

File

CALIFORNIA REGIONAL WATER

JUL 10 1986

July 2, 1986

QUALITY CONTROL BOARD

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

BACKGROUND

The passage of Assembly Bill 1362 has required that every owner/operator of underground tanks used for the storage of hazardous substances including fuels provide a means of monitoring their tanks against leaks or spills. The deadline for compliance was January 1, 1985. However, extensions have been granted. The bill stipulated that administration was to be conducted at the local level. Subsequently, The Alameda County Flood Control and Water Conservation District, Zone 7 with jurisdiction over Alameda City groundwater use jointly adopted hazardous materials ordinances and accepted the Groundwater Monitoring Guidelines for Hazardous Materials Storage (GMG) drafted by the Alameda County Water District (May 1984).

The City of Alameda maintains eleven underground tanks at seven different sites around the city. Nine tanks were selected for monitoring and two tanks selected for removal. The following is a summary of tank size, site location, and installations for the nine tanks selected for monitoring.

Location	Capacity	Contents	# of wells Installed
✓ Alameda Police Department 1555 Oak Street	1,000 Gallons	Diesel	1
Alameda City Hall 2263 Santa Clara	1,000 Gallons 280 Gallons	Gasoline Gasoline	2
Firehouse #1 1300 Park Street	280 Gallons 280 Gallons	Gasoline Diesel	1
Firehouse #2 635 Pacific Street	280 Gallons	Diesel	1
✓ Firehouse #3 1703 Grand Street	280 Gallons 280 Gallons	Gasoline Diesel	2
Alameda Mun. Golf Course	500 Gallons	Gasoline	1

In September 1985, Aqua Science Engineers was asked to submit a proposal on behalf of the City of Alameda which would fulfill city monitoring requirements for underground fuel tanks. Our proposal to install four monitoring wells was submitted on September 19. Four additional wells have since been approved, bringing the total number of installed wells

to eight. The proposal and subsequent additions have been approved by the Alameda County Flood Control and Water Conservation District, Zone 7 and well drilling permits issued. The monitoring wells were installed during the period beginning June 2 and ending June 4, 1986.

We certify that all licensing, credential and permit requirements under Chapter 3 of the GMG covering owner responsibility with regard to responsibility of performance (3.1), compliance with existing statutes (3.2), and well construction permits (3.3) have been satisfied. The hazardous materials classification used with reference to the Alameda County Water District GMG was that for commercial motor fuel (4.1).

The elements of the following report include monitoring well construction, figures depicting the site, tank configuration and monitoring well placement, well logs, soil and water sampling, analysis for hydrocarbons and recommendations for continued monitoring.

MONITORING WELL CONSTRUCTION

A 2-inch diameter PVC monitoring well was installed adjacent to each of the underground fuel tanks or tank configurations during the period 6/2 thru 6/4/86 (Figures 1 thru 6). The wells are located in the assumed direction of groundwater flow and satisfy the criteria within section 5.1.3. (GMG) concerning adequacy of monitoring coverage with respect to tank dimensions and spacing.

A Geo Space mobile drill with an 8-inch hollow stem auger was used and 2-inch PVC casing was installed in the borings. Screw caps were attached to the 2-inch PVC and 12-inch steel street boxes were grouted in to prevent surface contamination from entering the well. Eye bolt anchors were set in the street boxes to allow the placement of locks which will preclude tampering with the monitoring wells. A description of the well construction and findings is provided in the boring logs (Appendix).

The well screen used was 2 inch I.D. PVC tubing with 0.010 inch slots. The annular space outside each well screen was packed with washed No. 3 aquarium sand. The top of each well was sanitary sealed with neat portland cement to prevent surface contamination from entering the borings.

The well logs (see appendix) indicate layers of sand, and sandy clays of variable thickness were encountered at each of the borings with the exception of the golf course where the soils were mainly clays. Drilling was terminated after having penetrated at least five feet of saturated aquifer, the full depth of the primary aquifer to aquiclude, or at least five feet of aquiclude in the region of the water table. The engineer on site was careful to conduct the boring to a depth at which conclusive hydrogeologic results were obtained without penetrating the bay muds of the region which protect underlying aquifers.

Saturated conditions were first encountered at depths between four and seven feet. Since, in all cases, groundwater was encountered at a depth of less than 20 feet, no vadose monitoring well was required within the tank backfill. Details of well construction in each case, including

final depth to water, are shown on the accompanying well logs.

Motor fuels are essentially non-miscible with water and are lighter than water; therefore, when present, they will be found floating on top. The important interval to monitor is at the motor fuel-water interface (GMG 5.2). For this reason well screen was installed in the appropriate region about this interface to allow for fluctuations in groundwater level. The boring from the bottom of the well screen to the bottom of boring was backfilled with bentonite to protect deeper aquifers against possible introduction of contaminants via the monitoring wells.

SOIL AND WATER SAMPLING

Alameda County Groundwater Monitoring Guidelines state that soils shall be sampled, starting at the bottom of the tank, every 5 feet to the water table (6.1). A modified California split spoon sampler, holding 4, 2-in x 4-in brass tubes was used to take undisturbed samples. The samples thus obtained were used for soil classification but, in all cases, were excluded from chemical analysis since groundwater levels were above the level of the tank bottoms. Water samples were taken from the newly installed and developed monitoring wells, sealed, refrigerated, and transported to the lab for analysis.

Chemical analysis of the samples was performed by Wesco Laboratories, Novato, CA. using Gas Chromatography/Flame Ionization Detection. The hydrocarbon concentration in the samples obtained adjacent to the Fire House #3 diesel tank and the Police Station diesel tank indicate low to moderate levels of contamination at these sites. Hydrocarbon concentrations of 5.4 ppm and 1.6 ppm respectively were recorded (see appendix). The RWQCB is to be notified directly concerning these findings. At the Golf Course, odors of old, decomposing fuel were detected but high levels of fuels were not detected in the chemical analysis.

At all of the other sites sampled and tested, the hydrocarbon concentration recorded in the test results indicate levels below which either the Department of Health Services or the Regional Water Quality Control Board would require further action. Additionally, these sites have no prior history of contamination. Drilling spoils were frequently checked for fuel odors throughout the drilling. None were found.

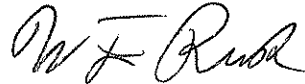
SCHEDULE FOR CONTINUED MONITORING

To assure early detection in the event of a fuel leak or spill, monthly monitoring is required (GMG 6.3.2). Groundwater monitoring wells for motor fuels are generally sampled using a clear plastic ball-valve bailer. The visual indication is the presence of sheen at the water surface which reflects rainbow colors when exposed to sunlight. Should positive results be found, you must notify hazardous materials officials at the California Regional Water Quality Control Board and the Alameda County Flood Control and Water Conservation District, Zone 7 as soon as possible.

Monitoring is also required of vadose wells, on a quarterly basis (GMG

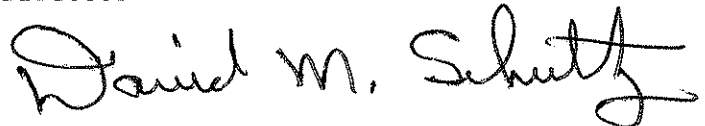
6.3.2). The procedure recommended by ACWD is to pump vapor from the monitoring well through a portable field analyzer (GMG 6.4). Should you find positive results, you must notify the hazardous materials administrators as soon as possible.

