A·C·C
ENVIRONMENTAL
CONSULTANTS

ENVIRONMENTAL
PROTECTION

95 JUL 11 PM 12:18

July 10, 1995

Mr. Wesley Adams
City of Alameda
2263 Santa Clara Avenue
Alameda, CA 94501

STID 3837

RE: Corrected Page for Work Plan for Preliminary Site Assessment
2263 Santa Clara Avenue, Alameda, California

Dear Mr. Adams:

Enclosed, please find a corrected Table of Contents page for the Work Plan for Preliminary Site Assessment. The original page was not changed to reflect the Work Plan.

We are sorry for any inconvenience this may have caused you.

If you have any questions please contact me at (510) 522-8188.

Sincerely,

April J. Hamilton

April J. Hamilton
Environmental Project Administrator

Enclosure

CC: Juliet Shin, Alameda County Health Care Services Agency

1000 Atlantic Avenue, Suite 110 •Alameda, CA 94501 •(510) 522-8188 •FAX: (510) 865-5731

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ATTACHMENTS

A·C·C
ENVIRONMENTAL
CONSULTANTS

June 28, 1995

Mr. Wesley Adams
City of Alameda
2263 Santa Clara Avenue
Alameda, CA 94501

STID 3837

RE: Work Plan for Preliminary Site Assessment
2263 Santa Clara Avenue, Alameda, California

Dear Mr. Adams:

Enclosed, please find the Work Plan for Preliminary Site Assessment for the above referenced site.

If you have any question regarding this report, please do not hesitate to contact me at (510) 522-8188.

Sincerely,

Misty Kaltreider
Project Geologist

Enclosure

CC: Juliet Shin, Alameda County Health Care Services Agency

95 JUL -6 PM 2:01

1000 Atlantic Avenue, Suite 110 •Alameda, CA 94501 •(510) 522-8188 •FAX. (510) 865-5731

A·C·C
ENVIRONMENTAL
CONSULTANTS

WORK PLAN - PRELIMINARY SITE ASSESSMENT
2263 SANTA CLARA AVENUE
ALAMEDA, CA

Prepared for:
Mr. Wesley Adams, Engineer
City of Alameda
2263 Santa Clara Avenue
Alameda, CA 94501-4455

May 1995

Job Number: 95-6209-3.0

Prepared by: _____
Misty Kaltreider
Project Geologist

Reviewed by: _____
David R. DeMent, RG #5874
Senior Project Geologist

REGISTERED GEOLOGIST
DAVID R. DEMENT
NO. 5674
STATE OF CALIFORNIA

1000 Atlantic Avenue, Suite 110 •Alameda, CA 94501 •(510) 522-8188 •FAX (510) 865-5731

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Page

TABLES

ATTACHMENTS

1.0 INTRODUCTION

This work plan presents proposed procedures for ACC Environmental Consultants, Inc. (ACC) to conduct a preliminary site assessment on behalf of Mr. Wesley Adams of the City of Alameda for the property located at 2263 Santa Clara Avenue, Alameda, California, (Figure 1). A preliminary site assessment was requested by Alameda County Health Care Services Agency to determine the lateral and vertical extent of petroleum hydrocarbon impact.

2.0 BACKGROUND

Three monitoring wells are located within the one block radius of Oak and Santa Clara Streets in Alameda. The monitoring wells were installed by Aqua Science Engineers, Inc. in June 1986 for the City of Alameda. The wells were installed within 10 feet, adjacent to their respective underground storage tanks at the Alameda City Hall and the Police Department. The wells were sampled biannually as part of the underground storage tank monitoring requirements.

In June 1994, three underground storage tanks (UST) were removed from the above reference property. The USTs consisted of one 280-gallon unleaded gasoline (T-1), one 1,000-gallon leaded gasoline (T-2), and one 1,500-gallon heating oil UST (T-3). Soil samples collected from excavation of T-1 indicated up to 4,700 parts per million (ppm) of Total Petroleum Hydrocarbons (TPH) as gasoline and 8.4 ppm benzene. Sample results collected from tank excavations T-2 and T-3 indicated below detectable concentrations of TPH as gasoline with benzene, toluene, ethylbenzene, and total xylenes (BTEX).

Due to the results of the initial soil samples collected from excavation T-1, interim remedial activities including overexcavation were performed. Tank excavation T-1 was extended to a depth of approximately 12 feet in depth and 10 feet wide by 20 feet in length. A total of 60 cubic yards of additional soil was removed from the excavation and stockpiled onsite. Samples collected from the newly extended excavation sidewalls indicated 10 ppm TPH as gasoline within a sidewall directly adjacent to a unreinforced brick garage. Laboratory analysis of a soil sample collected from the southern sidewall, adjacent to the onsite monitoring well indicated 12 ppm TPH as gasoline. Due to the close proximity of utilities, the monitoring well, and the onsite building, additional overexcavation was not performed.

Based on the results of the findings from Tank T-1, Alameda County Health Care Sevices Agency (ACHCSA) has requested that a preliminary site assessment be conducted to determine the lateral and vertical extent and severity of any potential groundwater contamination resulting from the release at the site. As part of the PSA, ACHCSA required the installation of one perminent groundwater well to be installed within 10 feet downgradient of the observed soil contamination. The groundwater gradient needs to be verified within the use of monitoring wells within the vicinity. This Preliminary Site Assessment Work Plan addresses request from ACHCSA.

In accordance with requirements of ACHCSA, ACC proposes to use the existing three groundwater monitoring wells for the groundwater assessment. Monitoring wells CH-MW2 and CH-MW1 are located within the near vicinity of Tank T-1. Monitoring well CH-MW-2 is located within 2 feet of the tank excavation, T-1, and monitoring well CH-MW-1 is located within 25 feet, downgradient from T-1. Groundwater monitoring well PS-MW-1 is located approximately 225 feet downgradient from the former tank excavation T-1.

3.0 GROUNDWATER INVESTIGATION

3.1 Groundwater Monitoring

Two monitoring wells are located adjacent to the former tank locations T-1 (CH-MW2) and T-2 (CH-MW1). In addition, one groundwater monitoring well (PS-MW1) is located adjacent to the police station, on the same block. The monitoring wells were installed by Aqua Science Engineers, Inc. for the City of Alameda in June, 1986. The monitoring wells were constructed with 13 feet of slotted PVC casing below 5 feet of solid PVC casing. A copy of the construction diagram for each monitoring well is attached in Appendix A.

3.2 Groundwater Sampling

Each monitoring well located onsite has been sampled on a semiannual basis since their installation. A copy of a June 2, 1994 Semiannual Groundwater Monitoring Report from RESNA is attached in Appendix B.

As part of the semiannual monitoring program, samples were collected from each monitoring well and submitted for analysis of Total Petroleum Hydrocarbons (TPH) as gasoline, TPH as diesel, and benzene, toluene, ethylbenzene, and total xylenes (BTEX). Sample results collected from 1987 through March 1994 are summarized in Table 1, Attachement B.

3.3 Groundwater Gradient

The groundwater flow direction at the site was determined with the use of nearby groundwater wells located at the Alameda Historical High School located at 2200 Central Avenue, and BP service station No. 11266 located at 1541 Park Street. The groundwater measured at the Alameda Historical High School was monitored from July 1992 through May 1993 and was determened to flow north to northeast. The groundwater flow direction at the BP station was measured in March 1992 was determined to flow northeast. The Alameda City Hall is located within one block between each site. Therefore it is likely that the groundwater flow direction at the Alameda City Hall is toward north to northeast.

4.0 PROPOSED WORK

4.1 Groundwater Monitoring

The existing three monitoring wells will be surveyed to an established benchmark, with an accuracy of 0.01 foot. Groundwater levels within each well will be measured monthly for six months then quarterly thereafter. Groundwater sample will be collected quarterly for a maximum of one year from the wells and submitted to a state analytical laboratory for TPH as gasoline by EPA Test Method 5030 and BTEX by EPA Test Method 602.

Prior to each sampling event, the water level elevation in all the wells will be measured. ACC will collect, store, and transport the water samples in accordance with existing regulatory guidelines (see Appendix C, "Water Sampling in Wells and Boreholes").

A report containing the analytical results will be submitted to ACHCSA on a quarterly basis. The quarterly report will also include maps showing the groundwater gradient and analytical findings.

If an additional monitoring well is required to be installed onsite, ACC will drill one boring using a truck-mounted drill rig equipped with eight-inch diameter hollow-stem augers and will be converted into a two-inch diameter monitoring well. The boring will be drilled within 10 feet downgradient of the former tank excavation. The newly installed monitoring wells will be used to evaluate the extent of impact in the groundwater. Figure 2 illustrates the existing and proposed monitoring well locations.

4.2 Boring

Drilling permits will be obtained from the Alameda County Water Conservation and Flood Control District - Zone 7 and the City of Alameda prior to drilling and sampling activities. The locations of the proposed borings will be marked with white paint. The work will be scheduled upon acceptance of the Work Plan by the regulatory agencies.

The County of Alameda Health Care Services Agency and Underground Services Alert (USA) will be notified at least 48 hours prior to commencing work.

During drilling, undisturbed soil samples will be obtained for chemical analyses and geotechnical classification at five-foot intervals, distinct lithologic changes and at the soil/groundwater interface. Sampling will begin at five feet below grade and continue to the bottom each boring, approximately 15 to 20 feet below ground surface (see Appendix C, "Soil Sampling in Boreholes and During Construction of Monitoring Wells"). Grab groundwater samples will be collected if groundwater is encountered during drilling.

A Photoionization detector (PID) will be used by ACC personnel to prescreen the soil to be sampled. Cuttings will be placed in capped drums, labeled and left onsite pending the analytical results.

Two soil samples per boring will be submitted to a state certified accredited analytical testing laboratory for analysis of Total Petroleum Hydrocarbons as gasoline using EPA Test Method 5030 and benzene, toluene, ethylbenzene and total xylenes (BTEX) by EPA Test Method 8020.

