

STAGE ONE SITE ASSESSMENT OF THE
HOUSING AUTHORITY OF THE
CITY OF ALAMEDA SITE AT
1916 WEBSTER STREET
ALAMEDA, CALIFORNIA

Prepared for:

Housing Authority of the City of Alameda
701 Atlantic Avenue
Alameda, California 94501

Prepared by:

Versar Inc. - Sacramento
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Versar Job No. 7703.22

November 4, 1991

The information contained herein (or attached hereto) has been prepared at the Housing Authority of the City of Alameda's request. The information is confidential and has been and will be disclosed only to those in the Housing Authority of the City of Alameda, its designated representatives, and Versar Inc., with a need to review this information.

PROJECT SUMMARY

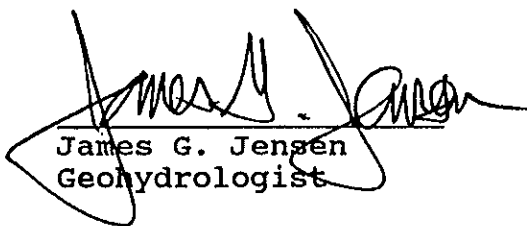
On July 12 and July 16, 1991, Versar collected soil and ground-water samples at the Housing Authority of the City of Alameda site in Alameda, California, as part of a site assessment study. The study included the drilling and sampling of two boreholes; the construction of a ground-water monitoring well in one of the boreholes; the development and sampling of three ground-water monitoring wells; the analysis of the soil and ground-water samples for total petroleum hydrocarbons as gasoline, benzene, toluene, xylenes, and ethylbenzene; and the generation of this report. Mr. James G. Jensen, Hydrogeologist, and Mr. Lawrence Kleinecke, Geologist/Chemist, conducted the study under the guidance of Mr. Michael P. Sellens, Registered Geologist No. 4714. Mr. Jensen prepared this report.


The following summarizes the findings of Versar's site assessment study:


- Ground-water samples did not contain any total petroleum hydrocarbons as gasoline or toluene at or above the relevant method's detection limits in any monitoring well.
- Ground-water samples did not contain any xylenes or ethylbenzene at or above the maximum contaminant level in any monitoring well.
- A ground-water sample from monitoring well 2 contained a benzene concentration slightly above the Maximum Contaminant Level of 1.0 micrograms per liter.
- Soil samples in Borehole 7, immediately adjacent to the original excavation, contained elevated concentrations of total petroleum hydrocarbons as gasoline and benzene, toluene, xylenes, and ethylbenzene.

Prepared by:

Approved for Release:


James G. Jensen
Geohydrologist


Michael P. Sellens, RG 4714
Senior Geologist/Program Manager



DISCLAIMER

The purpose of this report is only to inform the client of the proposed remediation alternatives for the subject site. Versar Inc. does not assume responsibility for the discovery and elimination of hazards that could possibly cause accidents, injuries, or damage. Compliance with submitted recommendations and/or suggestions in no way assures elimination of hazards or the fulfillment of a client's obligation under any local, state, or federal laws or any modifications or changes thereto. In many cases, federal, state, or local codes require the prompt reporting to relevant authorities if a release occurs. It is the responsibility of the client to comply with requirements to notify authorities of any conditions that are in violation of the current legal standards.

Factual information regarding operations, conditions, and test data was obtained, in part, from the client and has been assumed by Versar to be correct and complete. Since the facts stated in this report are subject to professional interpretation, they could result in differing conclusions. In addition, the findings and conclusions contained in this report are based on various quantitative and qualitative factors as they existed on or near the date of the investigation. Therefore, if the recommendations made in this report are not implemented within a reasonable period of time, there can be no assurances that intervening factors will not arise that will affect the conclusions reached herein.

Versar makes no warranty and assumes no liability with respect to the use of information contained in this report. No changes to its form or content may be made without Versar's express written approval.

This report reflects conditions, operations, and practices as observed during the investigation. Changes or modifications to procedures and/or facilities made after the site visit are not included.

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1.0 INTRODUCTION

This report describes the methods, procedures, and findings of a site assessment at the Housing Authority of the City of Alameda (HACA) site located at 1916 Webster Street in Alameda, California. The location of the site is shown on Figure 1.

This site assessment has been prepared by Versar Inc. (Versar) on behalf of HACA, which is proposing the development of the site. Prior to developing the site, HACA wants to secure approval from the Alameda County Department of Environmental Health, Hazardous Materials Division and the California Regional Water Quality Control Board (RWQCB) that the site is not a concern to human health or the environment. This assessment was performed to complete the characterization of the site and to determine if any contamination is present which would delay the development of the site.

1.1 Background/Site History

The site is the former operating office for HACA. The site consists of a warehouse and a parking lot. The potential for environmental impairment is based on soil contamination identified during the removal of a 280-gallon gasoline underground storage tank (UST) on July 16, 1986 by Aqua Science Engineering Inc. Although the UST had not been in service for many years, it was found to contain a mixture of water and regular gasoline. The UST contents were evacuated prior to the tank removal. A visual inspection did not indicate the presence of any holes in the UST. However, laboratory analysis of two soil samples (HA1 and HA2) collected from the excavation indicated elevated concentrations of total petroleum hydrocarbon as gasoline (TPH-G), as well as elevated concentrations of benzene, toluene, and xylene. Based on the results of the soil analysis, additional contaminated soil was excavated and additional samples were collected in July and August, 1986.

During this time, six soil samples were collected from the excavation and eight boreholes were drilled at the site, two of which were converted into ground-water monitoring wells. Soil and ground-water samples were collected from each borehole. All samples were analyzed for TPH-G, benzene, toluene, and xylene. Laboratory analytical results are summarized in Table 1 for soil samples and in Table 2 for ground-water samples. The most elevated concentrations of TPH-G were reported in: (1) soil samples from Boreholes 1 and 3; (2) excavation samples HA1 through HA4, HA7, and HA8; and (3) water samples from Boreholes 1 and 5. The lowest concentrations of TPH-G were reported in: (1) soil samples from Boreholes 2 and 4; (2) soil samples from Monitoring Wells 1 (MW1) and 2 (MW2); (3) water samples from Boreholes 2, 3, 4, and 6 and MW1.

Concentrations of benzene, toluene, and xylene were highest in: (1) soil samples from Boreholes 1 and 3; (2) excavation samples HA1 through HA8; and (3) water samples from Boreholes 1, 4, and 5. The lowest concentrations of benzene, toluene, and xylene were reported in: (1) soil samples from Boreholes 2, 4, and MW2; (2) water samples from Boreholes 2 and 3; and (3) water samples from MW1 and MW2.

