

September 4, 1986

Soils Investigation
A Summary of Findings
and
A Proposal for Remedial Action

Prepared for:

The City of Alameda
Housing Authority
1916 Webster St.
Alameda, CA 94501

Prepared By:

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

September 4, 1986

Mr. Tom Matthews
Executive Director
Housing Authority of the City of Alameda
1916 Webster Street
Alameda, CA 94501

RE: A Summary of Investigatory Findings and a Plan for Remedial
Action

Dear Mr. Matthews:

This report is a summary of information and documentation regarding the removal of an underground fuel storage tank and subsequent soil and water quality investigation at 1916 Webster St. in Alameda. The investigation was conducted as the first phase of a plan to mitigate the effects of soil and water contamination discovered during the excavation of the tank on July 16, 1986. Recommendations for further treatment of contaminated water and soils are included for your review.

TANK REMOVAL AND CONTAMINATION DISCOVERY

Aqua Science was contracted by the City of Alameda to remove a 280 gallon underground fuel storage tank. Although the tank had not been in service many years, it was found to contain a mixture of water and leaded gasoline. The tank was pumped dry prior to removal. On July 16, the tank was unearthed and removed from the site of the Alameda Housing Authority. The soils removed on the day of excavation were apparently saturated with tank product as evidenced by strong fuel odors. These excavated soils were sampled (sample #HA-1) and spread in a thin layer adjacent to the site to promote aeration. An additional sample (HA-2) was taken from the soils directly beneath the tank. A visual inspection of the unearthed tank failed to indicate a possible source of leaks. The tank pit was left open pending the results of the soil tests.

CONTAMINATED SOILS EXCAVATION AND AERATION

Laboratory test results indicated total motor fuel contamination at 3420 ppm and 2060 ppm for the two samples, respectively (see Figure 1). A tank leak report was completed, and state and local agencies were notified by phone of the situation. Aqua Science recommended that additional soils be excavated from the vicinity of the tank pit and spread over the adjacent parking lot in an attempt to treat the worst of the soil contamination by aeration. The Bay Area Air

Quality Management District was contacted. The allowable limits of contaminated soil scheduled for aeration were confirmed. On July 25, an additional 50 cubic yards of contaminated soils were removed. However, a significant decrease in soil contamination along the edges of the newly enlarged excavation was not discovered.

Four additional soil samples were taken along the perimeter of the enlarged pit and analyzed. The results of the test indicate soil contamination of 5000 ppm at a depth of four feet, approximately fifteen feet north of the original tank location. Other samples showed lower levels of contamination at the periphery, 25 feet to the east and as deep as six ft (See figure 1).

SITE CHARACTERISTICS

The soils excavated from the site were characteristically silty sands with fair permeability. Standing water was observed in the excavation at about 5 ft below grade. Since the site is approximately one half of a mile from the Oakland Inner Harbour, a tidal canal, there is reason to believe that the water table at the site may be subject to tidal fluctuations with the general direction of groundwater flow toward the northeast. Reference to maps prepared by the U.S. Geological Survey confirms that surface contours, and presumably water table, slope downward in a northerly direction.

SOIL AND WATER QUALITY INVESTIGATION

As a result of the information gathered through field sampling, and observation of site characteristics, it was apparent that the extent of contamination may be considerable. Aqua Science made the recommendation to the City of Alameda that a boring program be implemented to obtain more information as to the extent, location, and degree of contamination in order that clean-up may proceed in an effective and efficient manner.

On August 5, a proposed boring schedule was drafted and presented to the City of Alameda. The program consisted of 7 soil borings and three monitoring wells to be placed on concentric circles centered on the original tank location. With approval from the Alameda County Flood Control and Water Conservation District, an initial set of four borings was completed along the first arc on August 13. Soil samples were obtained at a depth of 2.0 and 4.0 feet, a water sample was taken, and the borings were immediately backfilled with portland cement. The results of this first round of sampling appear in Figure 1. With the laboratory results indicating considerable soil and water contamination in boring B1, a second set of borings was approved. Two borings and two monitoring wells were placed along the second arc with modifications based on first round findings. The results of this second set of borings appears in Figure 1.

SUMMARY OF DATA

Several conclusions have been drawn from the soil and water sampling program.