4.3 Monitoring Well Installation

The total depth of the monitoring well will be contingent upon lithology and depth to groundwater. It is anticipated that the total depth of the well will be approximately 18 to 20 feet below ground surface. The well installations will be conducted in a manner consistent with Regional Water Quality Control Board requirements (see Appendix D, Well Construction).

The boring for the monitoring well will be drilled to a depth of 18 to 20 feet or the first aquitard below ground surface with a hollow stem auger as groundwater is estimated at 8 to 11 feet below ground surface. The well will be sealed with minimal 5 foot seal, or as field conditions dictate, to best meet the Regional Water Quality Control Board specifications.

The boring will be converted into a two-inch diameter monitoring well which will be screened with 0.020 slot Schedule 40 PVC from approximately 6 to 18 feet below the ground surface. Packing material consisting of # 2/12 sand will be used as annular fill and will be added from the bottom of the screened depth to at least one foot above the top of the screen. A surface seal consisting of bentonite/volclay grout will be added to the top of the sand pack. The well will

be completed with a traffic safe "Christy" box cemented over the top.

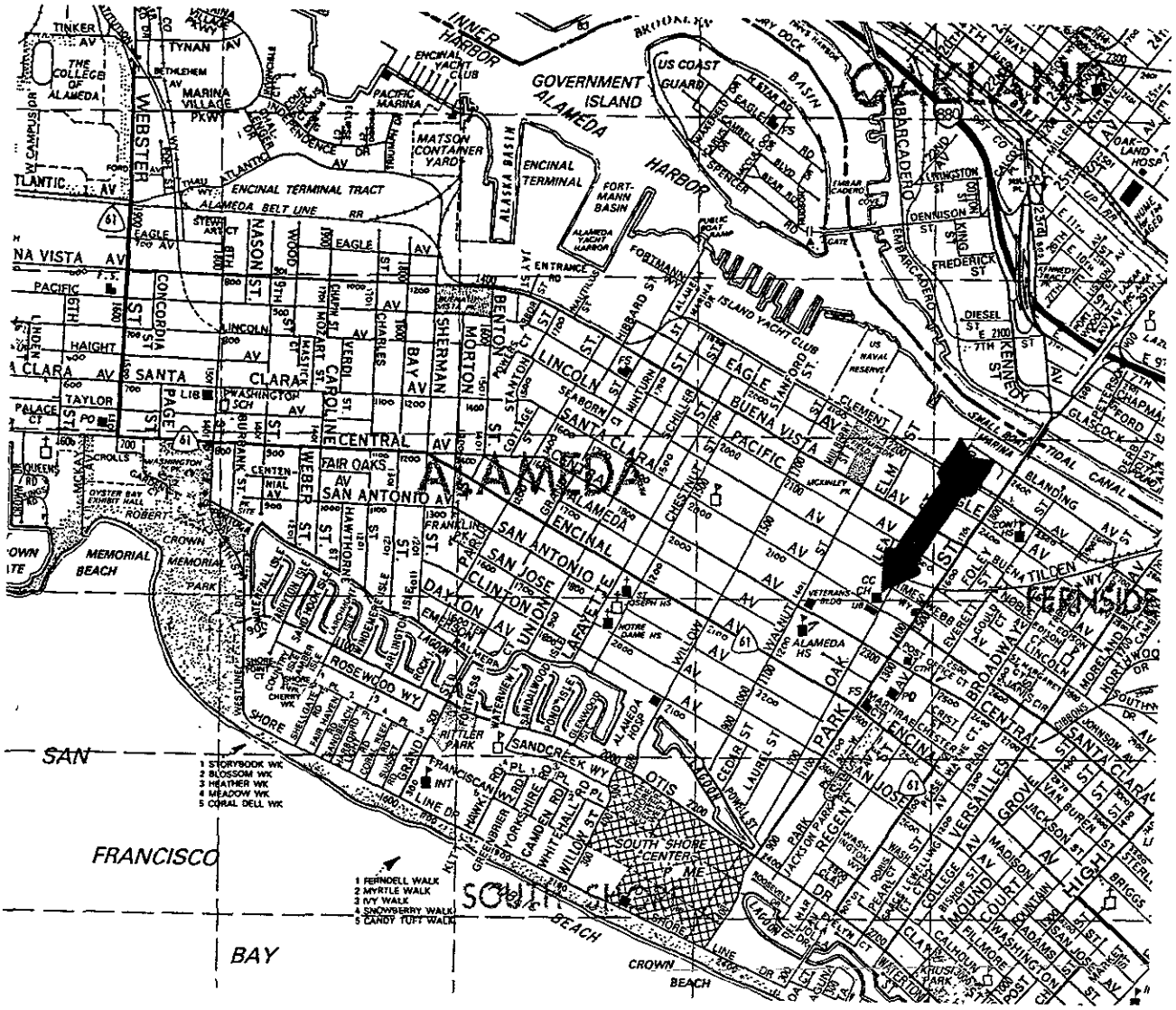
The specifics of the construction and development of the monitoring well are discussed in detail in Appendix D, "Well Construction". Per Alameda County's Monitoring Well Guidelines, the wells will not be developed until at least 24 hours have elapsed after completion of construction. Additionally, as specified in Alameda County regulations, the wells will not be sampled until at least 24 hours have elapsed following completion of well development. After development of each well, water samples will be collected and analyzed for Total Petroleum Hydrocarbons as gasoline using EPA Test Method 5030 and benzene, toluene, ethylbenzene and total xylenes (BTEX) by EPA Test Method 602 (see Appendix E, Water Sampling in Wells and Boreholes). All purge water generated during the sampling process will be contained on site in DOT-approved 55-gallon drums. Disposal of this purge water will be governed by the laboratory results for the associated water sample.

5.0 HEALTH AND SAFETY PLAN

A site health and safety plan which encompasses the proposed work at the site and complies with the requirements of 29 CFR Part 1910.120 is presented in Appendix F.

6.0 TECHNICAL REPORTS

A technical report discussing the subsurface findings and the monitoring well installations and the initial groundwater sampling event at the site will be submitted to the client for review and acknowledgement prior to sending the report to Alameda County Health Care Services Agency. Additional reports detailing groundwater monitoring activities and results will be submitted on a quarterly basis thereafter.



Title:	Location Map City of Alameda, City Hall 2263 Santa Clara Avenue, Alameda, California
Figure Number: 1	Scale: **None**
Drawn By: AJH	Date: 5/20/95
Project Number: 6209-3.0	

ACC Environmental Consultants
1000 Atlantic Avenue, Suite 110
Alameda, CA 94501

(510) 522-8188 Fax: (510) 865-5731

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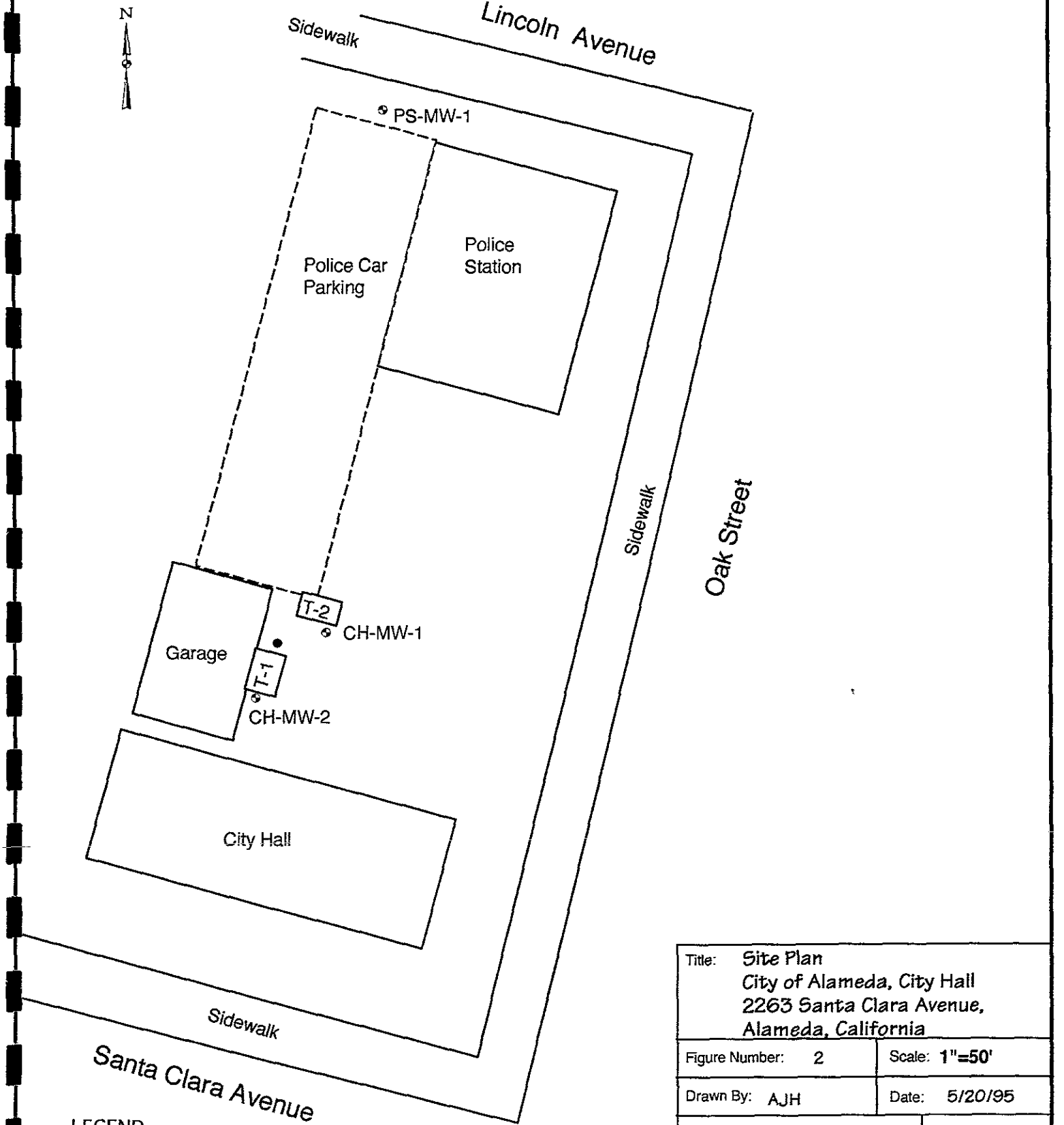

LEGEND

- ⊙ Existing Monitoring Well
- ● Proposed Monitoring Well

Title: Site Plan City of Alameda, City Hall 2263 Santa Clara Avenue, Alameda, California	
Figure Number: 2	Scale: 1"=50'
Drawn By: AJH	Date: 5/20/95
Project Number: 6209-3.0	

ACC Environmental Consultants
1000 Atlantic Avenue, Suite 110
Alameda, CA 94501
(510) 522-8188 Fax: (510) 865-5731

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APPENDIX A

WELL CONSTRUCTION DETAILS
AQUA SCIENCE ENGINEERS, INC., 1986

Info. from Wesley 5/2/95

RUDLOFF

aqua science engineers inc.