Review of previous reports indicates soil excavation ceased in a northerly direction when field screening and visual observations indicated that all contaminated soil had been removed. A total of approximately 130 cubic yards of contaminated soil was excavated and aerated on the site. The treated soil was used as backfill in the excavation. The Aqua Science (1986) reports and laboratory analytical results are summarized in the Versar (1991) Work Plan report and both of these reports are included in the References.

No additional work was conducted at the site until 1990 when PRC Environmental Management, Inc. sampled the two monitoring

wells (MW1 and MW2) as part of the sampling program for the nearby Alameda Naval Air Station. Analysis of the ground-water samples did not report the presence of any aromatic compounds (benzene, toluene, and xylene).

1.2 Assessment Objectives

The primary purpose of Versar's site assessment was to clarify the areal extent of any soil contamination and to determine the local hydrologic flow direction and ground-water quality. The general objectives of the assessment were to:

- 1) Install a third ground-water monitoring well at the site to be used in determining the local ground-water flow direction.
- 2) Evaluate the condition and suitability of the two existing ground-water monitoring wells at the site.
- 3) Develop, sample, and analyze the ground water in the two existing wells, and the new monitoring well at the site.
- 4) Evaluate the water quality beneath the site to determine if any ground-water remedial action is required.
- 5) Drill an exploratory borehole at the northern end of the previously excavated area, in order to verify soil conditions.
- 6) Coordinate with local regulatory agencies to develop a remedial program, if required, to evaluate any environmental impairment that may be present at the site.

2.0 SITE DESCRIPTION

2.1 Site Location

The site is located in the City of Alameda, California at 1916 Webster Street on property owned by HACA. The City of Alameda has a population of approximately 80,000 people and is located in the northwest section of Alameda County. The site is at the southwest corner of the intersection of Webster Street and Atlantic Avenue (see Figure 2) and is approximately 0.5 miles south of the Oakland Inner Harbor and 0.75 miles north of San Francisco Bay.

2.2 Site Geology and Soils

The site is located in the Coast Ranges geomorphic province, at an approximate elevation of six feet, above mean sea level. The area is tectonically active, being situated between the Hayward Fault on the east and the San Andreas Fault on the west. The underlying bedrock consists of Mesozoic sedimentary and volcanic rocks found throughout the Coast Ranges. The general area surrounding the site is underlain by Quaternary marine and nonmarine terrace deposits consisting of clays and silts. The local soil geology at the site consists of fill material overlying sandy clays and sands.

2.3 Site Hydrology

The uppermost ground water at the site is at approximately five feet below grade (one foot above mean sea level) (see Appendix D and E). The local ground-water flow direction is reported to be to the north-northeast.

3.0 SITE ASSESSMENT METHODS AND PROCEDURES

The site assessment involved drilling two boreholes on the site, one of which was converted into a ground-water monitoring well and sampling and analysis of the ground water from two existing wells and the new monitoring well. All work was conducted in accordance with Versar's Work Plan dated March 22, 1991. The locations of the borehole and the new monitoring well are shown on Figure 3. The location of the borehole (BH-7) was selected to clarify the extent of any soil contamination that is present, while the monitoring well (MW3) was located to determine the local hydrologic flow direction and ground water quality. A copy of the monitoring well permit is included as Appendix A. The boreholes were drilled and the monitoring well installed on July 12, 1991. The monitoring wells were developed and sampled on July 16, 1991. Versar representatives Mr. James G. Jensen, Geohydrologist, and Mr. Lawrence Kleinecke, Geologist/Chemist, conducted the site assessment under the guidance of Mr. Michael P. Sellens, Registered Geologist No. 4714.

3.1 Borehole Drilling and Analysis

The boreholes were drilled with eight-inch outside diameter hollow-stem augers. As the drilling proceeded, soil samples were collected, using a split-spoon sampler, to determine the subsurface conditions. At MW3, samples were collected at two feet intervals and the hole was drilled to a total depth of 15.5 feet. At BH-7, which was drilled to a total depth of 5.5 feet, samples were collected at two feet and four feet. Geologic logs of MW3 and BH-7 were produced from borehole cuttings and split-spoon samples (See Appendix B). These soil samples were logged by a geologist in accordance with the Unified Soil Classification System (USCS) for classifying soils. All of the augers, bits, and downhole sampling equipment was decontaminated after the completion of each borehole. When the drilling of BH-7 was

completed, the borehole was backfilled to the surface grade with cement grout. Upon completion of the drilling of MW3, the borehole was converted to a monitoring well.

The borehole for monitoring well MW3 drilled through asphalt at the surface and then penetrated gravel to approximately two feet. Below the gravel layer, gray to dark gray clay was present to a depth of approximately four feet. From four feet to approximately eight feet, the formation consisted of gray, clay-rich sand. Below eight feet an orange-brown sand was present to approximately 15.5 feet where the drilling stopped. Ground water was encountered at a depth of approximately five feet below the surface. Slight hydrocarbon odor was noted in soil samples at four feet.

Borehole B-7 drilled through asphalt at the surface and then gravel to approximately six inches. Below the gravel layer, a dark gray sand was present to approximately five feet. From five feet to approximately 5.5 feet, a medium gray, clayey sand was encountered and then drilling stopped. Ground water was encountered at approximately five feet below surface. Strong hydrocarbon odor was noted in soil samples at two feet and at four feet.

3.2 Monitoring Well Installation

The borehole in which the monitoring well was installed, MW3, was drilled to a total depth of 15.5 feet. The ground-water level was estimated at five feet below the surface from soil samples collected during drilling. No confining layers below five feet were observed during drilling.

The monitoring well was constructed using ten feet of two-inch inside diameter, Schedule 40 PVC screen with 0.020-inch slots, and two-inch inside diameter, Schedule 40 PVC blank casing to the surface. Clean sand was placed in the annular space between the screen and the borehole wall. There is a one-foot

sand plug below the screen at total depth and the sand was placed to a height approximately one foot above the top of the screen. Approximately one foot of bentonite pellets was placed above the sand. Above the bentonite, the annular space was filled with neat cement to just below the surface. A locking cap was placed on top of the PVC casing and a traffic box was set in concrete over the well. The top of the traffic box is slightly above grade to help prevent surface water from entering the well. A copy of the well construction record is included as Appendix C.

3.3 Ground-Water Sampling and Analysis

Prior to conducting any ground-water sampling, each monitoring well was surveyed to a common elevation and the depth to ground water was measured. Ground water was present at depths below surface of 4.92 feet, 4.76 feet, and 4.50 feet, for monitoring wells MW1, MW2, and MW3, respectively. This data was used to calculate the hydraulic gradient, which was determined to be toward the north. The survey data with flow direction is shown in Figure 4.