It appears as though the contamination has remained, for the most part, within the boundaries of the Alameda Housing Authority property. Soil contamination was discovered at levels above the 100 ppm acceptable lower limit only in boring B1. Soil contamination below the 100 ppm limit was discovered as distant as 75 ft. (W1-A) from the presumed source. It was noted that the worst of the contaminated soils appeared at about 2.0 ft. with the deeper soils apparently having been washed by tidal fluctuations over time. Water contamination above the 0.10 ppm acceptable lower limit was discovered in borings B1 and B5, with detectable levels of contamination appearing as far away as 80 ft. (W2).

RECOMMENDATIONS FOR CONTINUED CLEAN-UP

The following recommendations are being made to assure that soils with levels of contamination above 100 ppm are treated until an acceptable level of contamination is obtained and the soils can be returned to the excavation with least cost to the City of Alameda. Also, that water contaminated by fuel product will be treated until levels of contamination fall below 0.10 ppm with least cost to the City.

Treatment of contaminated soils by aeration should continue as the most cost effective alternative. Hauling the remainder of contaminated soils to a class one waste dump and importing clean fill has been rejected for the following reasons. The soils removed during the initial pit enlargement have responded well to aeration due partly to the sandy nature of the soil and partly to the nature of the contaminant, a volatile hydrocarbon. Laboratory testing of soils collated from the aeration pile showed a significant decrease in hydrocarbon concentration after just 2 weeks (Figure 3). It is anticipated that the removal and aeration of an additional 30 cubic yards of contaminated soils will include all soils with hydrocarbon concentration above 100 ppm and conclude, in good faith, this phase of treatment. The soil currently being aerated on the deck can be returned to the pit immediately. The treatment of soils slated for removal in this last phase should be complete within 30 days and will be returned to the excavation pending laboratory test results.

The Regional Water Quality Control Board maintains the policy that a degraded groundwater supply must be restored to its original condition. Therefore, treatment of contaminated water should be initiated and continue until influent to an appropriately sized and placed system show contamination levels below 0.10 ppm or until the system fails to create a significant impact on the quality of the water it is treating. The installation of an appropriate system will begin with a pump test / recovery well drilled to the depth of a confining aquiclude. This well allows for the determination of the vertical extent of contamination, provides a source for water recovery, and is used for the determination of the zone of well influence. The well will be located in the region of known contamination.

Based on laboratory testing of water samples taken during boring operations it appears that a plume of contamination has moved in the assumed direction of groundwater flow (North Northeast). In order

to adequately describe the hydraulics of the site, and hence the movement of the contamination plume, an additional piezometer well should be installed. The placement of this well will be such that it intercepts the region of contaminated aquifer in close proximity to the first pump test / recovery well. This piezometer will serve as a observation point for the accurate determination of the direction of groundwater flow and for the measurement of drawdown once pumping operations begin.

Due to the nature of the decision making process, we would like to bill this work out on a time and materials basis at the following rates:

Engineer (field)	\$50/hr.
Engineer (design)	\$60/hr.
Technician	\$40/hr.
Clerical	\$25/hr.
Backhoe	\$65/hr.
Laboratory Analysis	\$125/analysis
Materials	Cost plus 15%

Sincerely,

William F. Rusk, PhD
President

October 16, 1986

**Soil and Water Quality
Treatment Summary and Recommendations**

A Final Report

Prepared for:

**The City of Alameda
Housing Authority
1916 Webster St.
Alameda, CA 94501**

Prepared By:

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

October 16, 1986

Mr. Tom Matthews
Executive Director
Housing Authority of the City of Alameda
1916 Webster Street
Alameda, CA 94501

RE: A Final Report on Soil Treatment and Recommendations for Continued Monitoring

Dear Mr. Matthews:

This report is a summation of activities and recommendations regarding the condition of soil and water quality at 1916 Webster Street, Alameda. With the completion of the third phase of soil treatment described herein, abatement activities will be suspended with further action to be at the discretion of the Regional Water Quality Control Board.

CONCLUSION TO SOIL TREATMENT

The third and final phase of soil treatment was initiated on September 9, 1986 with the excavation of approximately 35 cubic yards of contaminated soil. This third phase of action is based on a recommendation founded on the results of a soil boring program completed on August 15, 1986. The results of the boring program are summarized in a previous ASE report dated September 4, 1986 which indicated that the worst of the soil contamination had been addressed in first and second phase excavations but an area of significant contamination still remained. This area, centered around boring B1 (Figure 1), was excavated on September 9, spread on the adjacent parking lot, and allowed to aerate.