If you wish we can set up a groundwater and/or vapor monitoring program and maintain a monthly log of the results. The fee for a water monitoring well is \$45.00 per month for water monitoring wells and \$50.00 per quarter for vapor monitoring wells.



William F. Rusk, PhD.
Director

Approved:



David M. Schultz, P.E.
C 38738

APPENDIX
CREDENTIALS

Engineer of Record

For Aqua Science Engineers:
David M. Schultz, Civil Engineer
Calif. State License P.E. C 38738
1280 C, Suite 144
Walnut Creek, CA 94596

Driller

ASE Drilling
P.O. Box 535
San Ramon, CA 94583
License #487000

Laboratory

Wesco Laboratories
State Certified Water Quality Lab
14 Galli Drive, Suite A
Novato, CA 94947

PRIMARY AUTHORITY FOR MONITORING WELL REQUIREMENTS

Alameda County Flood Control and Water Conservation
District, Zone 7 as put forth in:

(GMG) Groundwater Monitoring Guidelines
for Hazardous Materials Storage. May 1984.
Alameda County Water District
38050 Fremont Boulevard
Fremont, CA 94537



RECEIVED
 JUN 18 1986
 AQUA SCIENCE ENG.

Date: June 17, 1986
 Client: Aqua Science
 Submitted by: E. Bratlien
 Report to: Aqua Science
 WESCO Job #: AQS 8648

Client Job/P.O. #: Alameda City
 Date collected: 6-9-86
 Date submitted: 6-10-86
 # & type of sample(s): 8 Water

Lab No.	Client ID	Motor Fuel (mg/l)	Beuzene (mg/l)	Toluene (mg/l)	Xylene (mg/l)	Fuel Type
4629	Fire House #2 635 Pacific Street	< 0.2	—	—	—	Diesel
4630	Fire House #3 1703 Grand Street	5.4	—	—	—	Diesel
4631	Police Dept. 1555 Oak Street	1.6	—	—	—	Diesel
4632	Fire House #1 1300 Park Street	< 0.2	—	—	—	Diesel
4633	City Hall #1 2263 Santa Clara	< 0.05	< 0.001	< 0.001	< 0.001	Gasoline
4634	City Hall #2 2263 Santa Clara	< 0.05	< 0.001	< 0.001	< 0.001	Gasoline
4635	Fire House #3 1703 Grand Street	< 0.05	< 0.001	< 0.001	< 0.001	Gasoline
4636	Alameda Municipal Golf Course	< 0.05	< 0.001	< 0.001	< 0.001	Gasoline
METHOD: Note 1						

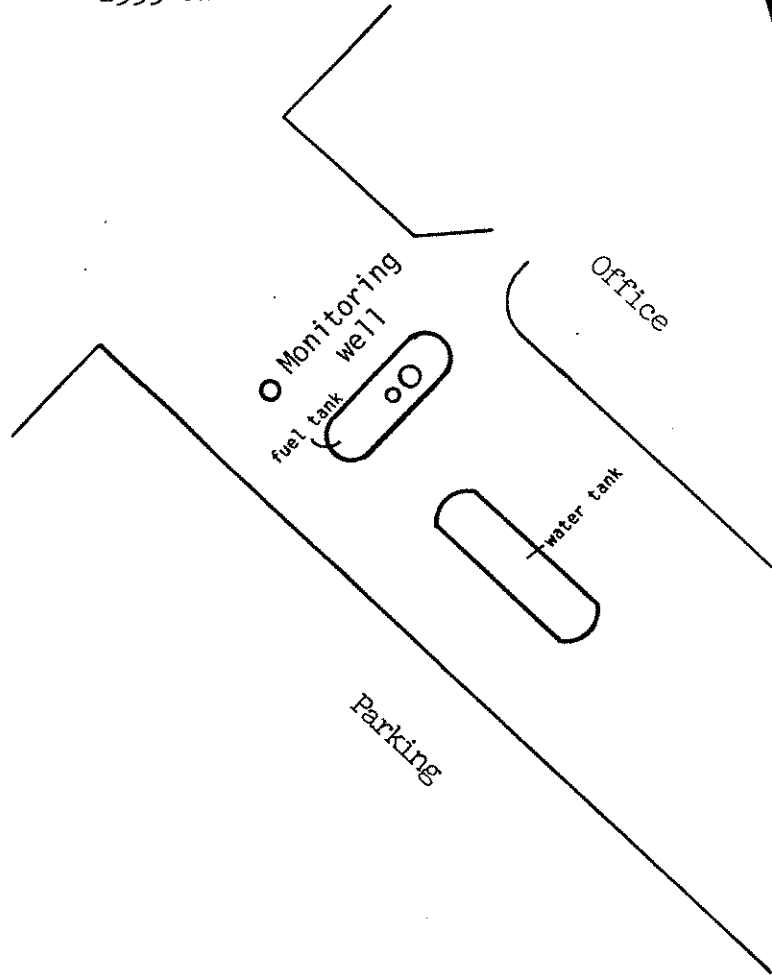
NOTES: Note 1 - EPA method 5020/8015/8020.

M. L. Will
 Analytical Supervisor

WESCO LABORATORIES IS A DIVISION OF
 WESTERN ECOLOGICAL SERVICES COMPANY (WESCO)

Figure 1

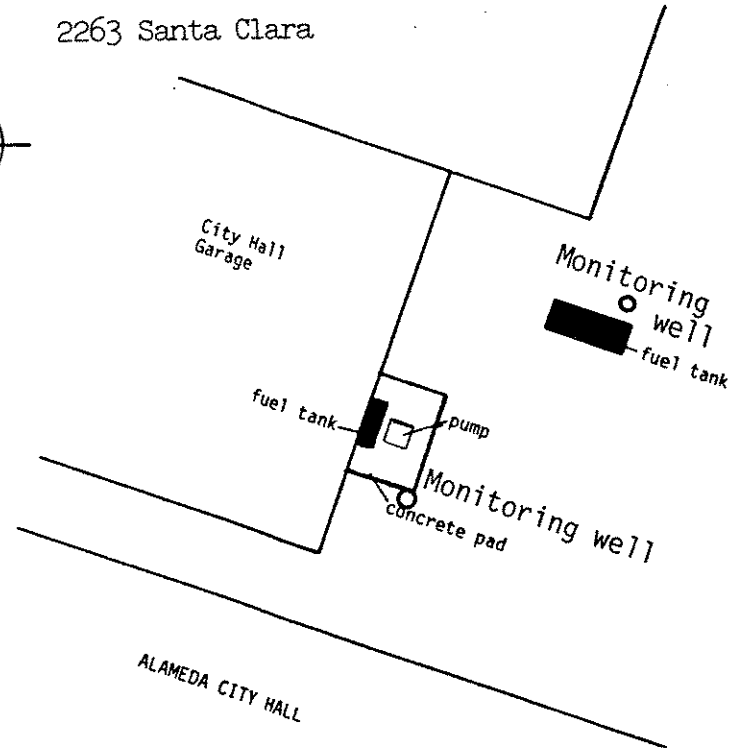
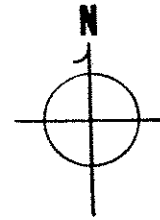
POLICE DEPARTMENT
1555 Oak Street



1 inch = 22 ft.

Figure 2

CITY HALL
2263 Santa Clara



1 inch = 12 ft.