After measurement of ground-water depth on July 16, 1991, all wells were developed and purged using a dedicated bailer (see Test Data for Monitoring Wells Developed and Purged During July, 1991 Site Assessment in Appendix D). A minimum of five well volumes of fluid was removed from each well. The wells were allowed to recover and ground water to stabilize. Ground-water samples were then collected for laboratory analyses from the newly installed well and the two existing monitoring wells. The samples were collected in precleaned, 40-milliliter vials, preserved with hydrochloric acid. During the developing, purging, and sampling, no free product was observed in any of the wells; however, ground water from monitoring well MW2 exhibited a slight hydrocarbon odor.

4.0 LABORATORY ANALYTICAL RESULTS

Soil and ground-water samples were collected for laboratory analysis for total petroleum hydrocarbons as gasoline (TPH-G) and for benzene, toluene, xylenes, and ethylbenzene (BTXE). TPH-G was analyzed using the DHS method with a purge and trap. BTXE was analyzed using EPA method 8020. All samples were handled in accordance with EPA protocols. All samples were delivered under Chain-of-Custody by Mr. Jensen to Trace Analysis Laboratory, Inc. (Trace) in Hayward, California. A copy of the analytical results and COC records are included as Appendices E and F.

4.1 Soil Sample Results

Trace reported the soil samples from MW3 did not contain any TPH-G or benzene at or above the method reporting limits.

Elevated concentrations of TPH-G and BTXE were reported in the soil samples from BH-7. TPH-G concentrations of 1,300,000 micrograms per kilogram (ug/kg) and 59,000 ug/kg were reported from samples at two feet and four feet, respectively. Benzene, toluene, xylenes, and ethylbenzene concentrations of 130,000 ug/kg, 390,000 ug/kg, 190,000 ug/kg, and 42,000 ug/kg, respectively, were reported from the soil sample at two feet. Soil sample results are summarized in Table 3 and on Figure 5.

4.2 Ground-Water Sample Results

Trace reported the ground-water samples from MW1 and MW3 did not contain any TPH-G or BTXE at or above the method reporting limits.

Ground-water samples from MW2 did not contain TPH-G or toluene at or above the method reporting limits. Benzene, xylenes, and ethylbenzene concentrations of 3.7 micrograms per liter (ug/L), 5.1 ug/L, and 0.50 ug/L were reported from the ground-water sample from monitoring well MW-2. Ground-water sample results are summarized in Table 4 and on Figure 6.

5.0 CONCLUSIONS

Previous investigations at the HACA site identified the presence of TPH-G and associated aromatic compounds (BTXE) in soil samples associated with the excavation of a UST. Impacted soil was excavated and aerated. Excavation ceased in a northerly direction when field observations indicated that all impacted soil had been removed. The treated soil was used as backfill in the excavation.

The present site assessment has identified impacted soil north of the previous limits of excavation. BH-7 was drilled three feet north of the previous excavation and laboratory analysis of soil samples from BH-7 reported the presence of elevated concentrations of TPH-G and BTXE. MW3 was drilled approximately 40 feet northwest of the previous excavation and laboratory analysis of soil samples from MW3 reported the presence of slightly elevated concentrations of toluene, xylenes, and ethylbenzene.

Three monitoring wells were developed and sampled as part of the present assessment. Ground-water levels were recorded and the local ground-water flow was determined to be in a northerly direction. Ground-water samples collected from monitoring wells MW1, MW2, and MW3 had no free product present in the water. TPH-G and BTXE were not detected at or above the laboratory reporting limits in monitoring wells MW1 and MW3. Benzene, xylenes, and ethylbenzene were reported in the ground-water sample from MW2. The benzene concentration of 3.7 ug/l exceeds the Maximum Contaminant Level (MCL) of 1.0 ug/l.

Based on the work conducted, it is believed that impacted soil is present north of the previous excavation limits. This impacted soil was probably not removed during the original excavation due to the nearness of the adjacent property line. It is also believed that the areal extent of the impairment is

restricted to the immediate vicinity of the former UST site. This is supported by the ground-water samples collected from the monitoring wells. The analytical results of the samples from MW1 and MW3 did not detect any TPH-G and BTXE at or above the laboratory reporting limits. Results of the samples from MW2 detected the presence of xylenes and ethylbenzene below the MCL and benzene slightly above the MCL.

6.0 RECOMMENDATIONS

To reduce the risk of incurring further environmental impairment and to monitor potential impact on the ground water, Versar makes the following recommendations.

- 91-9-1: Excavation of soil in the vicinity of BH-7 in order to remove the source of possible future contamination.
- 91-1-2: Quarterly ground-water monitoring for one year with sampling and laboratory analyses from MW-1, MW-2, and MW-3.

7.0 REFERENCES

The site assessment of the HACA site utilized the reference materials and reports documented below:

Aqua Science Engineers, Inc., August 11, 1986, A Proposal for Soil and Water Investigation at the Alameda Housing Authority.

Aqua Science Engineers, Inc., September 4, 1986, Soils Investigation - A Summary of Findings and a Proposal for Remedial Action.

