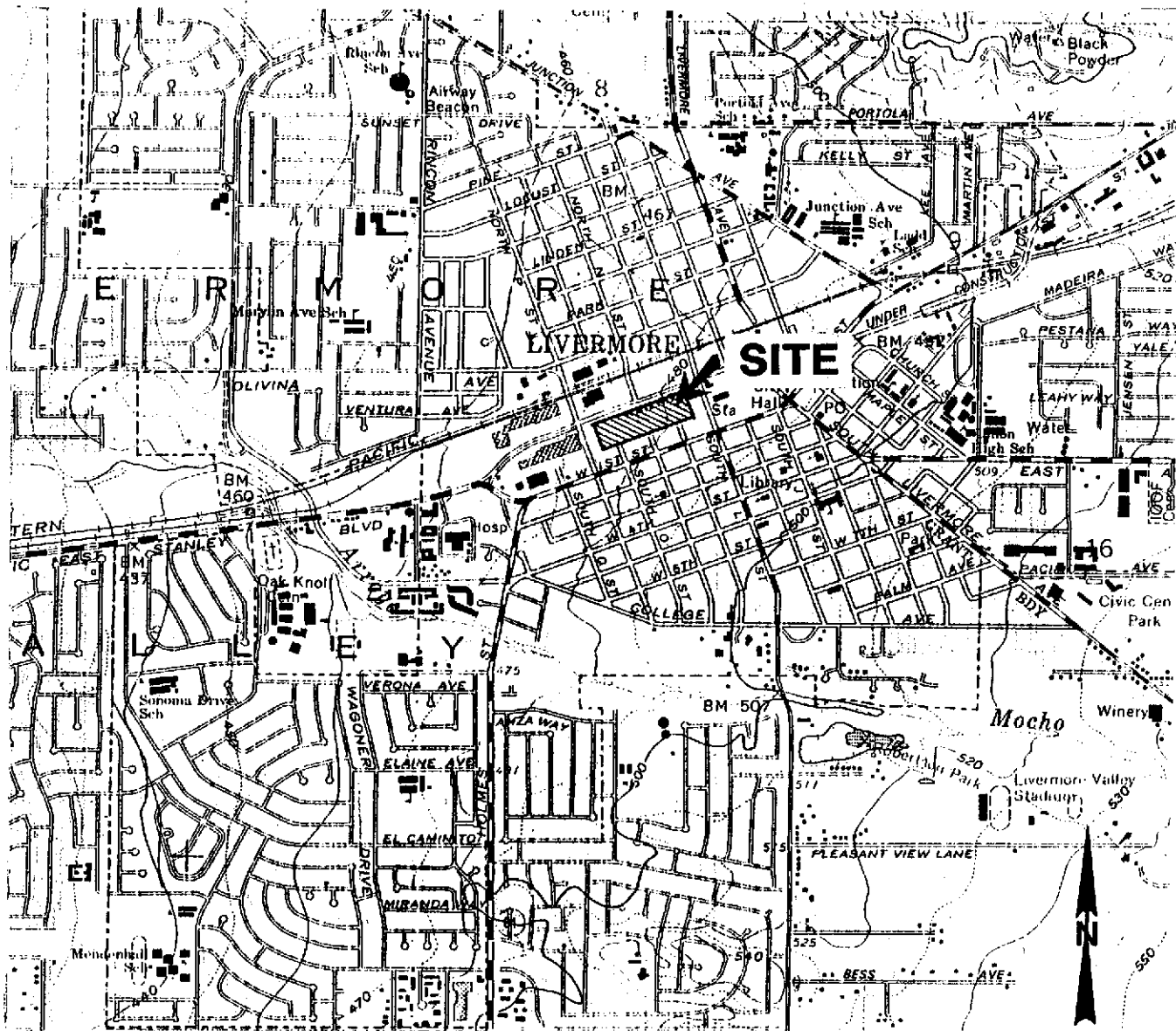
cc: Addressee (2)

Barnett Range Corporation (2)  
Attn: Mr. Larry Malcolm

Regional Water Quality Control Board  
San Francisco Region

Attn: Ms. Lisa McCann

Attachments: Plate 1 - Vicinity Map  
Plate 2 - Monitoring Well Location Plan  
Plates 3 through 5 - Groundwater Elevation Contour Maps



## VICINITY MAP

### MILL SPRINGS PARK APARTMENTS

Railroad Avenue  
Livermore, California

#### REFERENCE:

Portion of U.S.G.S. 7.5 Minute Topographic Quadrangle Map, Livermore, California, dated 1961, photorevised 1980, at a scale of 1:24,000.





**EXPLANATION**

- GROUNDWATER BASIN BOUNDARY
- ACTIVE QUARRY AREA (WATER SURFACE ELEVATION)
- 486--- WATER LEVEL CONTOUR (10-FOOT INTERVAL)
- 500--- PERCHED AQUIFER CONTOUR
- 3822 KEY WELL NUMBER
- WELL DATA POINT

3000 0 3000 6000  
Scale 1" = 3000'

DATE 9 MARCH 1984

FILE NO.

| REVISION | DATE | BY | DESCRIPTION |
|----------|------|----|-------------|
|          |      |    |             |
|          |      |    |             |
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|          |      |    |             |