CITY of ALAMEDA		
SCALE	APPROVED BY	DRAWN BY
DATE 5-7-86		REVISED
Aqua Science Engineers		
		DRAWING NUMBER

Figure 3

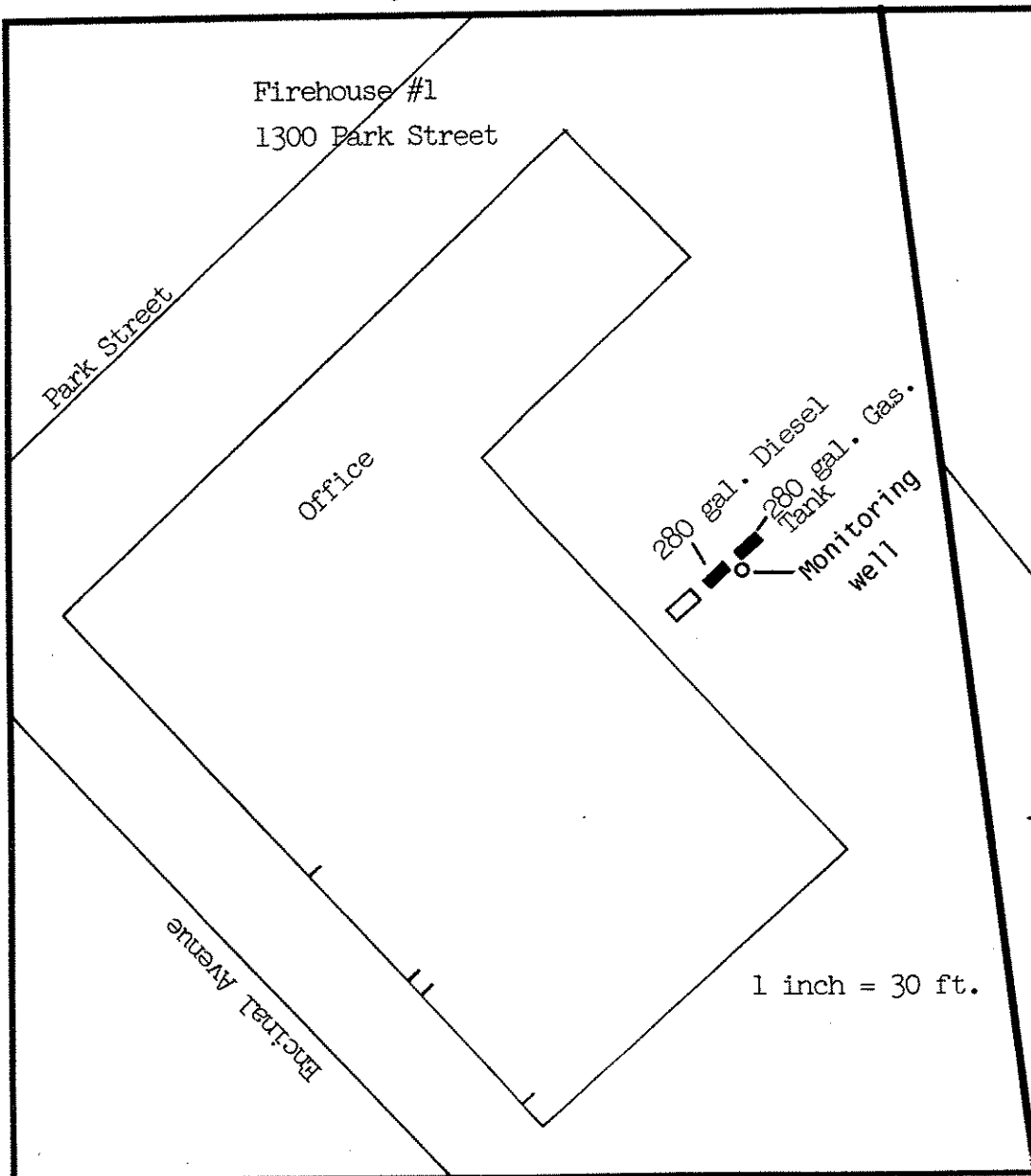
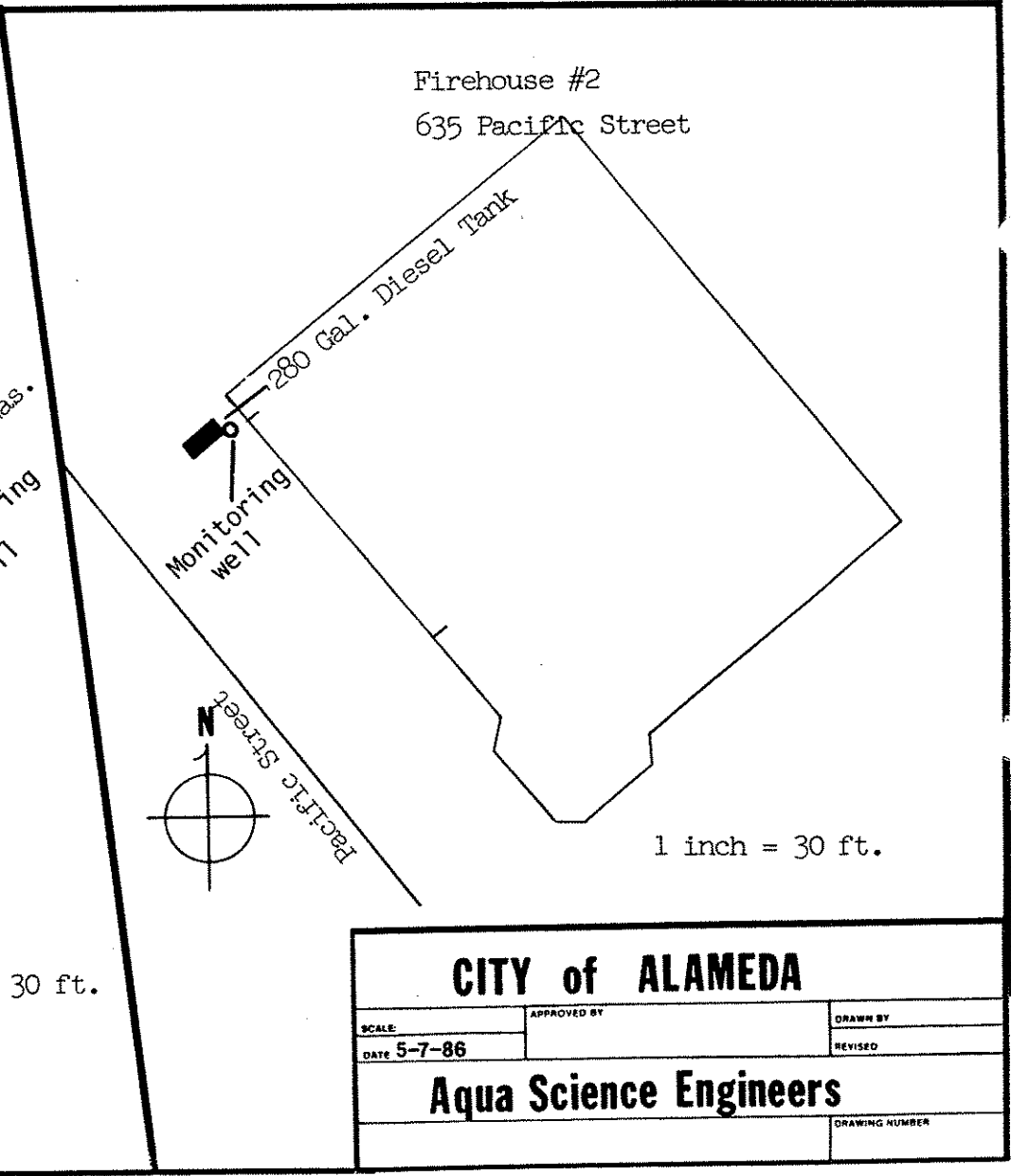