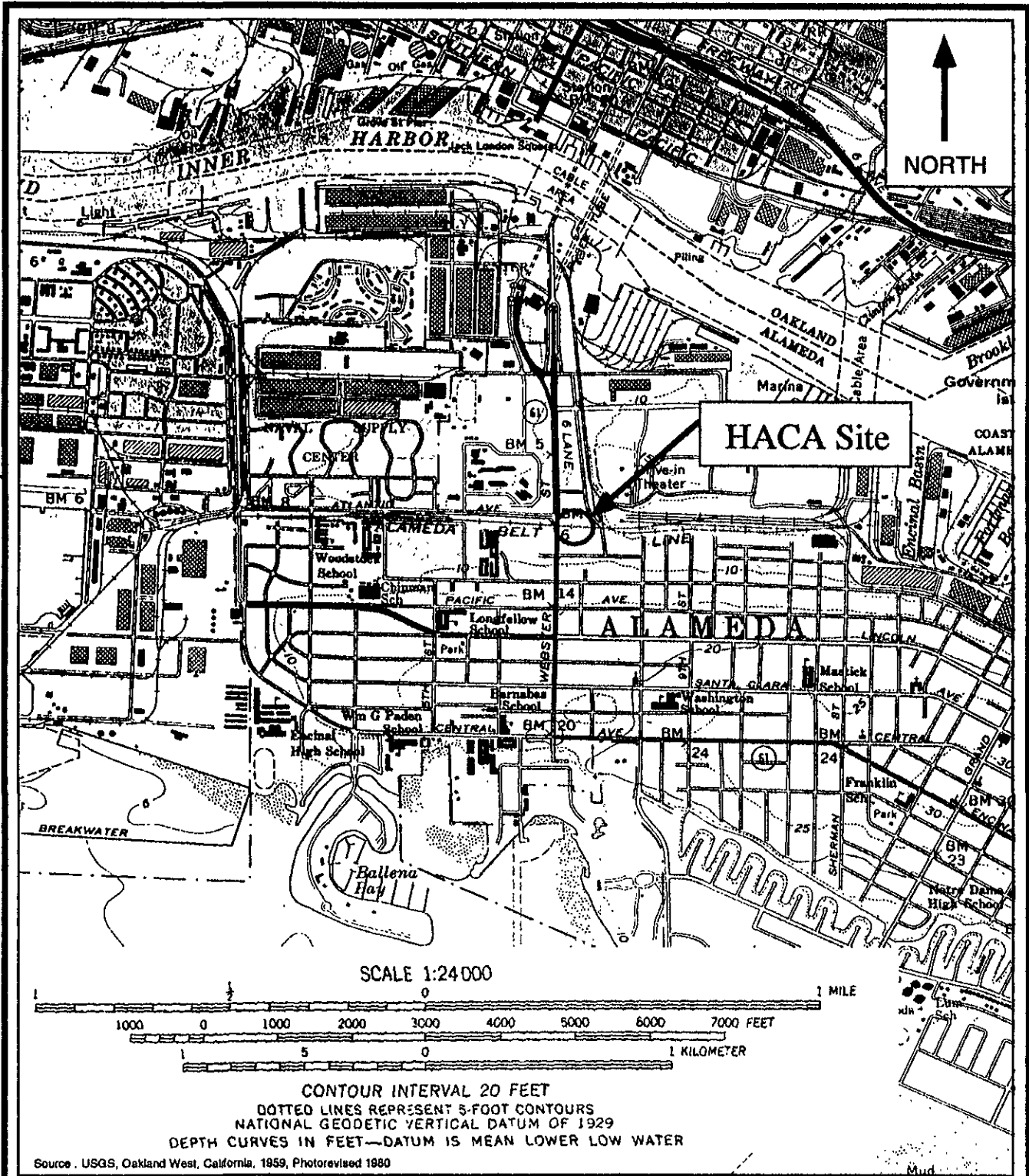
Aqua Science Engineers, Inc., October 16, 1986, Soil and Water Quality Treatment Summary and Recommendations - A Final Report.

Davis, S.N., 1966, Hydrogeology Field Trip East Bay Area and Northern Santa Clara Valley, in Geology of Northern California: California Division of Mines and Geology, Bulletin 190, p. 465-471.

Norris, R.M. and Webb, R.W., 1990, Geology of California: John Wiley and Sons, New York, 541 p.

U.S. Geological Survey Topographical Map, 7.5 Minute Series, Oakland West, California Quadrangle, 1959 (Photorevised 1980).

Versar, Inc., March 22, 1991, Work Plan for the Subsurface Evaluation at 1916 Webster Street, Alameda, California.



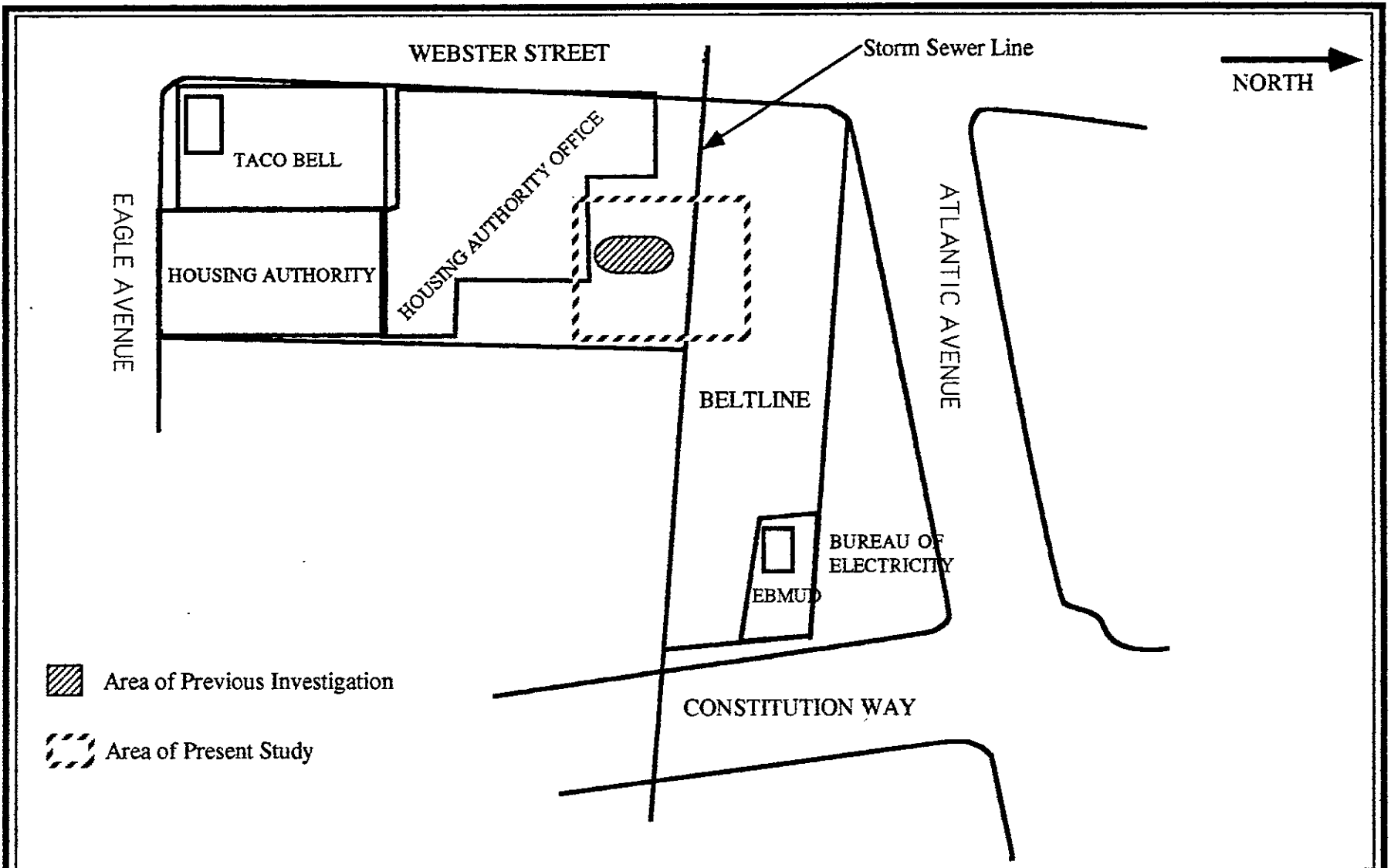
SITE VICINITY MAP


Figure 1.