July 2, 1986

PROJECT REPORT

FUEL TANK MONITORING WELL INSTALLATION

For The

City of Alameda
Room 204
Santa Clara and Oak Streets
Alameda, California 94501

Submitted
By

Aqua Science Engineers
P.O. Box 535
San Ramon, California 94583

Figure 1

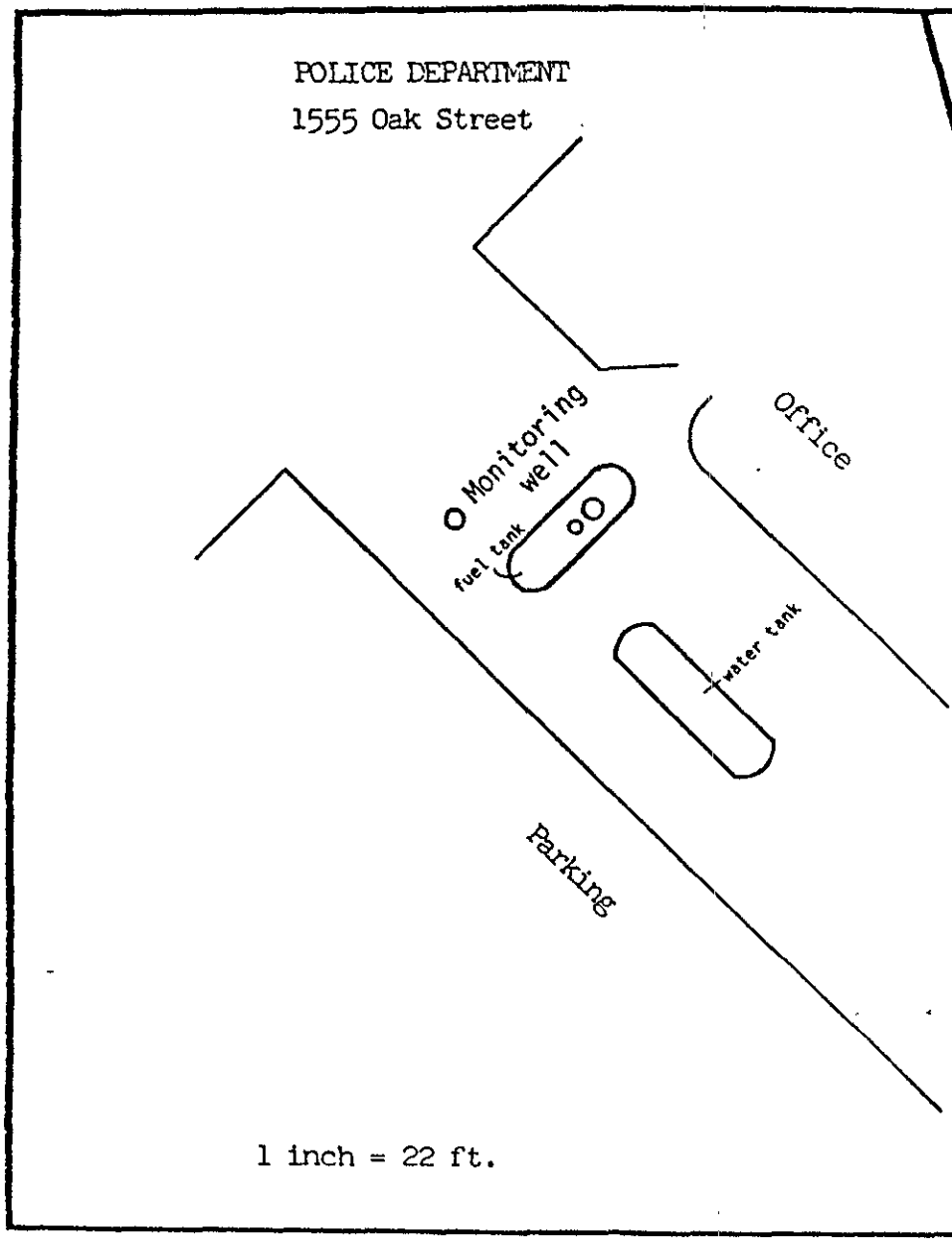
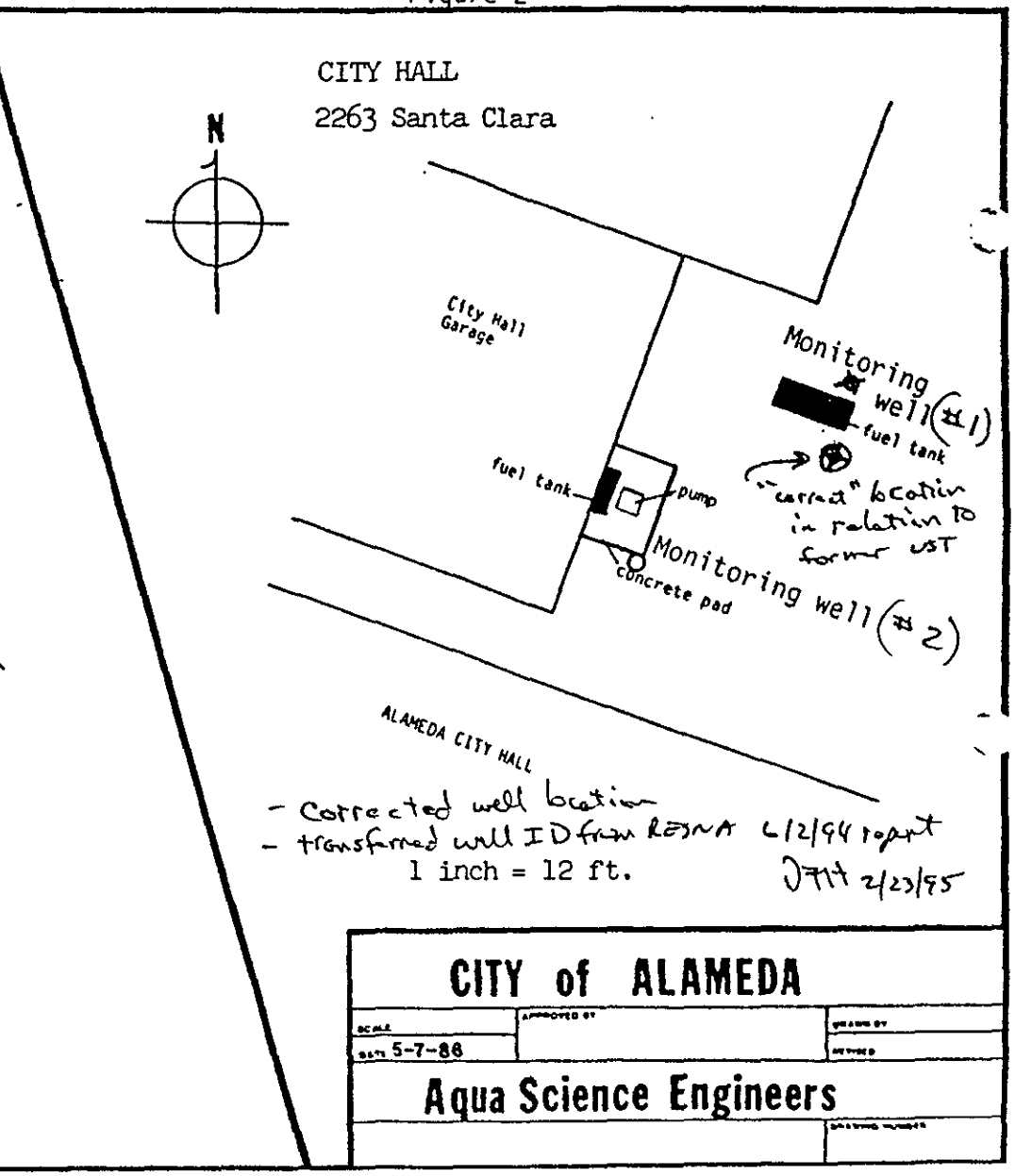