Soil samples were taken on the periphery of the newly enlarged excavation and analysed using EPA test methods 5020/8015/8020. The results of the analysis, performed by Wesco Laboratory, Navato, are tabulated in Figure 2. Soils aerating since the phase II excavation were also sampled on September 9. The results appear as sample HA 100 - HA 101 in Figure 2. These soils were returned to the pit that same day.

The sample labeled HA 8 was taken from the north wall of the pit following the phase III excavation (Figure 1). The sample showed total hydrocarbon concentrations of 3700 ppm. This value is far above the action level of 100 ppm established by the Regional Water Quality Control Board. In a telephone conversation with Dale Boyer of the RWQCB, Aqua Science maintained that continued excavation in the region of the questionable sample was no longer cost effective. It was made clear to the Board that; approximately 130 cubic yards of contaminated soil, representing a significant portion of the problem area, have already been treated; that the region where soil quality remains questionable is near a security fence posing difficulty in further excavation; that the transfer of contamination from soil to groundwater probably peaked more than 10 years ago when the fuel tank causing the contamination was last used; that the season for soil aeration is near its end and other treatment alternatives represent large cost with relatively small gain for the City. Based on these arguments and the lack of significant groundwater use in the area, it is decided that soil treatment will end at the conclusion of this third phase.

On September 29, 1986 the phase III aerating soils and standing water within the excavation were sampled. The results of the sampling appear in Figure 3. Based on these results, phase III aeration was determined a success and the site was scheduled for final backfill and compaction. In order to obtain a reasonable degree of compaction in the backfill, the excavation would have to be dewatered. The RWQCB was contacted for permission to release approximately 150 gallons of contaminated water with a total hydrocarbon concentration of 1.4 ppm (Figure 3). Due to the nature of the contaminant, a volatile hydrocarbon, and the low volume of the release, permission was granted to run the water out over the parking lot prior to diversion to a collection channel.

Dewatering and backfilling was initiated on October 8, 1986 and final compaction was completed on October 15. The pit was scheduled for paving on October 17.