Figure 4



CITY of ALAMEDA		
SCALE:	APPROVED BY	DRAWN BY
DATE 5-7-86		REVISED
Aqua Science Engineers		
		DRAWING NUMBER

Figure 5

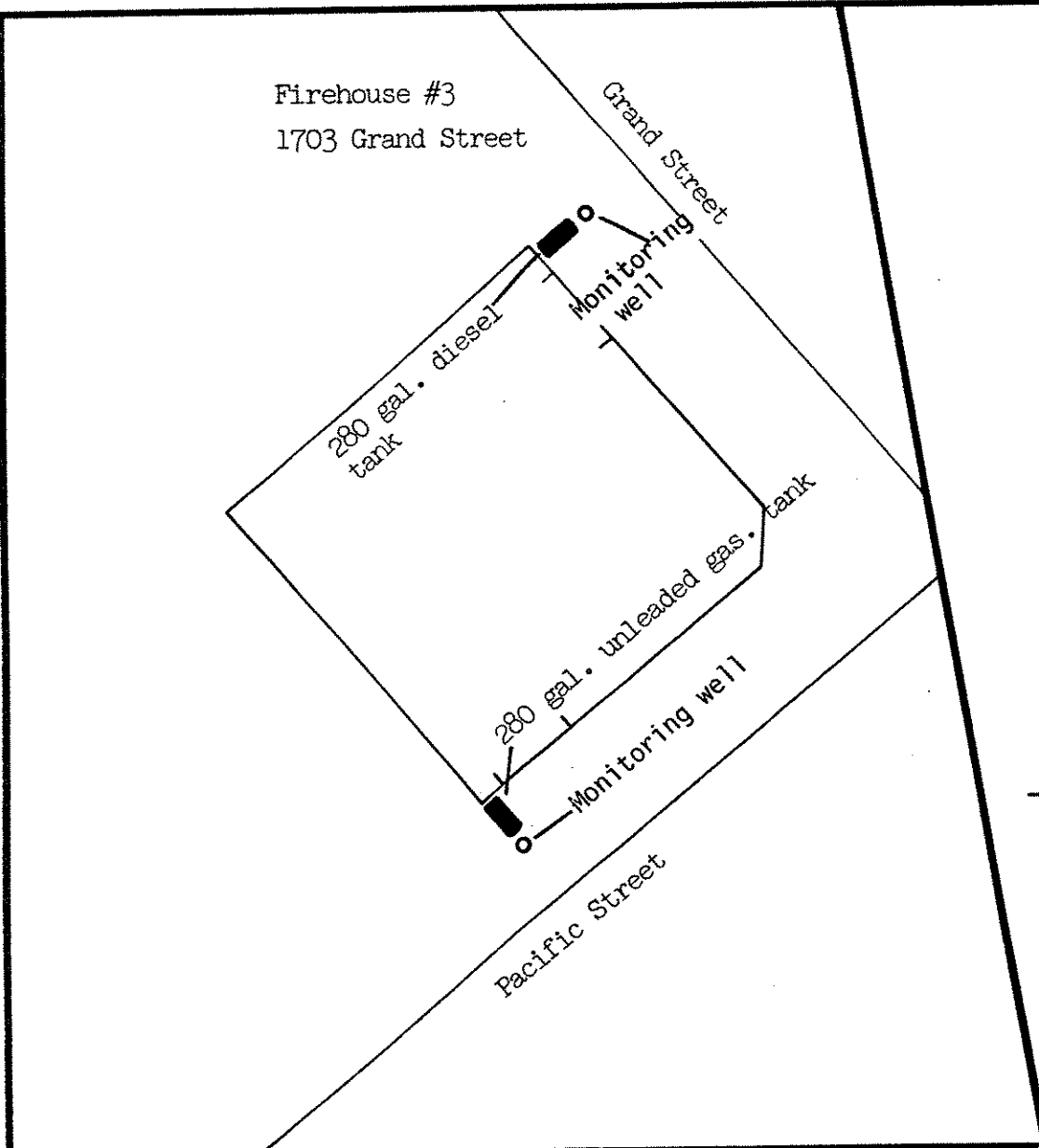
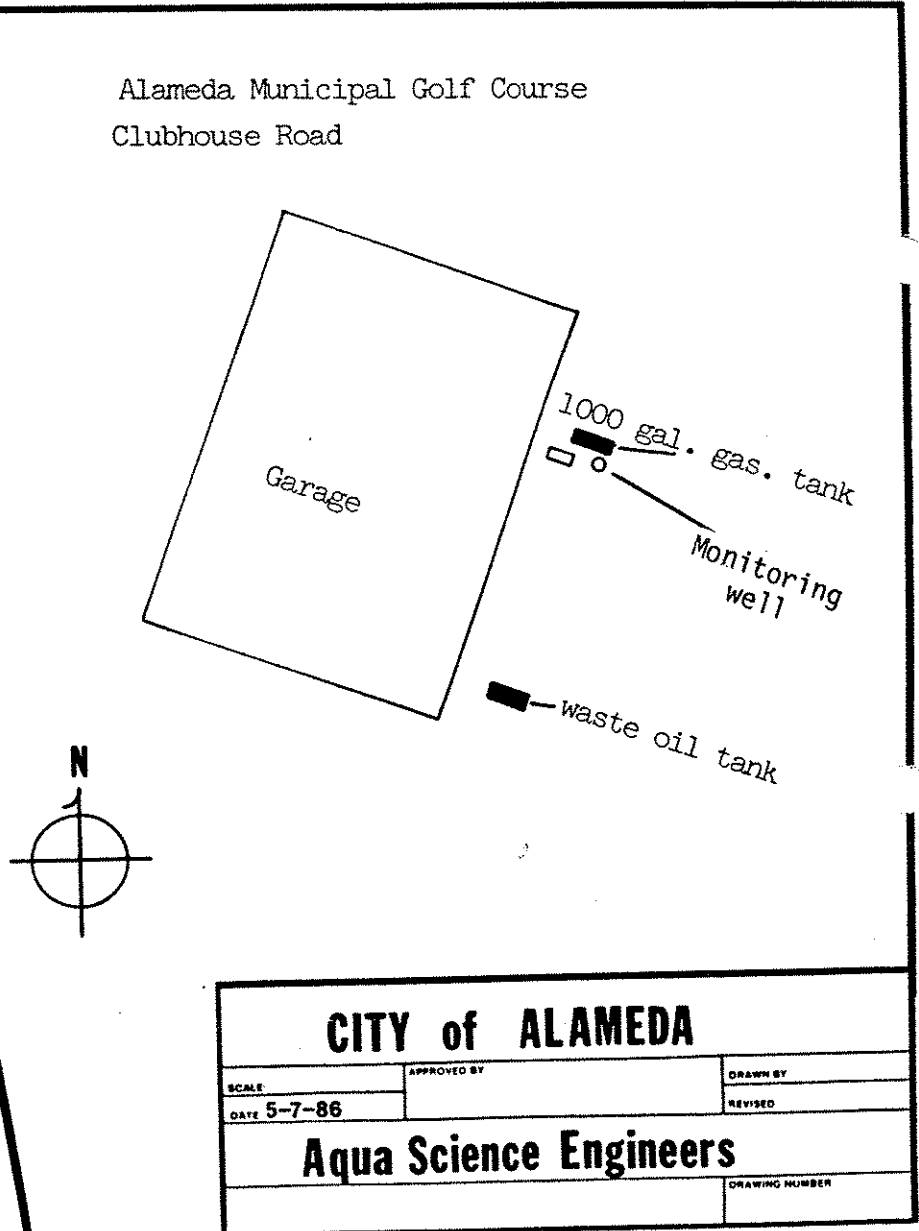