Figure 2

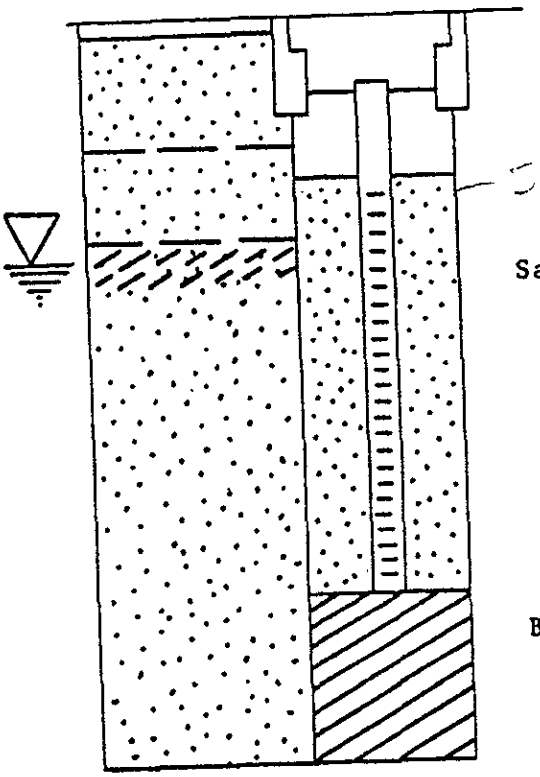


AQUA SCIENCE ENGINEERS WELL LOG

Casing: 2" PVC
Well Depth: 18.0 ft.
Logged By: D. Schultz, P.E.
Water Depth: 7.5 ft.
Driller: ASE

Alameda City Hall
2263 Santa Clara Ave.
Alameda, CA
Boring # 1 = CHMW-1
Date: 6-4-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS
0-	6" Asphalt Cover	
2-	Dark Brown Sand	
4-	Light Brown Sand	
6-		
8-	Light Brown Sand, some Clay	
10-		
12-		
14-		
16-		
18-		
20-		
22-		



Bottom of Boring 22.5 ft.

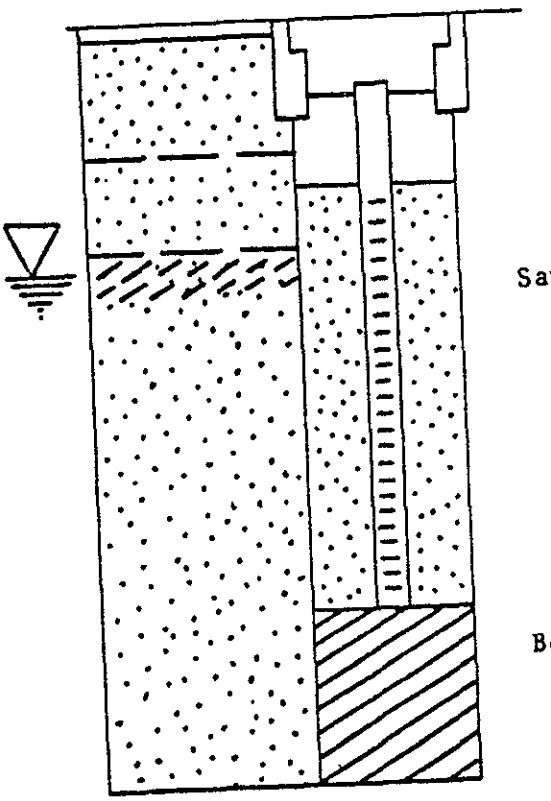
- locking of well

ASE SCIENCE ENGINEERS WELL LOG

Casing: 2" PVC
Well Depth: 18.0 ft.
Logged By: D. Schultz, P.E.
Water Depth: 7.5 ft.
Driller: ASE

Alameda City Hall
2263 Santa Clara Ave.
Alameda, CA
Boring # 2 = CHNW-2
Date: 6-4-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS
0-	6" Asphalt Cover	
2-	Dark Brown Sand	
4-	Light Brown Sand	
6-		
8-	Light Brown Sand, some Clay	
10-		
12-		
14-		
16-		
18-		
20-		
22-		



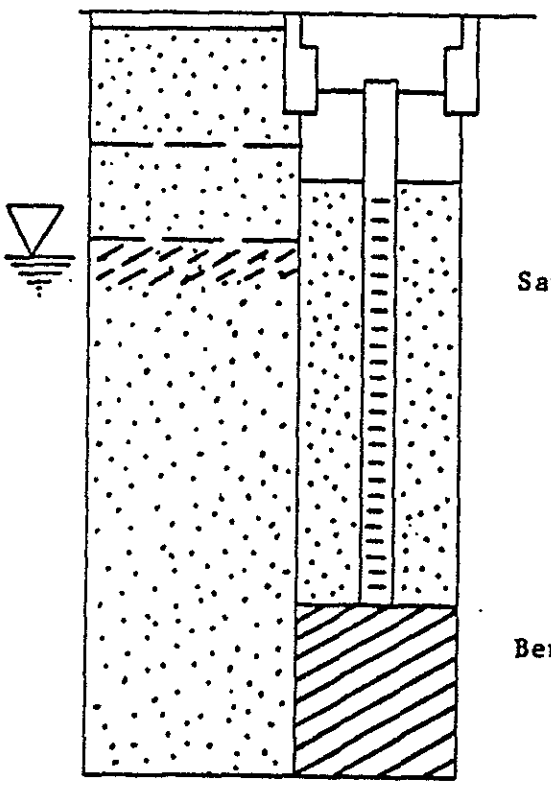
Bottom of Boring 22.5 ft.

AQUA SCIENCE ENGINEERS WELL LOG

Casing: 2" PVC
Well Depth: 18.0 ft.
Logged By: D. Schultz, P.E.
Water Depth: 7.5 ft.
Driller: ASE

Alameda Police Dept.
1555 Oak Street = PS-MW-1
Alameda, CA
Boring # 1
Date: 6-4-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS
0-	6" Asphalt Cover	
2-		
	Dark Brown Sand	
4-		
	Light Brown Sand	
6-		
8-	Light Brown Sand, some Clay	Sand
10-		
12-		
14-		
16-		
18-		Bentonite
20-		
22-		



Bottom of Boring 22.5 ft.

City of Alameda California

September 22, 1994

Mr. David Hoexter
RGA
734 Torreya Court
Palo Alto, CA 94303

Dear Mr. Hoexter:

Mr. Steve Davis, Chief Building Inspector, City of Alameda, asked that I send you the enclosed report from RESNA.

Sincerely,

Sharon Dickson

Sharon Dickson
Admin. Services Coordinator

Enclosure (1)

Public Works Department

Maintenance Services Division
1616 Fortmann Way
Alameda, CA 94501-1274
1-415-748-4520
Fax 1-415-521-8762

RESNA
Working to Restore Nature

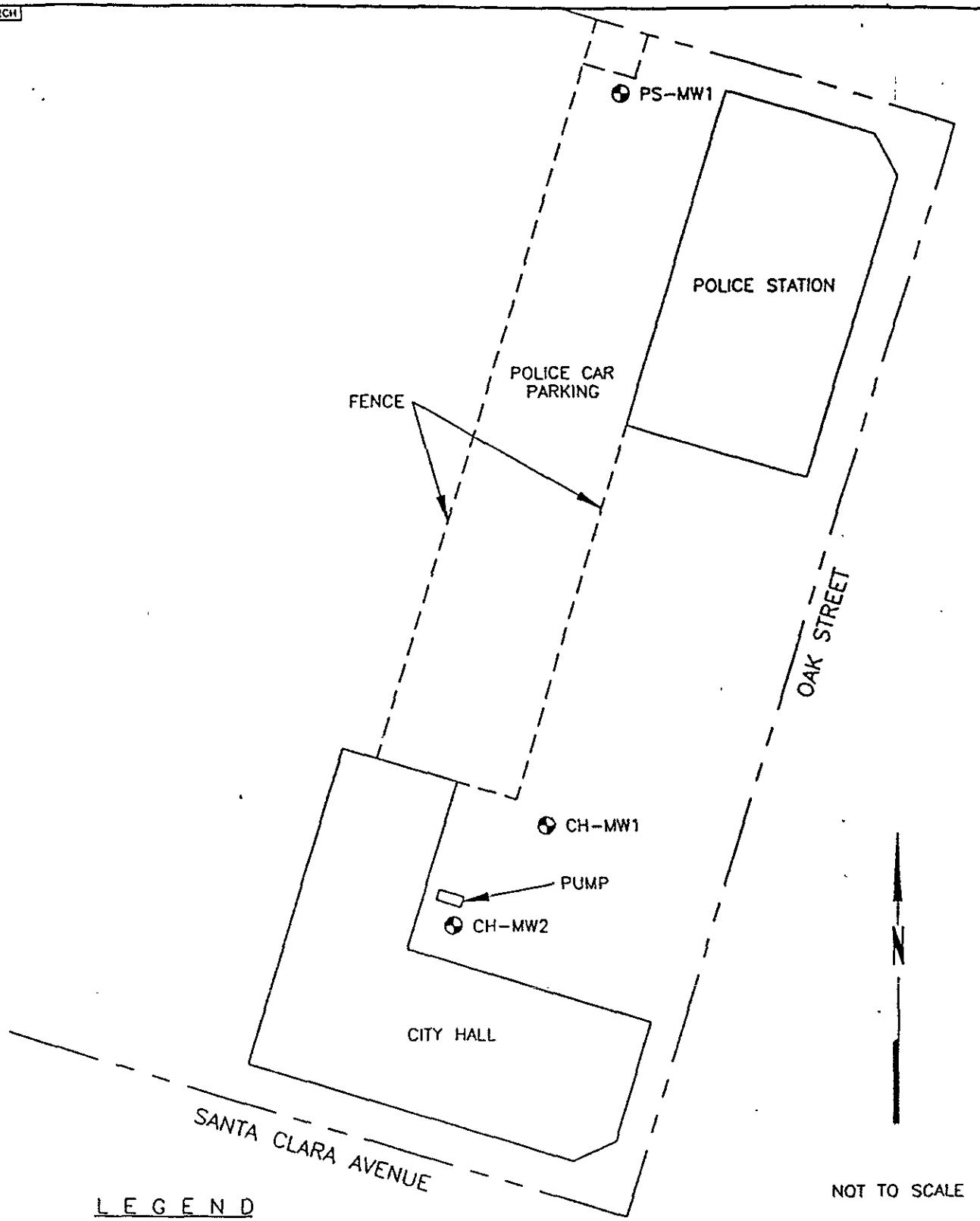
42501 Albrae Street, Suite 100
Fremont, California 94538
Phone: (510) 440-3300
FAX: (510) 651-2233

SEMIANNUAL GROUNDWATER MONITORING REPORT
First Half 1994

Three City of Alameda Facilities
Alameda, California

Job 11010.02

6/2/94



RESNA Working to Restore Nature	SITE PLAN City Hall and Police Station 2263 Santa Clara Avenue Alameda, California	PLATE 3
PROJECT 11010.02		

6/2/94

APPENDIX B

SEMIANNUAL GROUNDWATER MONITORING RESNA, JUNE 2, 1994

RESNA
Working to Restore Nature

42501 Albrae Street, Suite 100
Fremont, California 94538
Phone: (510) 440-3300
FAX: (510) 651-2233

June 2, 1994

Mr. Jim Sanderson
City of Alameda
Maintenance Service Center
1616 Fortmann Way
Alameda, California 94501

Subject: Semiannual Groundwater Monitoring Report, First Half 1994
Three City of Alameda Facilities
Alameda, California.