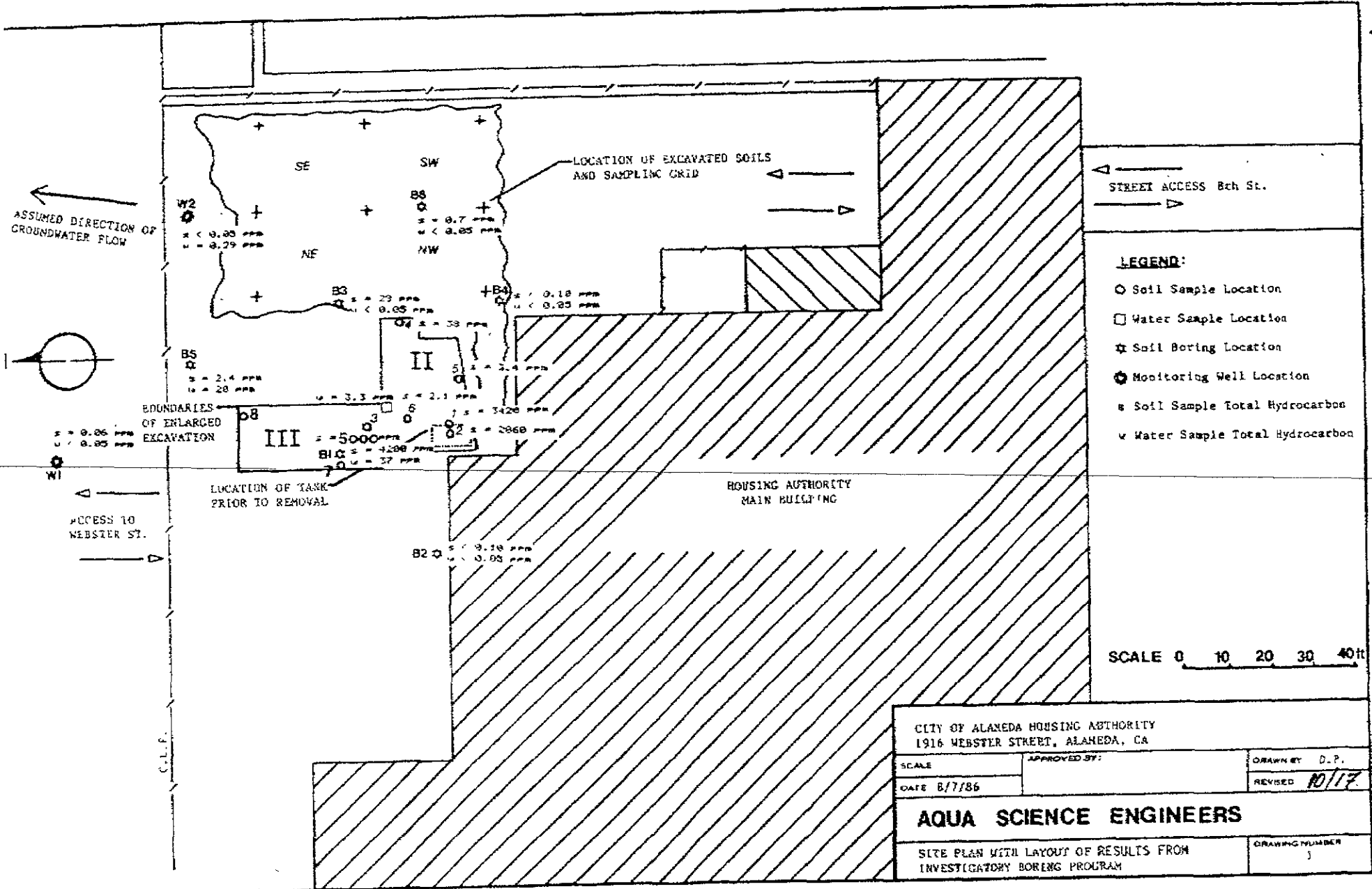
RECOMMENDATIONS FOR CONTINUED MONITORING

The Regional Water Quality Control Board has received a copy of the report describing the initial tank excavation, the subsequent site evaluation, and the progression of events through the phase II excavations. The Board is unable, at this time, to make any decisions regarding the severity of the groundwater contamination problem at 1916 Webster St., Alameda. Aqua Science recommends, however, that the groundwater monitoring wells at the site be sampled every six months and a record of the water quality condition be established and maintained. At which time the Board makes a decision on this case the data necessary to maintain the Cities position of action based on good faith will be available and a reasonable path for continued action can be defined.

Aqua Science would like to provide the monitoring services. Every six months each of the two monitoring wells will be developed by bailing four well volumes from the well. A sample will then be bailed from the region of the air-water interface and placed in an air tight vial for analysis. A continuous record of the sampling will be maintained and any significant changes in the condition of water quality will be brought to the City's attention. Aqua Science can provide this service for \$750.00 per sampling.

Sincerely,

David M. Schultz, P.E.
Vice President, Operations





Date: September 30, 1986

Client Job/P.O. #: City of Alameda
Housing Authority/6401

Client: AquaScience Engineers

Date collected: 9-09-86

Submitted by: Dave Prull

Date submitted: 9-11-86

Report to: Dave Prull

& type of sample(s): 3 Soil

WESCO Job #: AQS 8696

Lab No.	Client ID	Motor Fuel (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Xylene (mg/kg)	Fuel Type
5343-44	Soil HA 100 - HA 101	5.1	0.010	0.056	0.065	Gasoline
5345	Soil HA 7	38	0.12	0.97	1.8	Gasoline
5346	Soil HA 8	3700	28	260	360	Gasoline

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AQUA SCIENCE ENG.

METHOD(S):

Note 1

NOTES:

Note 1 - EPA Methods 5020/8015/8020.

Michael Webb
Analytical Supervisor

FIGURE 2



Date: October 8, 1986
 Client: AquaScience Engineers
 Submitted by: Dave Prull
 Report to: Terry Carter
 WESCO Job #: AQS 86107

Client Job/P.O. #: Alameda Housing Authority/
 Date collected: 9-29-86
 Date submitted: 9-29-86
 # & type of sample(s): 2 Soil
 / WATER

Lab No.	Client ID	Motor Fuel (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Xylene (mg/kg)	Fuel Type
5596-97	Soil N (collate)	15	0.02	0.095	0.060	Gasoline
5598	Soil Pit <i>WATER</i>	1.4	0.030	0.041	0.008	Gasoline
METHOD(S): Note 1						

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

Michael Webb
 Analytical Supervisor

FIGURE 3

RECEIVED
 OCT 10 1986
 AQUA SCIENCE ENG.