Figure 6





ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE, PLEASANTON, CALIFORNIA 94566 415-484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

(1) LOCATION OF PROJECT Alameda Police Department
1555 Oak Street
Alameda, CA 94501

PERMIT NUMBER 86140
LOCATION NUMBER

(2) CLIENT City of Alameda
Name
Address 2263 Santa Clara Phone (415) 522-4100
City Alameda, CA Zip 94501

Approved Craig A. Mayfield Date 3 Jun 86
Craig A. Mayfield

PERMIT CONDITIONS

(3) APPLICANT Aqua Science Engineers *
Name 1 Crow Canyon Ct. Suite 100
Address San Ramon, CA Phone (415) 820-9391
City Zip 94583

Circled Permit Requirements Apply

(4) DESCRIPTION OF PROJECT
Water Well Construction [X] Geotechnical
Cathodic Protection Well Destruction

GENERAL

(5) PROPOSED WATER WELL USE
Domestic Industrial Irrigation
Municipal Monitoring [X] Other

- 1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Notify this office (443-9300) at least one day prior to starting work on permitted work and before placing well seals.
3. Submit to Zone 7 within 30 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. Permit is void if project not begun within 90 days of approval date.

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary Air Rotary Auger [X]
Cable Other

WELL PROJECTS
Drill Hole Diameter 8 in. Depth 15 ft.
Casing Diameter 2 in. Number 1
Surface Seal Depth 5 ft.
Driller's License No. 483678

- WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

GEOTECHNICAL PROJECTS
Number Diameter Maximum Depth ft.

- C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.
D. CATHODIC. Fill hole above anode zone with concrete placed by tremie, or equivalent.
E. WELL DESTRUCTION. See attached.

(7) ESTIMATED STARTING DATE 6-2-86
ESTIMATED COMPLETION DATE 6-4-86

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

* Aqua Science Engineers Representative: Mr. David Schultz

APPLICANT'S SIGNATURE David Schultz 5-27-86



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE, PLEASANTON, CALIFORNIA 94566 415-484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

(1) LOCATION OF PROJECT Alameda City Hall
2263 Santa Clara
Alameda, CA 94501

PERMIT NUMBER 86141
LOCATION NUMBER

(2) CLIENT City of Alameda
Name
Address 2263 Santa Clara Phone (415) 522-4100
City Alameda, CA Zip 94501

Approved Craig A. Mayfield Date 3 Jun 86
Craig A. Mayfield

(3) APPLICANT
Name Aqua Science Engineers *
1 Crow Canyon Ct. Suite 100
Address San Ramon, CA Phone (415) 820-9391
City Zip 94583

PERMIT CONDITIONS

*Circled Permit Requirements Apply

(4) DESCRIPTION OF PROJECT
Water Well Construction X Geotechnical
Cathodic Protection Well Destruction

GENERAL

- 1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Notify this office (443-9300) at least one day prior to starting work on permitted work and before placing well seals.
3. Submit to Zone 7 within 30 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. Permit is void if project not begun within 90 days of approval date.

(5) PROPOSED WATER WELL USE
Domestic Industrial Irrigation
Municipal Monitoring X Other

WATER WELLS, INCLUDING PIEZOMETERS

- 1. Minimum surface seal thickness is two inches of cement grout placed by tremie, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary Air Rotary Auger X
Cable Other

WELL PROJECTS
Drill Hole Diameter 8 in. Depth 15 ft.
Casing Diameter 2 in. Number 1
Surface Seal Depth 5 ft.
Driller's License No. 483678

- C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.
D. CATHODIC. Fill hole above anode zone with concrete placed by tremie, or equivalent.
E. WELL DESTRUCTION. See attached.

GEOTECHNICAL PROJECTS
Number 2
Diameter 8 in. Maximum Depth 12 ft.

(7) ESTIMATED STARTING DATE 6-2-86
ESTIMATED COMPLETION DATE 6-4-86

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE David Schultz * Aqua Science Engineers Representative: 5-27-86 Mr. David Schultz



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE, PLEASANTON, CALIFORNIA 94566 415-484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

(1) LOCATION OF PROJECT Firehouse #1
1300 Park Street
Alameda, CA 94501

PERMIT NUMBER 86136
LOCATION NUMBER

(2) CLIENT City of Alameda
Name
Address 2263 Santa Clara Phone (415) 522-4100
City Alameda, CA Zip 94501

Approved Craig A. Mayfield Date 3 Jun 86
Craig A. Mayfield

(3) APPLICANT Aqua Science Engineers *
Name
1 Crow Canyon Ct. Suite 100
Address San Ramon, CA Phone (415) 820-9391
City Zip 94583

PERMIT CONDITIONS

Circled Permit Requirements Apply

(4) DESCRIPTION OF PROJECT
Water Well Construction X Geotechnical
Cathodic Protection Well Destruction

(5) PROPOSED WATER WELL USE
Domestic Industrial Irrigation
Municipal Monitoring X Other

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary Air Rotary Auger X
Cable Other

WELL PROJECTS
Drill Hole Diameter 8 in. Depth 15 ft.
Casing Diameter 2 in. Number 1
Surface Seal Depth 5 ft.
Driller's License No. 483678

GEOTECHNICAL PROJECTS
Number
Diameter in. Maximum Depth ft.

(7) ESTIMATED STARTING DATE 6-2-86
ESTIMATED COMPLETION DATE 6-4-86

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

* Aqua Science Engineers Representative: David Schultz

APPLICANT'S SIGNATURE David Schultz Date 5-27-86

- (A) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Notify this office (443-9300) at least one day prior to starting work on permitted work and before placing well seals.
3. Submit to Zone 7 within 30 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. Permit is void if project not begun within 90 days of approval date.
(B) WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.
(C) GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.
D. CATHODIC. Fill hole above anode zone with concrete placed by tremie, or equivalent.
E. WELL DESTRUCTION. See attached.



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE, PLEASANTON, CALIFORNIA 94566 415-484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

(1) LOCATION OF PROJECT Firehouse #2
635 Pacific Street
Alameda, CA 94501

PERMIT NUMBER 86137
LOCATION NUMBER

(2) CLIENT City of Alameda
Name
Address 2263 Santa Clara Phone (415) 522-4100
City Alameda, CA Zip 94501

Approved Craig A. Mayfield Date 3 Jun 86
Craig A. Mayfield

(3) APPLICANT
Name Aqua Science Engineers *
1 Crow Canyon Ct. Suite 100
Address San Ramon, CA Phone (415) 820-9391
City Zip 94583

PERMIT CONDITIONS

Circled Permit Requirements Apply

(4) DESCRIPTION OF PROJECT
Water Well Construction X Geotechnical
Cathodic Protection Well Destruction

GENERAL

- 1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Notify this office (443-9300) at least one day prior to starting work on permitted work and before placing well seals.
3. Submit to Zone 7 within 30 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. Permit is void if project not begun within 90 days of approval date.