Mr. Sanderson:

RESNA Industries Inc. (RESNA) has completed the semiannual sampling and analysis of five groundwater monitoring wells located at three City of Alameda facilities (Plate 1). Groundwater sampling was conducted on March 30, 1994, to satisfy the underground fuel storage compliance requirements of the County of Alameda. The five wells sampled are located at the following locations: Fire Station No. 3 (wells FS3-MW1 and FS3-MW2), City Hall (wells CH-MW1 and CH-MW2), and the Police Station (well PS-MW1). RESNA discontinued monitoring and groundwater sampling of well FS2-MW1 located at Fire Station No. 2 on January 1994. Discontinuation of groundwater monitoring and sampling was verbally approved by Juliet Shin of Alameda County Water District (ACWD) on October 5, 1993, based on tank pull activities and installation of additional wells at the site. The site plan for each facility is shown on Plate 2 and 3.

The purpose of this work is to evaluate fluctuations of possible petroleum hydrocarbon concentrations in groundwater beneath the subject site.

GROUNDWATER MONITORING

Field Work

On March 30, 1994, groundwater samples were collected from wells CH-MW1, CH-MW2, FS3-MW2, FS3-MW1, PS3-MW1 in accordance with RESNA's groundwater sampling protocol (Appendix A). Groundwater sampling data obtained during well purging is

included in Appendix A. Groundwater purged from the wells and equipment rinse water were placed in a Department of Transportation-approved drum and left onsite pending receipt of the laboratory analyses.

Laboratory Analyses

The groundwater samples were submitted to Sequoia Analytical Laboratories, a state-certified laboratory, located in Redwood City, California. The groundwater samples were analyzed for the presence of total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Environmental Protection Agency (EPA) Methods 5030/8015/8020 and selected groundwater samples were analyzed for the presence of total petroleum hydrocarbons as diesel (TPHd) using EPA Methods 3510/3520/8015.

Results of Groundwater Monitoring

Concentrations of TPHg and BTEX were not detected in any of the groundwater samples analyzed. Laboratory results indicated that no TPHd were detected in samples from well FS3-MW2. However, the laboratory reported the presence of 110 parts per billion (ppb) TPHd in well PS-MW1. The chromatogram pattern of TPHd consisted of a "non-diesel mix, C14-C20". The groundwater analytical results are summarized in Table 1. Analytical reports and chain-of-custody documents are presented in Appendix B.

REPORTING REQUIREMENTS

RESNA recommends a signed copy of this report be forwarded by the City of Alameda to the following agency:

Ms. Pamela Evans
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94612

RESNA
Working to Restore Nature

If you have any questions or comments regarding the information presented in this report please call (510) 440-3300.

Sincerely,
RESNA Industries Inc.

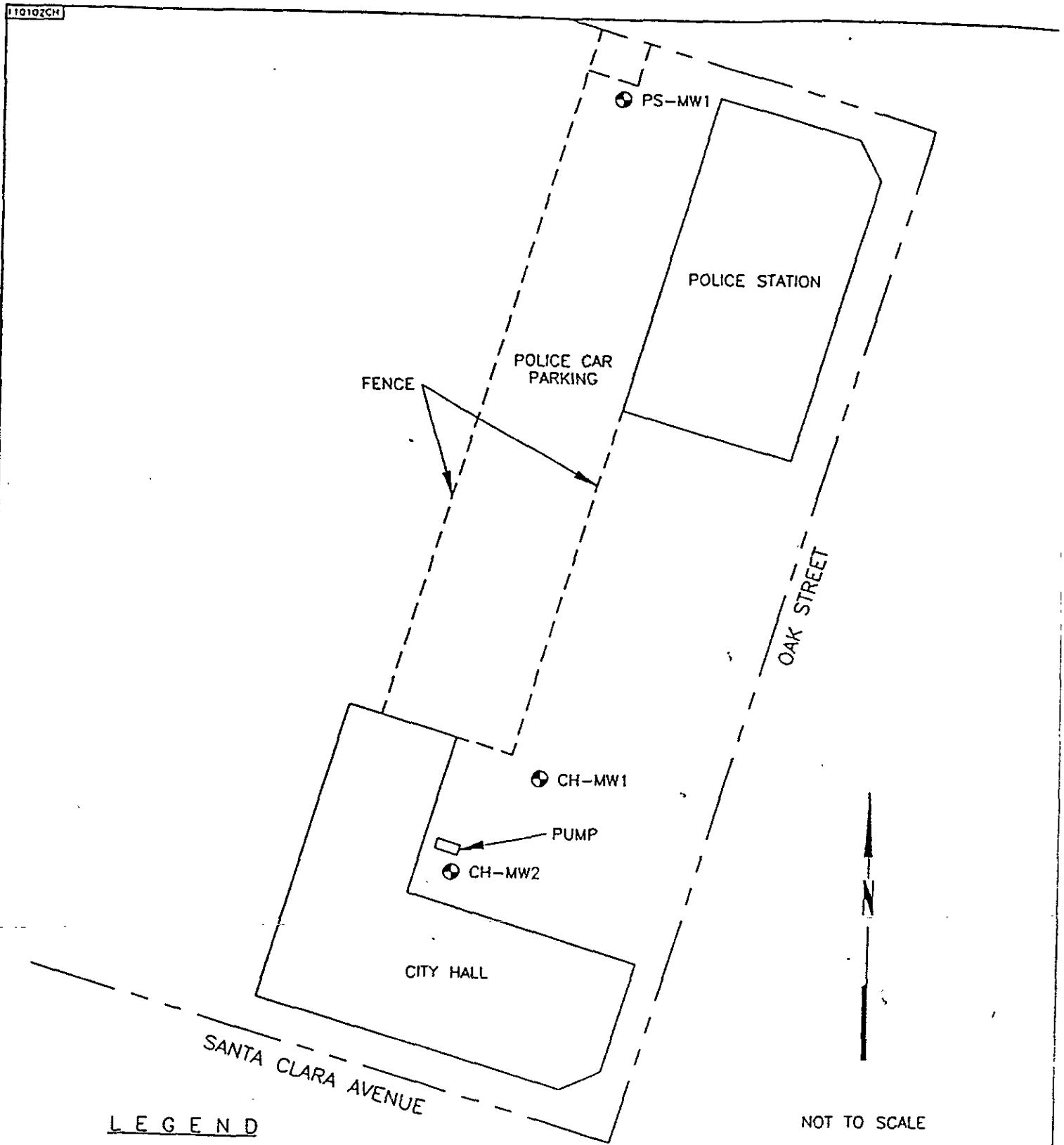
Jeffrey D. Sala
Geologic Technician

Michael L. Siembieda, R.G. 4007
Geoscience Manager

REGISTERED GEOLOGIST
MICHAEL L. SIEMBIEDA
No: 4007
STATE OF CALIFORNIA

Attachments:

Plate 1:	Site Vicinity Map
Plate 2:	Site Plan (Fire Station No. 3)
Plate 3:	Site Plan (City Hall and Police Station)
Table 1:	Summary of Groundwater Analytical Data
Appendix A:	Groundwater Sampling Protocol and Well Purge Data Sheets
Appendix B:	Analytical Reports and Chain-of-Custody Documents



RESNA
Working to Restore Nature

PROJECT 11010.02

SITE PLAN
City Hall and Police Station
2263 Santa Clara Avenue
Alameda, California

PLATE
3

RESNA
Working to Restore Nature

TABLE 1
SUMMARY OF GROUNDWATER ANALYSIS DATA
Two City of Alameda Facilities
Alameda, California
(Page 2 of 2)