AQUA SCIENCE ENGINEERS WELL LOG

Casing: 2" PVC
 Well Depth: 14.0 ft.
 Logged By: D. Prull
 Water Depth: 4.0 ft.
 Driller: ASE

Alameda Housing Authority
 1916 Webster St.
 Alameda, CA
 Boring # W1
 Date: 8-13-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS	
0-	6" Asphalt Cover.	Portland Cement	
	Blue cm Gravel.		
1-	Brown cmf Sand, and Silt.	Bentonite	
2-			
3-	Grayish Brown Clay.	Sand	
4-			
5-	Black cmf Sand, some Silt, trace Clay.		
6-			
7-			
8-			
9-	Grayish Brown cmf Sand, some Silt, trace Clay.		
10-			
11-			
12-			
13-			
14-			
15-	Orangish Brown cmf Sand, little Silt, trace Clay.		Bentonite
16-			
17-			
18-			
19-			
B.O.B. 19.0 ft.			

AQUA SCIENCE ENGINEERS WELL LOG

Casing: 2" PVC
 Well Depth: 10.0 ft.
 Logged By: D. Prull
 Water Depth: 5.0 ft.
 Driller: ASE

Alameda Housing Authority
 1916 Webster St.
 Alameda, CA
 Boring # W2
 Date: 8-14-86

DEPTH (ft.)	SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS
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0- 6" Asphalt cover
 6" mf Gravel, some cmf Sand,
 1- little Silt.

2- Dk Brown cmf Sand, some Silt
 trace mf Gravel.

3-

4-

5- Brownish Black cmf Sand,
 6- little Silt.

7-

8-

9-

10-

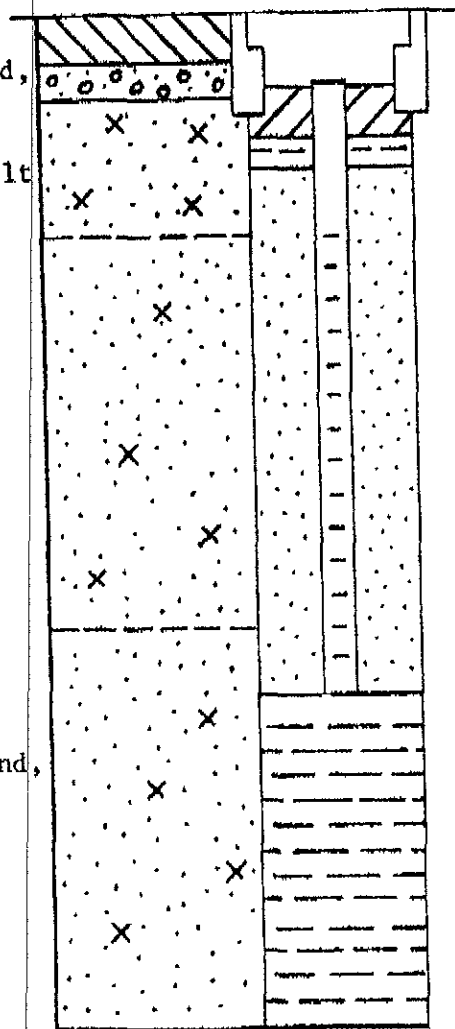
11- Lt Greenish Brown cmf Sand,
 little Silt.

12-

13-

14-

15- B.O.B. 15.0 ft.