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Housing Authority of the City of Alameda
Alameda, California

Versar Inc.



 Area of Previous Investigation

 Area of Present Study

Not to Scale

SITE LOCATION MAP

Figure 2

Project No.
7703.022

Housing Authority of the City of Alameda
Alameda, California

Versar Inc.



LEGEND

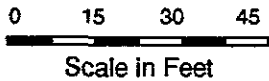
- Monitoring Well
- Borehole Location
- Soil Sample Location
- ▨ Excavated Area
- ▩ Previous Location of UST

Housing Authority
Main Building

STREET ACCESS
8th Street

STREET ACCESS
Webster Street

Reported Direction of
Ground-Water Flow



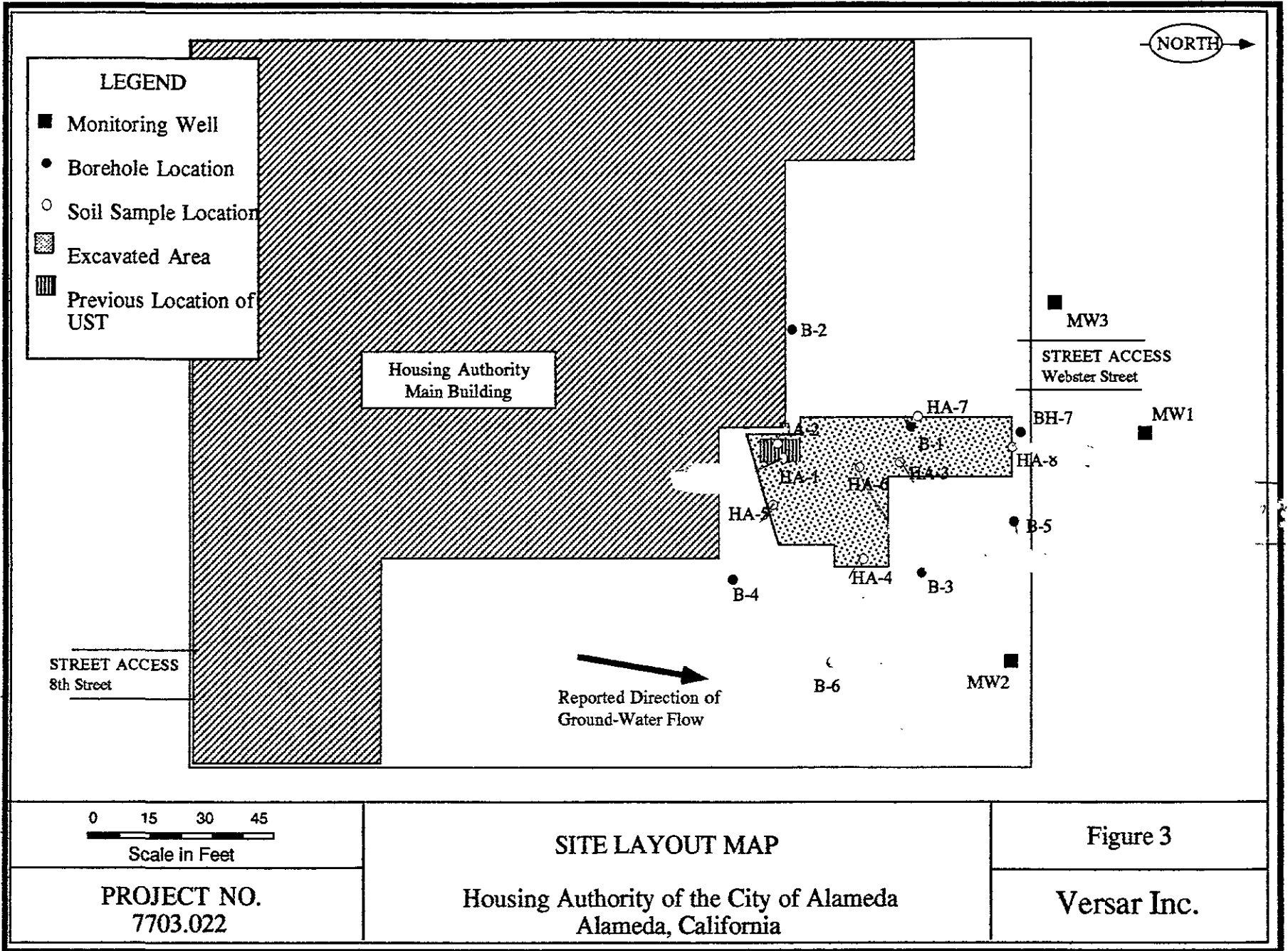
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7703.022

SITE LAYOUT MAP

Housing Authority of the City of Alameda
Alameda, California

Figure 3

Versar Inc.





LEGEND

- Monitoring Well
 - Borehole Location
 - ▨ Excavated Area
 - ▩ Previous Location of UST
- GWSE: Ground-Water Surface Elevation

Housing Authority
Main Building

STREET ACCESS
8th Street

Hydrologic Gradient

GWSE: 4.94 ft.

MW3

STREET ACCESS
Webster Street

MW1

GWSE: 4.31 ft.

MW2

GWSE: 5.24 ft.