Sample Number	Date Sampled	TPHg (ppb)	TPHd (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl benzene (ppb)	Total Xylenes (ppb)
CII-MW1	08/05/87	<20	NA	<0.4	<0.4	NA	<0.4
	02/16/88	<50	NA	<0.5	<0.5	NA	<0.5
	08/24/88	<7	NA	<0.1	<0.1	<0.1	<0.2
	02/08/89	<50	NA	<0.5	<0.5	<0.5	<0.5
	08/07/89	<30	NA	<0.3	<0.3	<0.3	<0.3
	02/09/90	<30	NA	<0.3	<0.3	<0.3	<0.3
	08/28/90	<30	NA	<0.3	<0.3	<0.3	<0.3
	02/08/91	<30	NA	<0.3	<0.3	<0.3	<0.3
	03/04/92	<50	NA	<0.5	<0.5	<0.5	<0.5
	09/08/92	<50	NA	NA	NA	NA	NA
	03/11/93	<50	NA	<0.5	<0.5	<0.5	<0.5
	09/29/93	<50	NA	<0.50	<0.50	<0.50	<0.50
	03/30/94	<50	NA	<0.50	<0.50	<0.50	<0.50
CII-MW2	08/05/87	<20	NA	<0.4	<0.4	NA	<0.4
	02/16/88	<50	NA	<0.5	<0.5	NA	<0.5
	08/24/88	36	NA	<0.1	<0.1	<0.1	<0.2
	02/08/89	<50	NA	0.55	<0.5	<0.5	<0.5
	08/07/89	<30	NA	<0.3	<0.3	<0.3	<0.3
	02/09/90	<30	NA	<0.3	<0.3	<0.3	<0.3
	08/28/90	<30	NA	<0.3	<0.3	<0.3	<0.3
	02/08/91	<30	NA	<0.3	<0.3	<0.3	<0.3
	03/04/92	<50	NA	<0.5	<0.5	<0.5	<0.5
	09/08/92	<50	NA	NA	NA	NA	NA
	03/11/93	<50	NA	<0.5	<0.5	<0.5	<0.5
	09/29/93	<50	NA	<0.50	<0.50	<0.50	<0.50
	03/30/94	<50	NA	<0.50	<0.50	<0.50	<0.50
PS-MW1	08/05/87	NA	160	NA	NA	NA	NA
	02/16/88	NA	<50	NA	NA	NA	NA
	08/24/88	NA	<60	NA	NA	NA	NA
	02/08/89	NA	<50	NA	NA	NA	NA
	08/07/89	NA	<50	NA	NA	NA	NA
	02/09/90	NA	<50	NA	NA	NA	NA
	08/28/90	NA	<50	NA	NA	NA	NA
	02/08/91	NA	NA	NA	NA	NA	NA
	03/04/92	NA	<100	NA	NA	NA	NA
	09/08/92	NA	57	NA	NA	NA	NA
	03/11/93	NA	<50	NA	NA	NA	NA
	09/29/93	NA	470*	NA	NA	NA	NA
	03/30/94	NA	110**	NA	NA	NA	NA

TPHg Total petroleum hydrocarbons as gasoline
TPHd Total petroleum hydrocarbons as diesel
NA Not sampled / not analyzed
* Laboratory indicated that chromatogram pattern consisted of a "Non-Diesel Mix; C13-C20"
** Laboratory indicated that chromatogram pattern consisted of a "Non-Diesel Mix; C14-C20"
ppb Parts per billion
< Less than the indicated detection limit

APPENDIX C

WATER SAMPLING IN WELLS AND BOREHOLES

GENERAL CONSIDERATIONS

In general, the composition of water within the well casing and in close proximity to the well is not representative of groundwater quality. This may be due to contamination by drilling fluids or equipment or disparities between the oxidation-reduction (redox) potential in the well and the redox potential in the aquifer. To obtain a representative sample of groundwater, the well should be pumped or bailed until the well is thoroughly flushed of standing water and contains fresh water from the aquifer. One common procedure is to pump or bail the well until a minimum of three boring volumes have been removed.

At the least, pumping should continue until water in casing storage has been removed. There are at least two common methods for determining that water in casing storage has been removed and water is flowing freely from the aquifer: (1) Monitor water level while pumping. When the pumping water level has "stabilized," it is likely that little or no water from casing storage is being pumped. (2) Monitor the temperature, pH and conductivity of the water while pumping. When these parameters "stabilize," it is probable that little or no water from casing storage is being pumped and that most of the water is coming from the aquifer. ACC utilizes the latter method.

PURGING

During each round of sampling, static water level will be measured prior to purging using an electronic sounder. All water-level measurements will be recorded to the nearest 0.01 foot with respect to mean sea level.

A minimum of three bore volumes will be purged from the well prior to sampling. Bore and well volumes will be calculated using the table in this Appendix. To ensure that water in the well has been exchanged, pumping or bailing shall commence at the top and work downward. The well will be allowed to return to 80% of the original water level before sampling.

Temperature, pH and specific conductance will be measured for each boring volume pumped. Purging will continue until these field-measured water quality parameters have stabilized and the water is, in the judgment of the geologist, representative of water in the aquifer. Data obtained from field water quality measurements will be recorded in the field log book or data sheets. To ensure cross contamination does not occur, a separate allotment of groundwater collected from the purge water outlet stream will be used for field measurements; samples intended for laboratory analysis will not be used.

Temperature, pH and specific conductance meters will be calibrated per manufactures guidelines. Calibration will be documented in the field log book or data sheets and will include a description of the calibration method, identification number of equipment, and/or reagents used in calibration.

VOLUME OF WATER IN CASING OR HOLE

Dia. of Casing or Hole (inches)	Gallons/foot of Depth	Cubic Feet/foot of Depth	Liters/Meter of Depth	Cubic Meters/ Meter of Depth
1	0.041	0.0055	0.509	0.509×10^{-3}
1.5	0.092	0.0123	1.142	1.142×10^{-3}
2	0.163	0.0218	2.024	2.024×10^{-3}
2.5	0.255	0.3410	3.167	3.167×10^{-3}
3	0.367	0.0491	4.558	4.558×10^{-3}
3.5	0.500	0.0668	6.209	6.209×10^{-3}
4	0.653	0.0873	8.110	8.110×10^{-3}
4.5	0.826	0.1104	10.26	10.26×10^{-3}
5	1.020	0.1364	12.67	12.67×10^{-3}
5.5	1.234	0.1650	15.33	15.33×10^{-3}
6	1.469	0.1963	18.24	18.24×10^{-3}
7	2.000	0.2673	24.84	24.84×10^{-3}
8	2.611	0.3491	32.43	32.43×10^{-3}
10	4.080	0.5454	50.67	50.67×10^{-3}
12	5.875	0.7854	72.96	72.96×10^{-3}
14	8.000	1.0690	99.35	99.35×10^{-3}
16	10.44	1.3960	129.65	129.65×10^{-3}
18	13.22	1.7670	164.18	164.18×10^{-3}
20	16.32	2.1820	202.68	202.68×10^{-3}
22	19.75	2.6400	245.28	245.28×10^{-3}
24	23.50	3.1420	291.85	291.85×10^{-3}
26	27.58	3.6870	842.52	342.52×10^{-3}
28	32.00	4.2760	397.41	397.41×10^{-3}
30	36.72	4.9090	456.01	456.02×10^{-3}
32	41.78	5.5850	518.87	518.87×10^{-3}
34	47.16	6.3050	585.68	585.68×10^{-3}
36	52.88	7.0690	656.72	657.72×10^{-3}

Notes: 1 Gallon = 3.785 Liters; 1 Meter = 3.281 Feet
1 Gallon Water Weighs 8.33 lbs.= 3.785 Kilograms;
1 Liter Water Weighs 1 Kilogram = 2.205 lbs.

Temperature will be measured with a mercury-filled, Centigrade-scaled, bimetallic-element thermometer, or electronic thermistor.

Acidity/alkalinity (ph) will be measured by dipping the pH probe in the water source or sample; pH will be measured soon after collection of the sample, preferably within a few minutes.

Conductivity will be measured by dipping the conductivity probe in the water source or sample. The temperature of the sample will be used to calculate specific conductance from the conductivity measurement. Measurements shall be reported in units of micromhos per centimeter at 25°C.

SAMPLE COLLECTION

Wells and borings will be sampled using a new, clean, disposable Teflon bailer attached to new, clean string. Sample vials and bottles will be filled to overflowing and sealed so that no air is trapped in the vial or bottle. Once filled, samples shall be inverted and tapped to test for air bubbles. Samples will be contained in vials and bottles approved by the US EPA and the Regional Water Quality Control Board. Some analyses may require separate sample containers in accordance with EPA methods described in 40 CFR Part 136 and SW-846.

Water samples intended for volatile hydrocarbon analysis (EPA Method 602) will be contained in 40 ml VOA vials and will contain a small amount of preservative (HCl) in the vial. Samples intended for analysis by EPA Method 601 and EPA 624 GCMS procedures will not be preserved. Water samples intended for low level diesel analysis will be stored in amber glass 1-liter bottles to reduce degradation by sunlight. Antimicrobial preservative (HCl) may be added to the sample if a prolonged holding time is expected prior to analysis.

Sample containers will be labeled with self-adhesive, pre-printed tags. Labels will contain the following information in waterproof ink:

- Project number (or name)
- Sample number (or name)
- Sample location (Well number, etc.)
- Date and time samples were collected
- Treatment (preservative added, filtered, etc.)
- Name of sample collector

All samples will stored in ice filled coolers to be delivered to an EPA/CAL accredited laboratory for analysis.

All purged water will be stored on site in steel, DOT-approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number. The drums will be left on-site for subsequent disposal pending receipt of analytical results. Drums of water will be disposed of at an accepting facility.

DOCUMENTATION

Sampling information will be recorded in ink in a bound notebook with consecutively numbered pages. Pages will not be removed for any reason. Alternatively, specially formatted field data sheets may be used to record the information collected during water quality sampling. Errata may be marked out with a single line and initialed by the person making the change. The log book and data sheets will be placed in the project file when sampling is completed.

FIELD EQUIPMENT DECONTAMINATION PROCEDURES

Bailers and string will be properly decontaminated and disposed of off- site. All other sampling equipment, such as buckets and stands, will be decontaminated after each use by washing in an Alconox solution, followed by tap water and deionized water rinses. Equipment will be sealed in plastic bags or sealed containers to prevent contact with solvents, dusts, or other types of contamination.

All rinsate used in the decontamination process will be stored on site in steel DOT-approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name, contact and phone number. These drums will be sealed and left on-site for subsequent disposal pending receipt of analytical results. Rinsate will be disposed of at an accepting facility.