Portland Cement

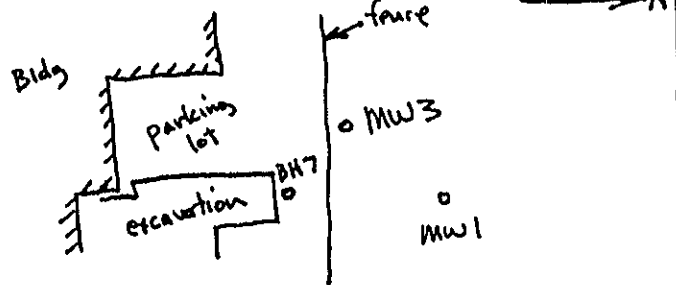
Bentonite

Sand

Bentonite

PROJECT: ALAMEDA HOUSING / HACA JOB NUMBER 7103.022
 LOCATION: WEBSTER & ATLANTIC, ALAMEDA, CALIFORNIA
 WELL NUMBER: MW 3 GROUND ELEVATION: APPROXIMATELY 6 FEET
 DATE INSTALLED: 7-12-91 WELL CASING ELEVATION: _____
 FIELD REPRESENTATIVE: J. G. JENSEN / L. J. KLEINCKE PROTECTOR CASING ELEVATION: _____
 DRILLING CONTRACTOR: WOODWARD DRILLING CO.
 DRILLER: W. WOODWARD LICENSE NO. C-57/581639
 DRILLING METHOD: HOLLOW STEM AUGER
 RIG TYPE: MOBILE B-57
 CONDITION OF GROUND SURFACE: WEATHERED PAVEMENT
 FORMATION SCREENED: _____

LOCATION SKETCH



BIT TYPE	HOLE DIA. (IN.)	END DEPTH* (FT.)	FLUID TYPE

TIME LOG

ACTIVITY	DATE	START	END
DRILLING			
CASING			
FILTER PACK			
SEAL			
GROUT			
DEVELOPMENT			
SURVEY			
OTHER			

PROTECTOR, CASING & SCREEN RECORD

DESCRIPTION	DIA. (IN.)	TOTAL LENGTH	TOP	BOTTOM
Blank PVC csg	2"	4.5'	surf.	4.5'
0.020 Screen PVC w/ plug	2"	10'	4.5'	14.5'
Total depth	—			15.5'

GROUND WATER LEVELS

DURING DRILLING:
 5' by samples during drilling
 4.47' measured @ 1220 pm 7-12-91

COMPLETION MATERIALS RECORD

DESCRIPTION	TOP	BOTTOM
Grout	surf.	3'
Bentonite	3'	3'10"
Sand	3'10"	15.5'

WELL DEVELOPMENT

* DEPTH FROM GROUND SURFACE

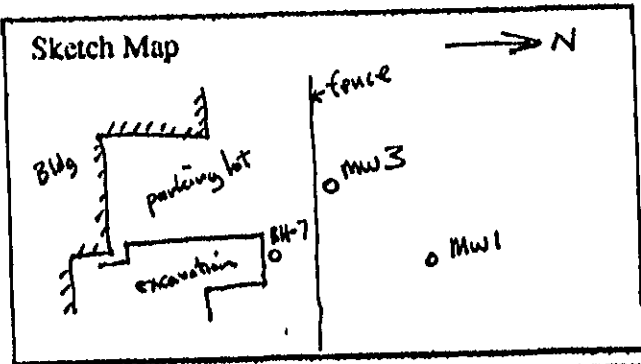
COMMENTS: _____

J. G. Jensen

DRILLING LOG

Job Number 7703.022

Project ALAMEDA HOUSING / HACA
 Location WEBSTER & ATLANTIC, ALAMEDA, CA
 Borehole Number MW3
 Date Drilled 7-12-91
 Contractor WOODWARD DRUG. CO.
 Drilling Method HOLLOW STEM AUGER
 Driller WAYNE WOODWARD
 Hole Diameter 8"
 Log By JAMES G. JENSEN
 Total Depth 15 1/2'



Depth (ft)	Advanced/Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description		OVA Reading (heads per ppm)
					(Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)		
					sample ↓ MW3-2	Surface - asphalt Gravel to 2 feet clay - "bay mud"	5
5'		1-3-5			MW3-4	clay - dark gray to black, moist, moderate odor sand - gray, medium grained, clayey, wet, no odor broke through something right @ 6 feet (by drill)	39
		4-4-3	7 ft		MW3-6	sand - gray, med. grained, moderately sorted, clayey, moist-wet, no odor	1.6
		4-8-12			MW3-8	sand - orange-brown to gray, med. grained, mod. sorted, clayey, less wet, plant material (roots), no odor	0
10'		17-22-27			MW3-10	sand - orange-brown, med. grained, mod. sorted, moist, no odor	1.2
		12-24-33			MW3-12	sand - orange-brown, med. grained, mod. sorted, wet, no odor	1.0
15'		10-16-25			MW3-14	sand - orange-brown, med. grained, mod. sorted, wet, no odor	0.8
					Total Depth: 15 1/2 feet, reached @ 9:45 AM, 7-12-91		
					Water Table: 4.47 feet, measured @ 12:30 PM, 7-12-91		