0 15 30 45

Scale in Feet

**GROUND-WATER ELEVATION WITH
HYDROLOGIC GRADIENT, JULY, 1991**

Housing Authority of the City of Alameda
Alameda, California

Figure 4

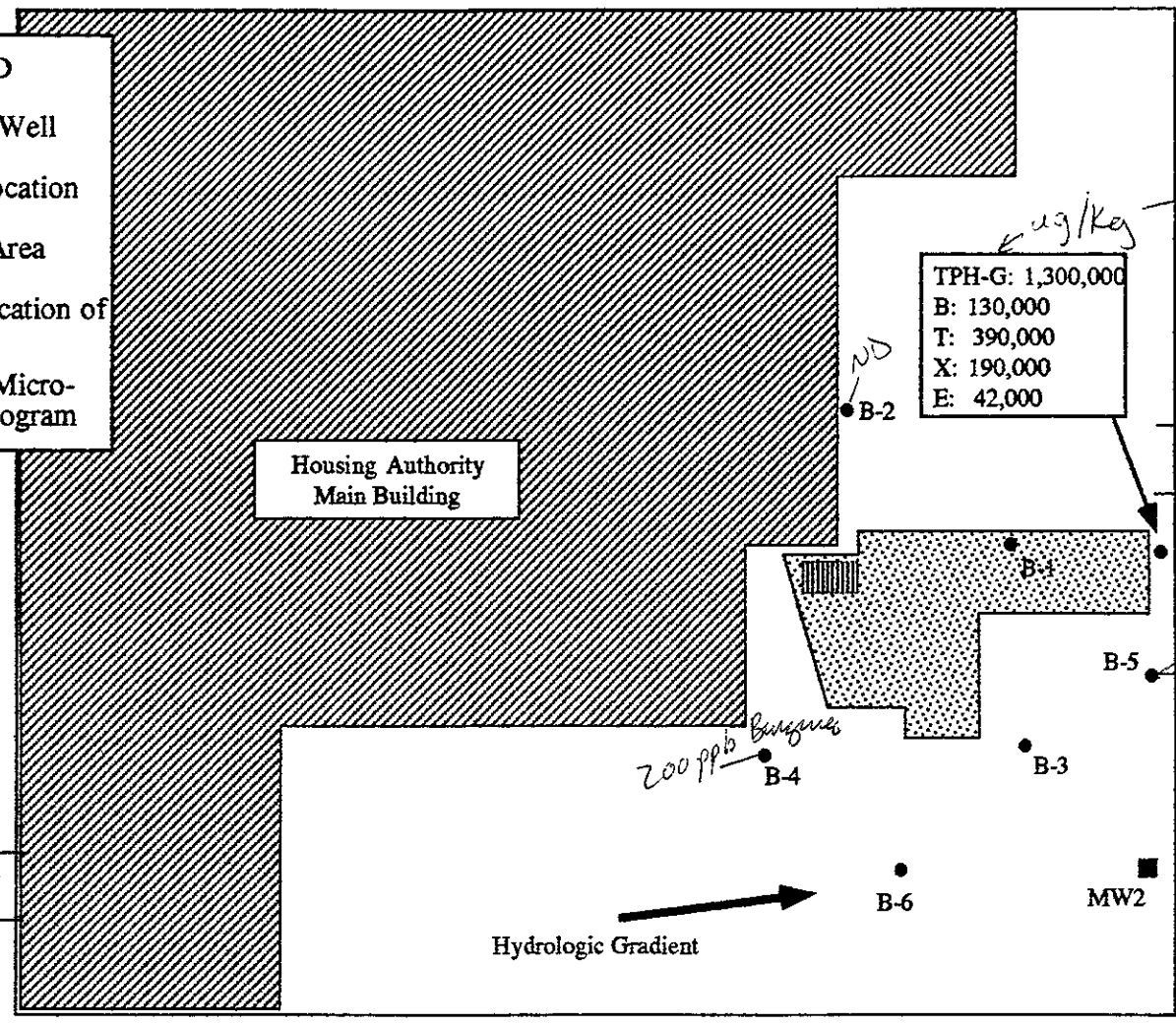
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7703.022



LEGEND

- Monitoring Well
 - Borehole Location
 - ▨ Excavated Area
 - ▩ Previous Location of UST
- All Results in Micrograms per Kilogram



← ug/kg

TPH-G: 1,300,000
 B: 130,000
 T: 390,000
 X: 190,000
 E: 42,000

TPH-G: ND
 B: ND
 T: 5.2
 X: 45
 E: 8.6

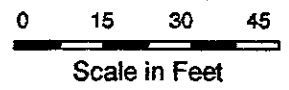
20,000 ppb TPH in the
 700 ppb, 1,260 ppb Benzene in the

STREET ACCESS
 8th Street

STREET ACCESS
 Webster Street

Housing Authority
 Main Building

Hydrologic Gradient →



**LABORATORY ANALYTICAL RESULTS
 FROM SOIL SAMPLES**

Housing Authority of the City of Alameda
 Alameda, California

Figure 5

Versar Inc.

PROJECT NO.
 7703.022



LEGEND

- Monitoring Well
 - Borehole Location
 - ▨ Excavated Area
 - ▩ Previous Location of UST
- All Results in Micrograms per Liter

TPH-G: ND
B: ND
T: ND
X: ND
E: ND

MW3

STREET ACCESS
Webster Street

Housing Authority
Main Building

TPH-G: ND
B: ND
T: ND
X: ND
E: ND

MW1

BH-7

B-5

B-3

MW2

ug/l
TPH-G: ND
B: 3.7
T: ND
X: 5.1
E: 0.50

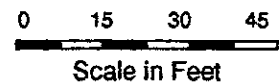
B-4

B-3

B-6

Hydrologic Gradient

STREET ACCESS
8th Street



**LABORATORY ANALYTICAL RESULTS
FROM GROUND-WATER SAMPLES**

Housing Authority of the City of Alameda
Alameda, California

Figure 6

PROJECT NO.
7703.022

Versar Inc.

91 NOV -5 11:13

November 4, 1991

Mr. Lowell J. Miller
Senior Hazardous Materials Specialist
Alameda County Health Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Reference: Site Investigation at 1916 Webster Street,
Alameda, California; Versar Job No. 7703.022

Dear Mr. Miller:

Enclosed please find one (1) copy of Versar's report of the site investigation conducted at the subject property. The investigation was performed for the Housing Authority of the City of Alameda, on whom's behalf, Versar is submitted this report.

If you have any questions or require additional information, please do not hesitate to call me at (916) 962-1612.

Very truly yours,



Michael P. Sellens
Project Manager
R.G. #4714

cc: Mr. Don Gilmore HAA (letter only)

Table 1

Summary of Excavation and Borehole
Soil Sampling Analytical Results
at HACA Site (July - August, 1986)

Alameda, California

Sample ID	Location	EPA Method 5020\8015	EPA Method 5020/8020		
		TPH-G ¹	Benzene ¹	Toluene ¹	Xylene ¹
HA #1	excavation	3420	38.5	159	649
HA #2	excavation	2060	18.8	94.2	379
HA #3	excavation	5000	56	230	168
HA #4	excavation	38	0.268	0.122	0.315
HA #5	excavation	3.4	0.224	0.113	0.160
HA #6	excavation	2.1	0.341	0.016	0.010
B1A	borehole	4200	0.022	0.222	0.453
B2A	borehole	<0.10	0.003	0.003	0.003
B3A	borehole	28	0.355	0.177	0.322
B4A	borehole	<0.1	<0.005	<0.005	0.005
B5A	borehole	0.70	0.024	0.061	0.058
B6A	borehole	0.70	0.014	0.022	0.020
W1A	borehole	0.060	0.014	0.022	0.057
W2A	borehole	<0.050	0.003	0.008	0.003
HA7	excavation	38	0.12	0.97	1.8
HA8	excavation	3700	28	260	360