**ZONE 7**  
ALAMEDA COUNTY FLOOD CONTROL  
AND  
WATER CONSERVATION DISTRICT

DRAWN W. HONG *WH*  
DESIGNED *Jeff Stefan*  
CHECKED  
APPROVED

WATER RESOURCES ENGINEERING  
SPRING 1983  
WATER LEVEL CONTOURS

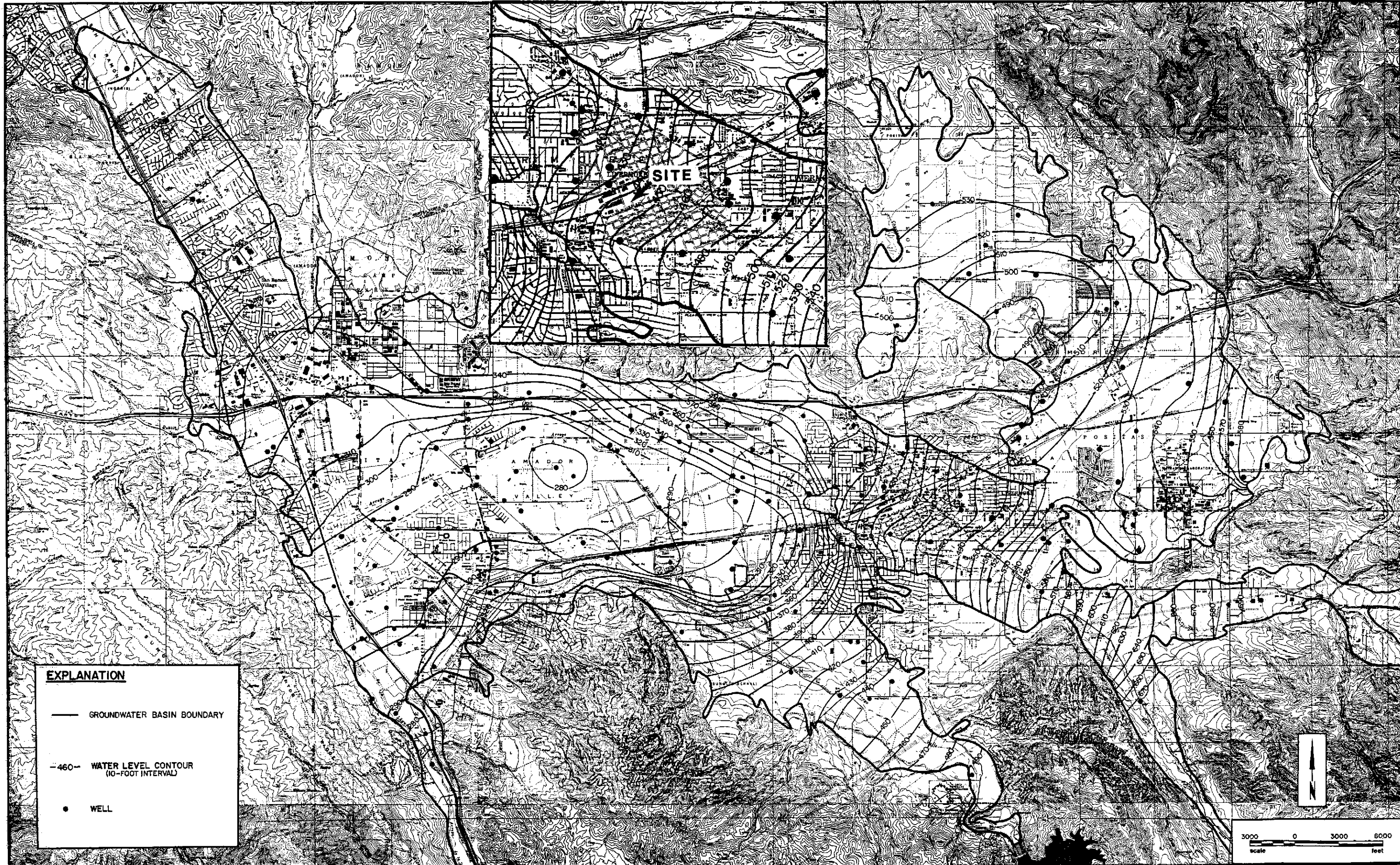
SCALE 1" = 3000'

DATE 9 MARCH 1984

FILE NO.

PLATE 3

OF SHEETS

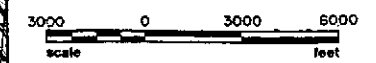


**EXPLANATION**

— GROUNDWATER BASIN BOUNDARY

-460- WATER LEVEL CONTOUR (10-FOOT INTERVAL)

• WELL



| REVISIONS | NO. | DATE | DESCRIPTION | BY | DATE | APPROVED |
|-----------|-----|------|-------------|----|------|----------|
|           | 7   |      |             |    |      |          |
|           | 6   |      |             |    |      |          |
|           | 5   |      |             |    |      |          |
|           | 4   |      |             |    |      |          |
|           | 3   |      |             |    |      |          |
|           | 2   |      |             |    |      |          |
|           | 1   |      |             |    |      |          |



**ZONE 7**  
ALAMEDA COUNTY FLOOD CONTROL  
AND  
WATER CONSERVATION DISTRICT

DRAWN *Myman Hong*  
DESIGNED *Rennis Wastenkowich*  
CHECKED  
APPROVED

WATER RESOURCES ENGINEERING  
FALL 1986  
WATER LEVEL CONTOURS

SCALE 1" = 3000'  
DATE 20 MARCH 1987  
FILE NO.

SHEET  
**PLATE 4**  
OF SHEETS