(5) PROPOSED WATER WELL USE
Domestic Industrial Irrigation
Municipal Monitoring X Other

WATER WELLS, INCLUDING PIEZOMETERS

- 1. Minimum surface seal thickness is two inches of cement grout placed by tremie, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary Air Rotary Auger X
Cable Other

WELL PROJECTS
Drill Hole Diameter 8 in. Depth 15 ft.
Casing Diameter 2 in. Number 1
Surface Seal Depth 5 ft.
Driller's License No. 483678

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.

GEOTECHNICAL PROJECTS
Number
Diameter in. Maximum Depth ft.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie, or equivalent.

(7) ESTIMATED STARTING DATE 6-2-86
ESTIMATED COMPLETION DATE 6-4-86

E. WELL DESTRUCTION. See attached.

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

* Aqua Science Engineers Representative: Mr David Schultz

APPLICANT'S SIGNATURE David Schultz Date 5-27-86



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE, PLEASANTON, CALIFORNIA 94566 415-484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

(1) LOCATION OF PROJECT Firehouse #3
1703 Grand Street
Alameda, CA 94501

PERMIT NUMBER 86138
LOCATION NUMBER

(2) CLIENT City of Alameda
Name
Address 2263 Santa Clara Phone (415) 522-4100
City Alameda, CA Zip 94501

Approved Craig A. Mayfield Date 3 Jun 8
Craig A. Mayfield

(3) APPLICANT
Name Aqua Science Engineers *
1 Crow Canyon Ct. Suite 100
Address San Ramon, CA Phone (415) 820-9391
City Zip 94583

PERMIT CONDITIONS

Circled Permit Requirements Apply

(4) DESCRIPTION OF PROJECT
Water Well Construction [X] Geotechnical
Cathodic Protection [] Well Destruction []

- GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Notify this office (443-9300) at least one day prior to starting work on permitted work and before placing well seals.
3. Submit to Zone 7 within 30 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. Permit is void if project not begun within 90 days of approval date.

(5) PROPOSED WATER WELL USE
Domestic [] Industrial [] Irrigation []
Municipal [] Monitoring [X] Other []

- WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary [] Air Rotary [] Auger [X]
Cable [] Other []

- GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.
D. CATHODIC. Fill hole above anode zone with concrete placed by tremie, or equivalent.
E. WELL DESTRUCTION. See attached.

WELL PROJECTS
Drill Hole Diameter 8 in. Depth 15 ft.
Casing Diameter 2 in. Number 2
Surface Seal Depth 5 ft.
Driller's License No. 483678

GEOTECHNICAL PROJECTS
Number
Diameter [] in. Maximum Depth [] ft.

(7) ESTIMATED STARTING DATE 6-2-86
ESTIMATED COMPLETION DATE 6-4-86

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

* Aqua Science Engineers Representative: Mr. David Schultz

APPLICANT'S SIGNATURE David Schultz 5-27-86



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE, PLEASANTON, CALIFORNIA 94566 415-484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

(1) LOCATION OF PROJECT Alameda Municipal Golf Course
Clubhouse Road
Alameda, CA 94501

PERMIT NUMBER 86139
LOCATION NUMBER

(2) CLIENT City of Alameda
Name
Address 2263 Santa Clara Phone (415) 522-4100
City Alameda, CA Zip 94501

Approved Craig A. Mayfield Date 3 Jun 86
Craig A. Mayfield

(3) APPLICANT
Name Aqua Science Engineers *
1 Crow Canyon Ct. Suite 100
Address San Ramon, CA Phone (415) 820-9391
City Zip 94583

PERMIT CONDITIONS

Circled Permit Requirements Apply

(4) DESCRIPTION OF PROJECT
Water Well Construction X Geotechnical
Cathodic Protection Well Destruction

(5) PROPOSED WATER WELL USE
Domestic Industrial Irrigation
Municipal Monitoring X Other

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary Air Rotary Auger X
Cable Other

WELL PROJECTS
Drill Hole Diameter 8 in. Depth 15 ft.
Casing Diameter 2 in. Number 2
Surface Seal Depth 5 ft.
Driller's License No. 483678

GEOTECHNICAL PROJECTS
Number
Diameter in. Maximum Depth ft.

(7) ESTIMATED STARTING DATE 6-2-86
ESTIMATED COMPLETION DATE 6-4-86

- GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Notify this office (443-9300) at least one day prior to starting work on permitted work and before placing well seals.
3. Submit to Zone 7 within 30 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. Permit is void if project not begun within 90 days of approval date.
WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.
G. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.
D. CATHODIC. Fill hole above anode zone with concrete placed by tremie, or equivalent.
E. WELL DESTRUCTION. See attached.

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

* Aqua Science Engineers Representative: Mr. David Schultz.

APPLICANT'S SIGNATURE David Schultz Date 5-27-86

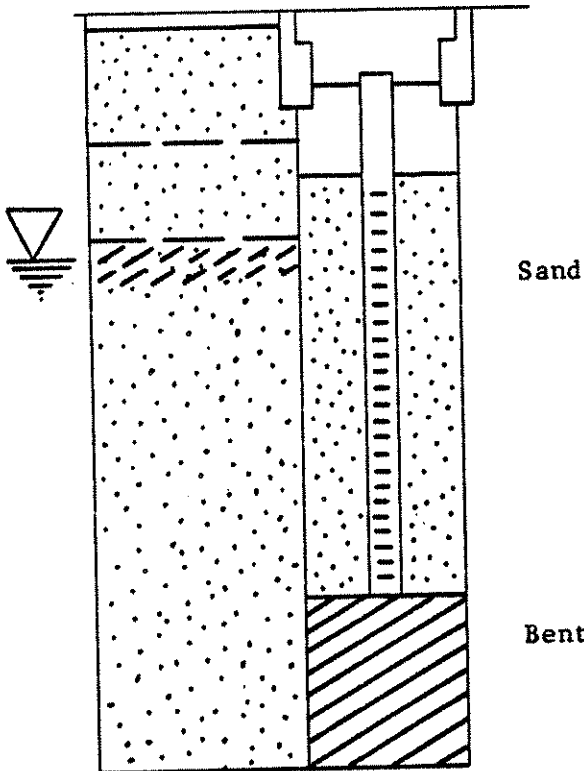
AQUA SCIENCE ENGINEERS WELL LOG

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
 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
 10-
 12-
 14-
 16-
 18-
 20-
 22-



Sand

Bentonite

Bottom of Boring 22.5 ft.