¹Results reported in milligrams per kilogram (mg/kg)
Reporting limits: TPH - unknown?; benzene - 0.2 ug/L;
toluene - 0.2 ug/L; xylene - unknown? (micrograms per liter
(ug/L)

Table 2

Summary of Borehole and Monitoring Well
Ground-Water Sampling Analytical Results
at HACA Site (July - August, 1986)

Alameda, California

Sample ID	Location	EPA Method 5020/8015	EPA Method 5020/8020		
		TPH-G ¹	Benzene ¹	Toluene ¹	Xylene ¹
B-1	borehole	37	5.1	5.2	1.3
B-2	borehole	<0.050	<0.001	<0.001	<0.001
B-3	borehole	<0.050	<0.001	0.003	0.004
B-4	borehole	<0.050	0.20	0.003	0.005
B5	borehole	20	1.26	0.033	0.32
B6	borehole	0.050	0.005	0.003	0.024
W1	monitoring well (MW1)	<0.050	0.003	0.003	0.006
W2	monitoring well (MW2)	0.29	<0.010	0.006	0.009

¹Results reported in milligrams per liter (mg/L)
Reporting limits: TPH - unknown?; benzene - 0.2 ug/L;
(micrograms per liter (ug/L))

Table 3

Summary of Borehole Soil Sampling
Analytical Results
at HACA Site (July, 1991)

Alameda, California

EPA Method 5030/ DHS Method		EPA Method 5030/Modified 8020			
Sample ID	TPH-G ¹	Benzene ¹	Toluene ¹	Xylenes ¹	Ethylbenzene ¹
MW3-2 ²	ND ³	ND	ND	ND	ND
MW3-4 ²	ND	ND	5.2	45	8.6
B7-2 ⁴	1,300,000	130,000	390,000	190,000	42,000
B7-4 ⁵	59,000	2,200	6,400	7,300	2,100

¹Results reported in micrograms per kilogram (ug/kg)

²Reporting limits: TPH-G - 500 ug/kg; benzene - 5.0 ug/kg;
toluene - 5.0 ug/kg; xylenes - 15 ug/kg; ethylbenzene - 5.0 ug/kg

³ND - not detected at or above the reporting limit

⁴Reporting limits: TPH-G - 48,000 ug/kg; benzene - 2,300 ug/kg;
toluene - 4,200 ug/kg; xylenes - 16,000 ug/kg; ethylbenzene - 3,500 ug/kg

⁵Reporting limits: TPH-G - 9,700 ug/kg; benzene - 460 ug/kg;
toluene - 840 ug/kg; xylenes - 3,200 ug/kg; ethylbenzene - 690 ug/kg

Table 4

Summary of Ground-Water Sampling
Analytical Results
at HACA Site (July, 1991)

Alameda, California

EPA Method 5030/ DHS Method		EPA Method 5030/Modified 8020			
Sample ID	TPH-G ¹	Benzene ¹	Toluene ¹	Xylenes ¹	Ethylbenzene ¹
MW1	ND ²	ND	ND	ND	ND
MW2	ND	3.7	ND	5.1	0.50
MW3	ND	ND	ND	ND	ND

¹Results reported in micrograms per liter (ug/L)Reporting limits: TPH-G - 50 ug/L; benzene - 0.5 ug/L;
toluene - 0.5 ug/L; xylenes - 1.5 ug/L; ethylbenzene - 0.50 ug/L²ND - not detected at or above the reporting limit

APPENDIX

STAGE ONE SITE ASSESSMENT OF THE
HOUSING AUTHORITY OF THE
CITY OF ALAMEDA SITE AT
1916 WEBSTER STREET
ALAMEDA, CALIFORNIA

- Appendix A. Monitoring Well Permit
- Appendix B. Drilling Logs of Boreholes
Drilled During July, 1991 Site
Assessment
- Appendix C. Well Construction Record
of Monitoring Well
Installed
- Appendix D. Test Data for Monitoring Wells
Developed and Purged
During July, 1991 Site
Assessment
- Appendix E. Laboratory Analytical
Results and Chain-of-
Custody for Soil Samples
Collected During July,
1991 Site Assessment
- Appendix F. Laboratory Analytical
Results and Chain-of-
Custody for Water Samples
Collected During July,
1991 Site Assessment

APPENDIX A

Monitoring Well Permit



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

6997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588 (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

LOCATION OF PROJECT 1916 Webster Street Alameda, California

PERMIT NUMBER 91380 LOCATION NUMBER

CLIENT Name Housing Authority of The City of Alameda Address 701 Atlantic Ave. Phone (415) 522-8422 City Alameda Zip 94501

PERMIT CONDITIONS

Circled Permit Requirements Apply

APPLICANT Name Michael P. Sellans Vesper Inc. Ste. 228 Address 5330 Primrose Dr. Phone 916-962-1612 City Fair Oaks, Calif. Zip 95628

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. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects. 3. 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. 2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

- C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings. D. CATHODIC. Fill hole above anode zone with concrete placed by tremie. E. WELL DESTRUCTION. See attached.

TYPE OF PROJECT Well Construction Geotechnical Investigation Cathodic Protection General Water Supply Contamination Monitoring X Well Destruction

PROPOSED WATER SUPPLY WELL USE Domestic Industrial Other Sampling Municipal Irrigation

DRILLING METHOD: Mud Rotary Air Rotary Auger X Casing Other

DRILLER'S LICENSE NO. 581639 (C-57)

WELL PROJECTS Drill Hole Diameter 8 in. Maximum Casing Diameter 2 in. Depth 15 ft. Surface Seal Depth 3 ft. Number 1

GEOTECHNICAL PROJECTS Number of Borings Maximum Hole Diameter in. Depth ft.

ESTIMATED STARTING DATE July 12, 1991 ESTIMATED COMPLETION DATE July 12, 1991

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

APPLICANT'S SIGNATURE Michael P. Sellans Date 7/8/91

Approved Wyman Hong Date 8 Jul 91 Wyman Hong

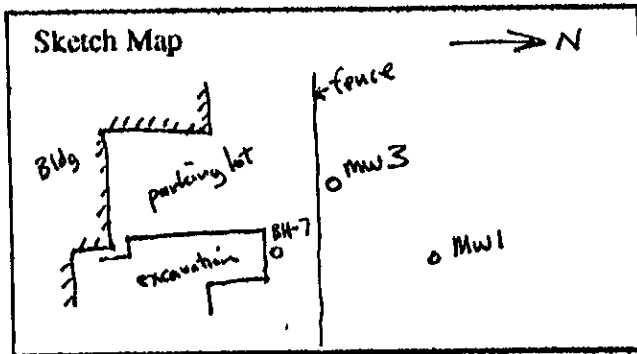
APPENDIX B

Drilling Logs of Boreholes Drilled
During July, 1991 Site Assessment

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'