APPENDIX D

SOIL SAMPLING IN BOREHOLES AND DURING CONSTRUCTION OF MONITORING WELLS

SOIL SAMPLING IN BOREHOLES

U.S. Environmental Protection Agency standards serve as the foundation for all field sampling operations performed by ACC. EPA SW 846 is the primary publication from which procedures are derived. While some aspects of field and laboratory work may be delegated to the CAL EPA-Department of Toxic Substances Control (DTSC), the Bay Area Regional Water Quality Control Board, and the Health Services Agency - Department of Environmental Health establish the general and specific criteria for sampling.

SAMPLE INTERVALS

Undisturbed soil samples will be obtained for chemical analysis and geo- technical classification at five-foot intervals or at distinct lithologic changes, beginning at five feet below grade.

COLLECTION DEVICES

Samples will be collected using a 2-inch or 2.5-inch inside diameter Modified California Split Spoon Sampler containing three six-inch-long brass tubes or two three-inch-long tubes between two six-inch-long brass tubes. The sample collection device and tubes will be decontaminated before and after each use by steam cleaning or by an Alconox solution wash, tap water rinse and deionized water rinse. The sampler will be driven ahead of the auger using a 140-pound drop hammer. The average blow counts required to drive the sampler the last 12 inches will be recorded on the boring logs.

PRESERVATION AND HANDLING

After collection, sample tubes will be labeled, sealed at each end with Teflon sheeting and PVC end caps, placed in plastic bags and stored in an ice filled cooler to be delivered under chain-of-custody to a State-certified laboratory by the next business day.

SOILS CLASSIFICATION

Soil exposed at the ends of each brass tube will be examined by a geologist for obvious signs of contamination and classified according to the Unified Soil Classification System. These observations will be recorded in the boring logs.

Selection of samples for laboratory analysis will be based primarily on headspace readings using a Photo ionization device (PID) and position within the boring. In general, samples with headspace readings over 50 ppm or that have visual or olfactory indications of contamination will be submitted for analysis. One sample will also be selected from one or two sampling intervals below the apparent lower limit of contamination to obtain a "zero line" value. In addition, the sample closest to the depth of the storage tank invert will be submitted for analysis. If the water table is above the tank invert, the sample closest to the water table will be selected.

SAMPLE LABELING AND CHAIN OF CUSTODY

Samples selected for analysis will be labeled with self-adhesive, pre- printed labels indicating project name (or number), sample number, boring/well number, sample depth, date and time of sample collection, and required analyses. The same information will be recorded on the chain of custody.

APPENDIX E
WELL CONSTRUCTION

GENERAL PRACTICES

Each monitoring well will be designed to register the potentiometric surface, facilitate soil sampling, and permit water sampling. ACC's standard procedures for well installation and soil/water sampling meet or exceed guidelines set forth by the EPA, California State Regional Water Quality Control Board, and the Alameda County Department of Environmental Health. Drilling, construction, and completion of all exploratory borings and monitoring well will be in conformance with procedures in this appendix.

DRILLING PROCEDURES

Monitoring wells will be drilled with a hollow-stem, continuous-flight auger. All boring and logging will be supervised by a geologist with special attention given to the avoidance of cross contamination of underlying aquifers. The following procedures used by ACC geologist prevent pollution of clean aquifers underlying contaminated zones:

1. Drilling will cease if five feet of saturated impermeable material is encountered. It will be assumed that any significant saturated, impermeable layer, such as a clay layer, is an aquitard separating the shallow and deep aquifers and should not be penetrated.

2. Drilling will be terminated 20 feet below any perched or unconfined water table.

3. Drilling will be terminated at 45 feet below ground surface if groundwater is not encountered. This is above nearly all deep aquifers currently supplying groundwater in the Bay Area.

The drill rig operator and ACC geologist will discuss significant changes in material penetrated by the drill, changes in drilling conditions, hydraulic pressure, and drilling action. The ACC geologist will be present during the drilling of exploratory borings and will observe and record changes by time and depth, evaluate the relative moisture and content of the samples, and note water producing zones. This record will be used later to prepare a detailed lithologic log. Lithologic descriptions will include soil or rock type, color, grain size, texture, hardness, degree of induration, carbonate content, presence of fossils or other materials (gypsum, hydrocarbons), and other pertinent information. A copy of the logs will be retained in the field file at the project site.

Soil Cuttings

Soil cuttings generated during drilling will be placed in steel, Department of Transportation (DOT) approved drums. Drums will be labeled as to contents, suspected contaminants, date container filled, expected removal date, company name and phone number of technical contact, and name of generator. Drums will be sealed and left on-site for subsequent disposal pending receipt of analytical results. Disposal of soil cuttings will be the responsibility of the owner/generator, although ACC may arrange for disposal if so requested.

SCREEN AND CASING

The monitoring well assembly will consist of new schedule-40 (minimum), flush-threaded, polyvinyl chloride (PVC) casing from the bottom of the boring to the ground surface. Casing will be shipped in protective wrappers.

From the base of the well to approximately five feet above the ground water surface, casing will consist of perforated casing (well screen); the remainder of the well will be solid PVC casing. Perforated casing (well screen) will be factory slotted. Screen sizes are intended to facilitate hydraulic connection between the monitoring well and the surrounding aquifer while retaining 70 to 90% of the filter pack material.

Upon completion of drilling, well casing will be assembled and lowered to the bottom of the boring. Since using glue to connect casing sections could cause false analytical interpretations of water quality, the casing will be connected with dry threads or slip joints. The bottom of the casing will be approximately flush with the bottom of the boring and will be capped with a threaded PVC cap or plug. Using the lithologic log for control, the ACC geologist will specify the exact depths of screened intervals so that the well screen is approximately opposite the water-bearing zone to be monitored.

Where possible, the casing will extend six inches above the ground surface. When monitoring wells are placed in traffic areas where the wells cannot extend above the surface, locking, pre-cast concrete or cast iron boxes and covers will be installed.

FILTER PACK

After the monitoring well assembly has been lowered to the specified depth, filter pack will be placed in the annular space between the well casing and borehole from the bottom of the well to approximately two feet above the top of the well screen. The depth to the top of the filter pack will be verified using the tremie pipe or a weighted steel tape. Filter pack will be at least 95% silica sand. Sand will be hard, durable, well-rounded, spherical grains that have been washed until free of dust and contamination.

American Society for Testing and Materials (ASTM) recommends the following guidelines for screen slot size and filter pack selection based on the anticipated underlying material:

Anticipated Soil Type	Recommended Well Screen Slot Size (inches)	Recommended Filter Pack material (US Sieve Size)
Sand & Gravel	0.030	20 to 4
Silt & Sand	0.020	30 to 8
Clay & Silt	0.010	50 to 16

Reference: Development Methods for Water Wells: An Anthology: NWWA Water Well Journal, June 1988.

GROUT SEAL

A layer of bentonite pellets approximately one foot thick will be placed above the filter pack and charged with water. The depth to the top of the bentonite pellets layer will be verified using the tremie pipe or a weighted steel tape. A cement-bentonite grout mixture will be tremied into the annular space from the bentonite seal to the top of the well. The grout material will be a mixture of Portland Type I/II cement (94 lb.) to five gallons of clean water or a sand-cement slurry with a minimum of 11 sacks of portland Type I/II cement per cubic yard. Only clean water from a municipal supply shall be used to prepare the grout. Well development will not begin until the grout has set for a minimum of 24 hours.

CAPPING WELLS

Following well construction, a steel or pre-cast concrete wall vault (or valve box) will be installed below ground surface. A metal tag containing well number and construction data will be permanently attached to the well vault. A steel well cover clearly marked "monitoring well" will be bolted to the vault. A suitable watertight, locking well cap will be fitted to the riser casing to prevent the entry of surface runoff or foreign matter.

WELL DEVELOPMENT

When well installation is complete, the well will be developed by surging, and/or bailing, and/or pumping to remove fines from the formation and filter pack. Well development generally restores natural hydraulic properties to the adjacent soils and improves hydraulic properties near the borehole so the water flows more freely in the well. At least three well volumes casing volumes will be removed from the wells. There are at least two common methods for determining that water in casing storage has been removed and water is flowing freely from the aquifer: (1) Monitor water level while pumping. When the pumping water level has "stabilized," it is likely that little or no water from casing storage is being pumped. (2) Monitor the temperature, pH and conductivity of the water while pumping. When these parameters "stabilize," it is probable that little or no water from casing storage is being pumped and that most of the water is coming from the aquifer. ACC will use the latter method. During development, pH, specific conductance, and temperature of the return water from the water pump will be measured. Well development will proceed until these field-measured water quality parameters have stabilized and the water is, in the judgement of the geologist, at its greatest possible clarity.

Temperature, pH and specific conductance meters will be calibrated per manufacturer's guidelines. Calibration shall be documented in the field log book or data sheets and will include a description of the calibration method, identification number of equipment, and/or reagents used in calibration.

Temperature will be measured with a mercury-filled, Centigrade-scaled, bimetallic-element thermometer, or electronic thermistor. pH measurements will be made shortly after collection of the sample, within a few minutes.

Conductivity will be measured by dipping the conductivity probe in the water source or sample. The probe must be immersed above the vent. The temperature of the sample will be used to calculate specific conductance from the conductivity measurement. Conductivity will be reported in units of micromhos per centimeter (mmho/cm) at 25°C.

WELL PURGING AND WATER SAMPLING

Purging and sampling will not begin for at least 24 hours following purging. Purging and sampling will be in accordance with procedures in Appendix C, Water Sampling in Wells, and Boreholes.

DOCUMENTATION

A well construction diagram for each monitoring well will be completed by the geologist and submitted to the project manager when the work has been completed. In addition, the details of well installation, construction, development, and field measurements of water quality parameters will be summarized as daily entries in a field notebook or data sheets which will be submitted to the project manager when the work has been completed.