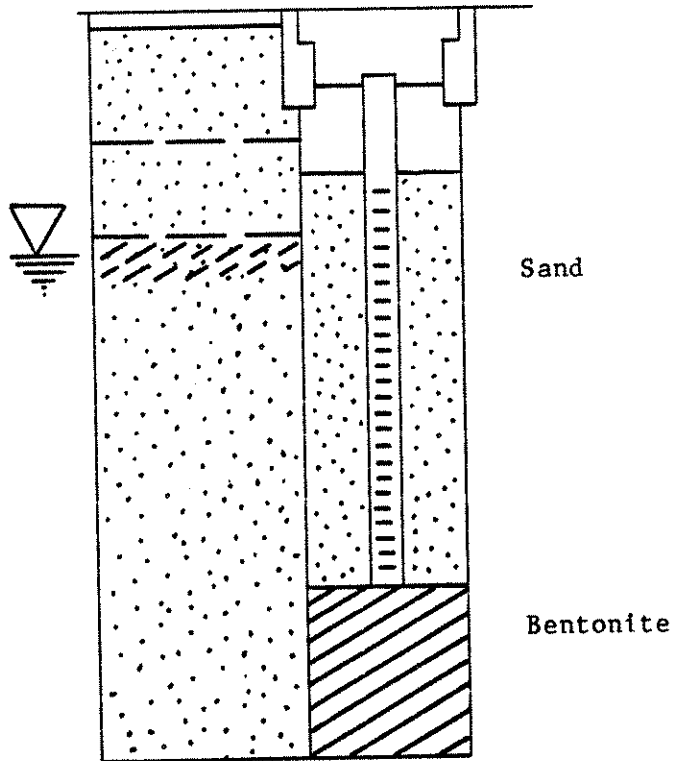
AQUA SCIENCE ENGINEERS WELL LOG

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

Alameda City Hall
 2263 Santa Clara Ave.
 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
 10-
 12-
 14-
 16-
 18-
 20-
 22-



Bottom of Boring 22.5 ft.

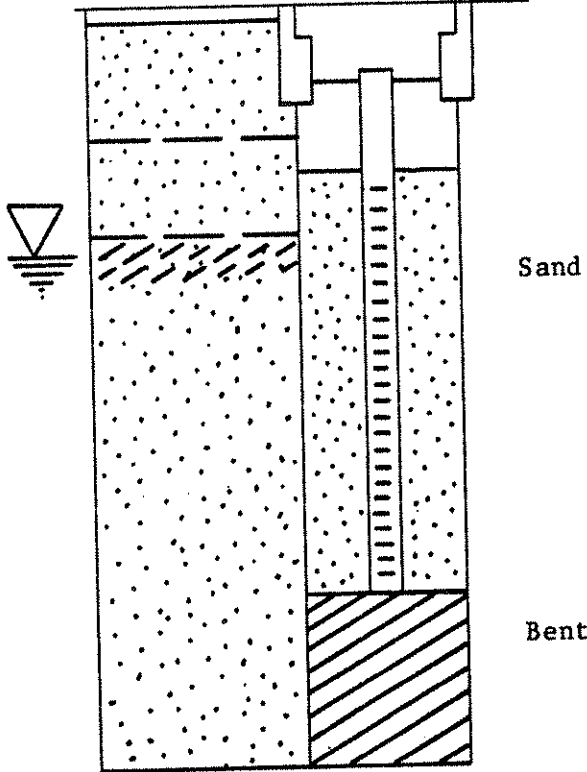
AQUA SCIENCE ENGINEERS WELL LOG

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

Alameda City Hall
 2263 Santa Clara Ave.
 Alameda, CA
 Boring # 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-



Sand
 Bentonite

Bottom of Boring 22.5 ft.

AQUA SCIENCE ENGINEERS WELL LOG

Casing: 2" PVC
 Well Depth: 19 ft.
 Logged By: D. Schultz, P.E.
 Water Depth: 9.0 ft.
 Driller: ASE

Alameda Firehouse #1
 1300 Park Street
 Alameda, CA
 Boring # 1
 Date: 6-2-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS
-------------	------------------	---------------------------

0- 6" Asphalt Cover

2-

4- Sand

6-

8- Sand, trace Clay

10-

12-

Sand

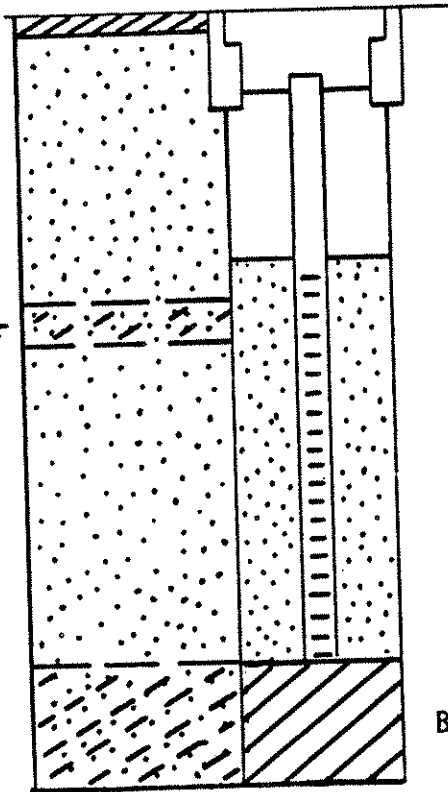
14-

16-

18-

20- Brown Clayey Sand

22-



Sand

Bentonite

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: 5.0 ft.
 Driller: ASE

Alameda Firehouse #2
 635 Pacific Street
 Alameda, CA
 Boring # 1
 Date: 6-3-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS
-------------	------------------	---------------------------

0- Brown Sand

2-

4-

6-

8-

10-

12-

14-

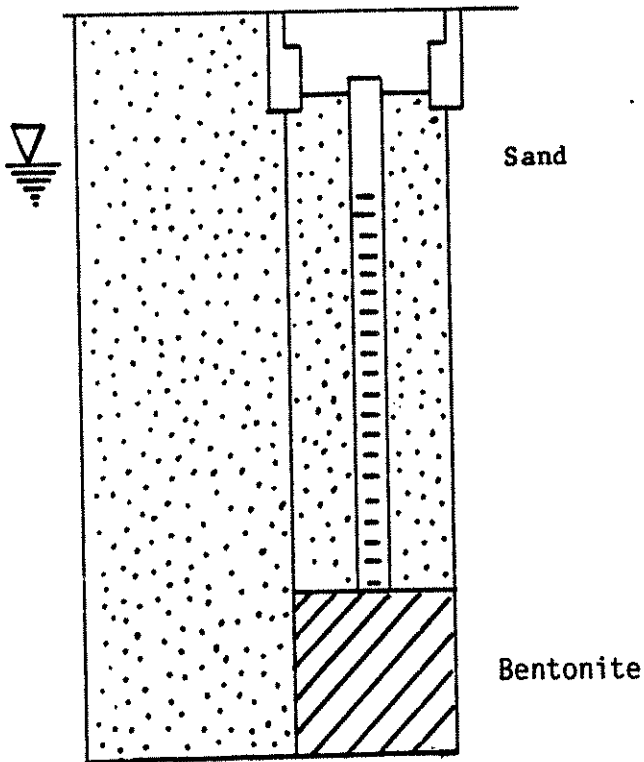
16-

18-

20-

22-

24- Bottom of Boring 23.0 ft.