DRILLING EQUIPMENT DECONTAMINATION PROCEDURES

The sampler and liners will be decontaminated before and after each use by steam cleaning or washing in an Alconox solution, followed by tap water and deionized water rinses. Only clean water from a municipal supply will be used for decontamination of drilling equipment. Sampler and liners will be sealed in plastic bags or other sealed containers to prevent contact with solvents, dust or other contamination.

All rinsate used in the decontamination process will be stored on site in steel DOT approved drums. Drums will be labeled as to contents, suspected contaminants, date container was filled, expected removal date, company name, contact and phone number. These drums will be sealed and left on- site for subsequent disposal pending receipt of analytical results.

APPENDIX F

SITE SPECIFIC HEALTH AND SAFETY PLAN

ACC - SITE SAFETY PLAN

A. GENERAL INFORMATION

Project Title: **City of Alameda**
Project No.: **95-6209-3.0**
Project Manager: **Misty Kaltreider**
Location: **2263 Santa Clara Ave., Alameda**
Prepared by/date: **Misty Kaltreider/ 5/14/95**

Approved by/date: _____

Scope of Work/Objective(s): **Soil Boring, Monitoring Well, Sampling**

Proposed Date of Field Activities: **June 1995**

Documentation/Summary:

Overall Chemical Hazard: Serious [ ] Moderate [ ]
Low [X] Unknown [ ]

Overall Physical Hazard: Serious [ ] Moderate [X]
Low [ ] Unknown [ ]

B. SITE/WASTE CHARACTERISTICS

Waste Types(s):
Liquid [X] Solid [X] Sludge [ ] Gas/Vapor [ ]

Characteristics:
Flammable/Ignitible [ ] Volatile [X] Corrosive [ ] Acutely Toxic [ ]
Explosive [ ] Reactive [ ] Carcinogen [X] Radioactive [ ]

Other: _____

Physical Hazards:
Overhead [ ] Confined Space [ ] Below Grade [ ] Trip/Fall [X]
Puncture [ ] Burn [ ] Cut [ ] Splash [X]
Noise [X]

Other: _____

Site History/Description and Unusual Features:

Locations of Chemicals/Waste: **In soil and water**

Estimated Volume of Chemicals/Waste: **Unknown**

Site Currently in Operation: Yes [X] No [ ]

C. HAZARD EVALUATION

List and Evaluate Hazards By Task (ie. sampling/drilling)

Task	Physical Hazard	Level of Protection
1	Soil Boring	D
2	Sampling	D
3	Groundwater Collection	D

Chemical Hazard Evaluation:

Compound	PEL/TWA	Route of Exposure	Acute Symptoms	Odor Threshold/Desc.
Benzene	**300 ppm**	**inhalation, dermal, ingestion**	**Skin Blisters, Nausea, Central Nervous System Disorder**	**Characteristic Odor**

D. SITE SAFETY AND WORK PLAN

Site Control: Attach map of the site.

Perimeter identified? [Y] Site secured? [Y] Work areas identified? [Y]
Zone(s) of contamination identified? [N]
0
Air Monitoring:

Contaminant of Interest: **gasoline/BTEX**

Type of Monitoring: **Air**

Frequency: **Continuous - As needed**

Equipment: **HNu**

Decontamination procedures and solutions:
Tri-sodium phosphate and water, triple rinsed

Special Site Equipment: (Sanitary facilities, lighting, etc)
None anticipated

Site Entry Procedures and Special Considerations
Underground Services Alert (USA) notified to avoid underground utilities

Work Limitations (time of day, weather conditions, etc.)
None.

General Spill Control, if applicable: **N/A**

Investigation-Derived Material Disposal (expendables, cuttings, etc.)
No cuttings will be generated during drilling and sampling process.

Sample Handling Procedures:
Soil samples collected in steel tubes, teflon tape and plastic end caps taped to each end. Water samples collected in one-liter jars and 40 ml VOA vials, without headspace. All samples will be placed in ice-filled coolers until pick-up by laboratory.

E. EMERGENCY INFORMATION

Ambulance **911**

Hospital Emergency Room **(510) 523-4357**

Directions to Hospital (attach map), **Alameda Hospital - 1070 Clinton Avenue**
Poison Control Center **911**
Police **911**
Fire Department **911**

Chromalab
UPS/Fed. Express **N/A**
Client Contact **Mr. Wesley Adams (510) 748-4512**

SITE RESOURCES

Water Supply Source **On-site**
Telephone **On-site**
Cellular Phone, if available ---
Other ---

EQUIPMENT CHECKLIST

Protective Gear	Quantity	Equipment	Quantity	Equipment	Quantity
Respirator	1	PID (HNu)	1	Baggies	1 box
Organic Cartridges	2	Liter bottles	10	Chain of Custody Forms	1 set
Tyvek	1	VOA Vials	20	Labels	1 set
Gloves, Nitrile	1 pair	Surveyors Tape	1	Paper Towels	1 roll
Steel Toed Boots	1 pair	Rope	100 feet	Trash Bags	1
First Aid Kit	1	Camera/Film	1	Buckets	3
Safety Glasses	1 pair	Bailers	5	Brushes	2
Portable eye wash	1	Cooler	1	TSP	1 box
Ear Plugs	1 pair	Teflon Tape	1 roll	Boring Logs	1 set

SITE SAFETY REVIEW

General Information

Date _____1995 Time _____ **Project No. 95-6209-3.0**

Site: **City of Alameda**

Client Contact **Mr. Wesley Adams (510) 748-4512**

Objectives **Soil Boring, groundwater sampling**

Types of Chemicals Anticipated - **Gasoline / BTEX**

Topics Discussed: **Traffic management issues**

Physical Hazards **Typical Hazards associated with drilling**

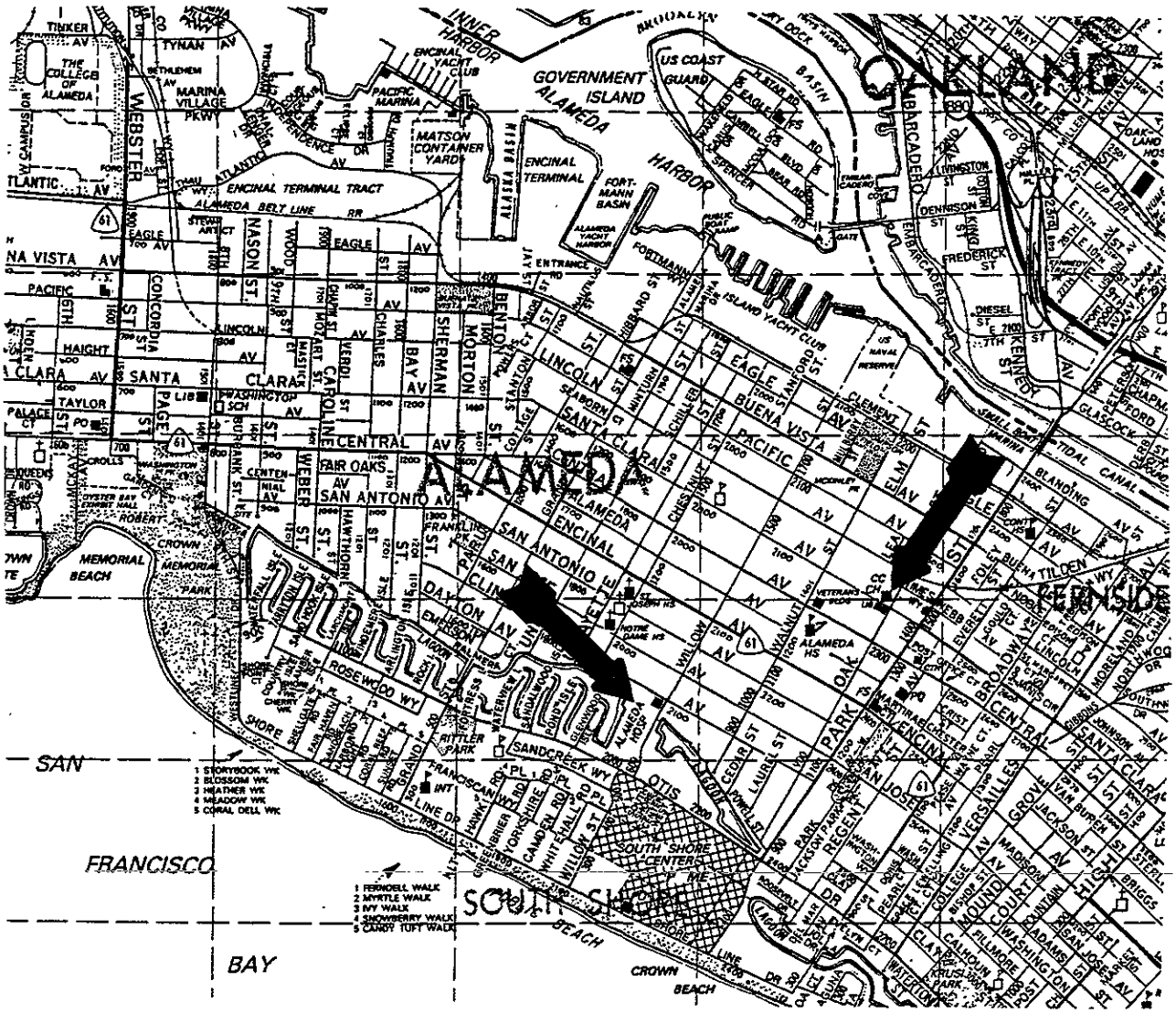
Personal Protection **Level D, modified as required**

Decontamination **Equipment to be decontaminated after each boring. Rinsate water will be drummed**

Special Site Considerations **Note: Working period perimeters (time of day), depending on traffic onsite).**

ATTENDEES

Name Printed	Signature



HOSPITAL LOCATION MAP