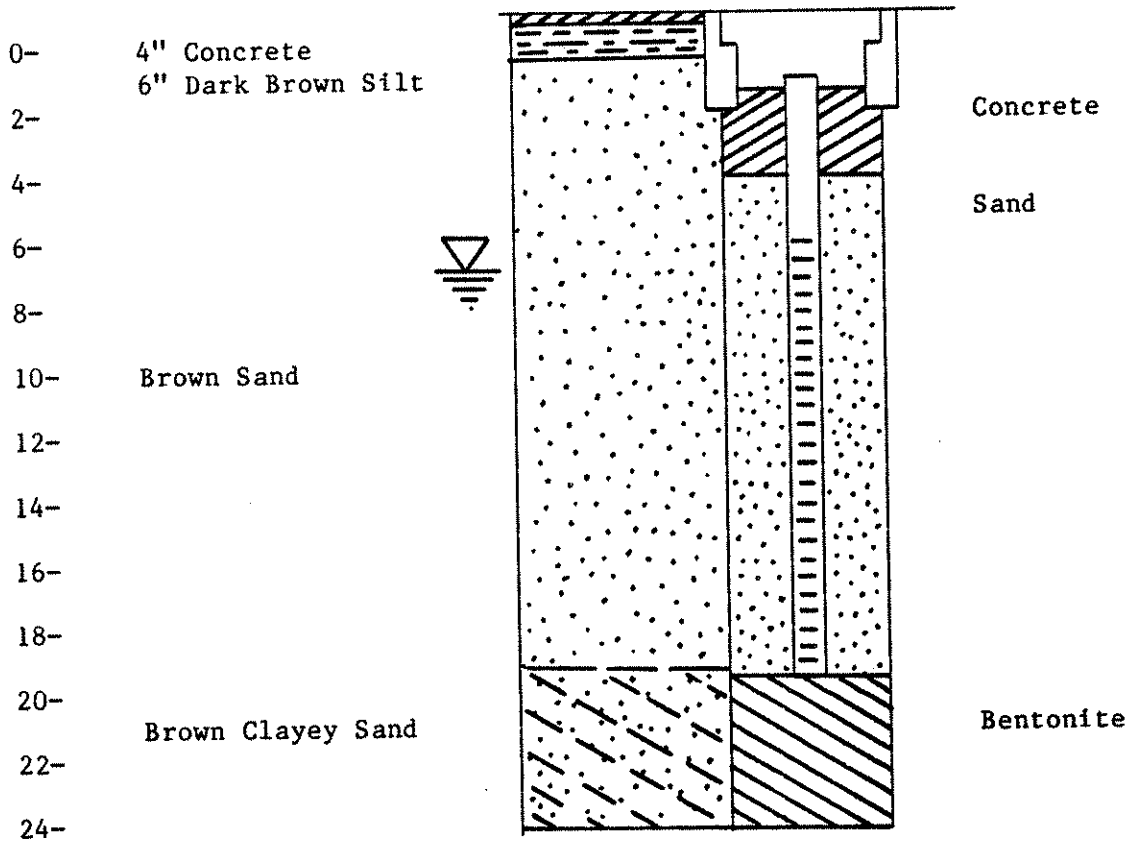


AQUA SCIENCE ENGINEERS WELL LOG

Casing: 2" PVC
 Well Depth: 19.0 ft
 Logged By: D. Schultz
 Water Depth: 7.0 ft
 Driller: HEW

Alameda Firehouse #3
 1703 Grand Street
 Alameda, CA.
 Boring # 1
 Date: 6-3-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS
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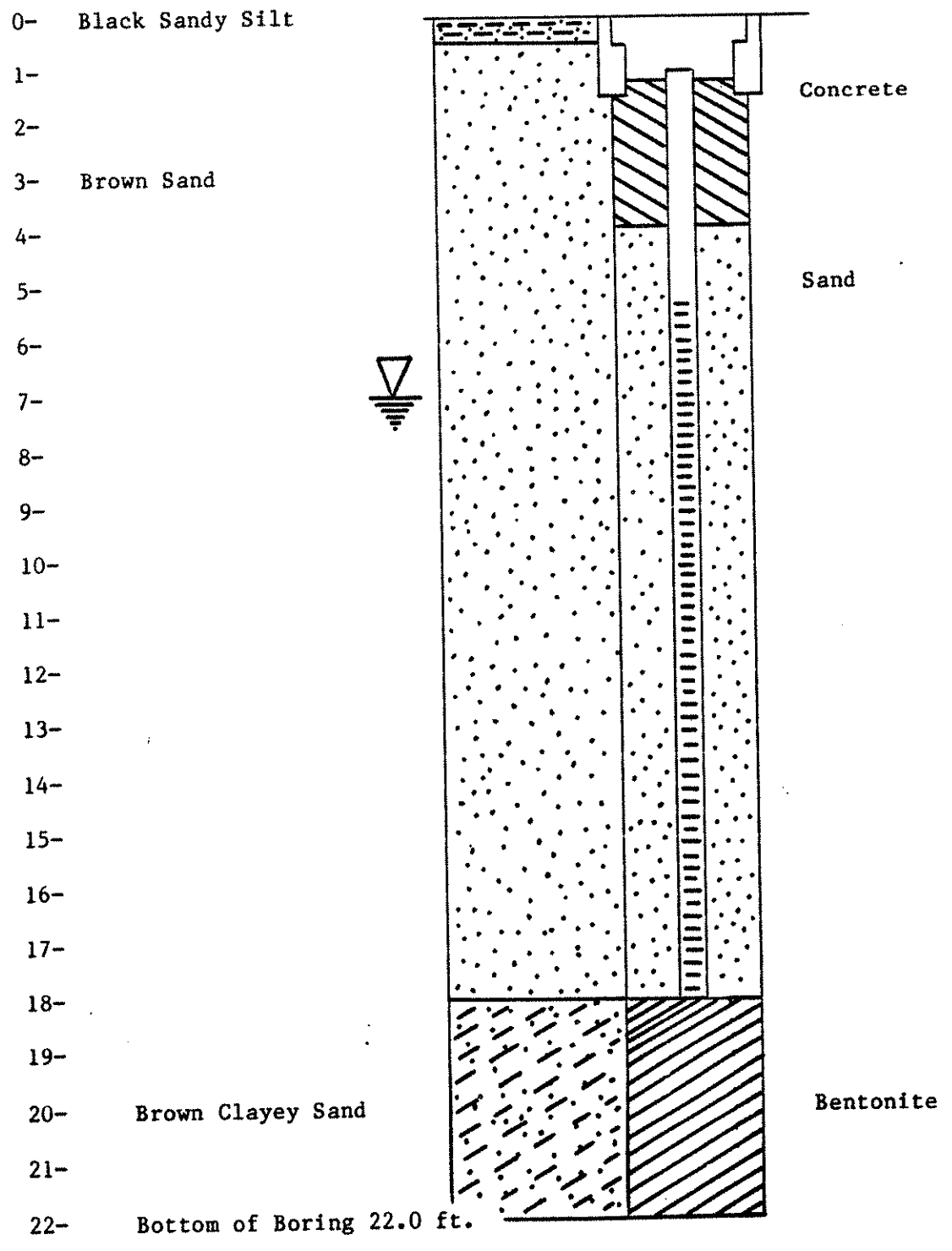
Bottom of Boring 24.0 ft.

AQUA SCIENCE ENGINEERS WELL LOG

Casing: 2" PVC
 Well Depth: 18.0 ft.
 Logged By: D. Schultz, P.E.
 Water Depth: 7.0 ft.
 Driller: ASE

Alameda Firehouse #3
 1703 Grand Street
 Alameda, CA
 Boring # 2
 Date: 6-3-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS
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AQUA SCIENCE ENGINEERS WELL LOG

Casing: 2" PVC
 Well Depth: 13.5 ft.
 Logged By: D. Schultz, P.E.
 Water Depth: 3.5 ft.
 Driller: ASE

Alameda Mun. Golf Course
 Clubhouse Road
 Alameda, CA.
 Boring # 1
 Date: 6-2-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS
-------------	------------------	---------------------------

0- Gravel Cover

1-

2- Brown Silty Clay

3-

4- Soft Gray Clay

5-

(bay mud)

6-

7-

8-

9-

10-

11-

12-

13-

14-

Bottom of Boring 13.5 ft.