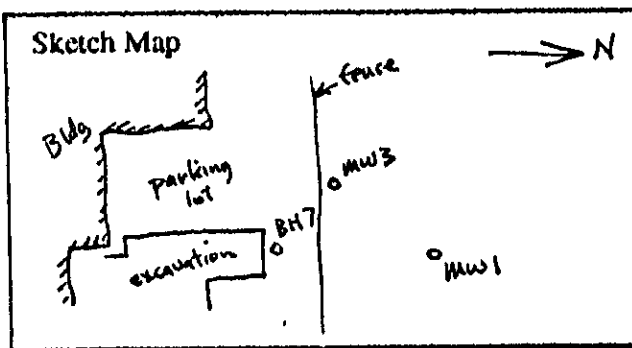


Depth (ft)	Advanced/Recovered	Blow Counts per Six inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)	OVA Reading (heads space) ppm
					surface - asphalt Gravel to 2 feet clay - "bay mud"	5
5'		1-3-5	▼		clay - dark gray to black, moist, moderate odor sand - gray, medium grained, clayey, wet, no odor water table by samples	39
		4-4-3	▼		broke through something right @ 6 feet (by driller)	
		4-8-12			sand - gray, med. grained, moderately sorted, clayey, moist-wet, no odor	1.6
10'		17-22-27			sand - orange-brown to gray, med. grained, mod. sorted, clayey, less wet, plant material (roots), no odor	0
		12-24-33			sand - orange-brown, med. grained, mod. sorted, moist, no odor	1.2
		10-16-25			sand - orange-brown, med. grained, mod. sorted, wet, no odor	1.0
15'					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 @ 12:20 PM, 7-12-91						

DRILLING LOG

Job Number 7703.022

Project ALAMEDA HOUSING / HACA
 Location WEBSTER & ATLANTIC, ALAMEDA, CA
 Borehole Number BH-7
 Date Drilled 7-12-91
 Contractor WOODWARD DELG. CO.
 Drilling Method HOLLOW STEM AUGER
 Driller WAYNE WOODWARD
 Hole Diameter 6"
 Log By JAMES G. JENSEN
 Total Depth 5 1/2 ft.

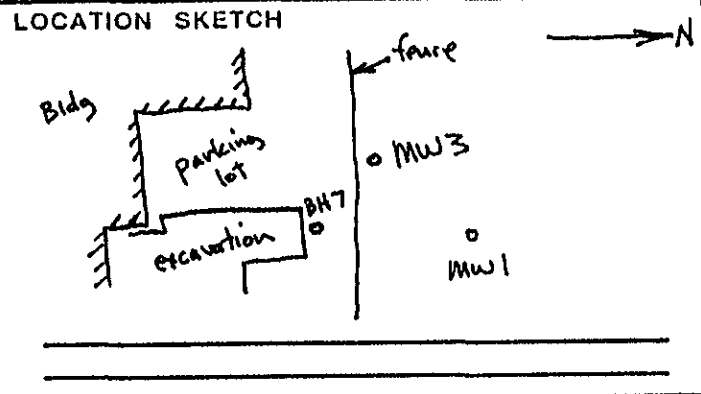


Depth (ft)	Advanced/Recovered	Blow Counts per Six inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2		3-2-2			Surface - asphalt (parking lot); chd gravel (?) to 6" Sand - dark gray Sample: B7-2: sand - dark gray, medium grained, damp, 1000 ⁺ ppm fairly strong hydrocarbon odor, slight sheen on water when washing sampling tools.
3.5					
4		1-1-2			sand - dark gray, med. grained, moderately sorted, damp, 320 ppm fairly strong odor (as above)
5					Sample: B7-4 @ 5 1/2 feet (bottom tube) sand - medium gray, medium grained, clayey, wet, no odor Total Depth: 5 1/2 feet, reached @ 11 Am 7-12-91 Water Table: 5', estimated by samples
5.5					
10'					Notes: Borehole 7 was drilled about 3' north of the edge of the excavation.
					<i>James G. Jensen</i>

APPENDIX C

Well Construction Record of Monitoring Well Installed

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. KLEINER PROTECTOR CASING ELEVATION: _____
 DRILLING CONTRACTOR: WOODWARD DRILLING CO.
 DRILLER: W. WOODWARD LICENSE NO. C-57/581639
 DRILLING METHOD: HOLLOW STEM AUGER
 RIG TYPE: MOBILE 8-57
 CONDITION OF GROUND SURFACE: WEATHERED PAVEMENT
 FORMATION SCREENED: _____



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 @ 12:20 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: _____

Jensen

APPENDIX D

Test Data for Monitoring Wells Developed and Purged
During July, 1991 Site Assessment

vol calculation
 $(4.93 - 4.92) = 0.01 \times 17 = 1.70$

WELL No.	DATE (M/D)	DEPTH of WELL	DEPTH TO WATER (ft)			TIME			PURGE VOLUME (gals)	NOTES
			BP	AP	BS	SP	EP	SS		
MW 1	7-16-91	14.93	4.92	4.58	4.69'	1 1/2 hrs			12 gal total	Purging
						↑ recovered in ≈ 20 min.				



Alameda Housing 7703.22
 Monitoring Well Purging Table

James J. Juan
 Field Representative Signature

2

WELL No. <small>7-16-91</small>	DEPTH (ft)	TEMP (°F)	pH	Cond (mho/cm)	O.V.A (ppm)	SHEEN	ODOR	FREE Product	TURBID (NTU)	Cumm. Volume Purged (gals)	NOTES
MW1	4.92	68°F	7.3	1900	—	none	none	none	cloudy	2.0	Purging
		66°	7.3	1800	—	none	none	none	cloudy	4.0	"
		66°	7.4	1600	—	none	none	none	becoming less cloudy fairly clear	6.0	"
		66°	7.4	1600	—	none	none	none	⊕ bottom of boiler "	8.0	"
		66°	7.4	1500	—	none	none	none	fluid in boiler more clear overall	10.0	"
	6.58'	66°	7.4	1500	—	none	none	none	fluid in boiler more clear	12.0	"
Sample	4.65'	68°	7.4	1400	—	"	"	"	clear		Sample @ 2:15 PM MW1 7-16-91

DATE: 7-16-91 LOCATION: Alameda Housing 7703.22



Ground Water Monitoring Data Sheet

James J. Jensen
Field Representative Signature

well volume calculation: $(12.85 - 4.76) \times 1.11 = 11.28 \text{ gal}$
 8.09

WELL No.	DATE (M/D)	DEPTH of WELL	DEPTH TO WATER (ft)			TIME			PURGE VOLUME (gals)	NOTES
			BP	AP	BS	SP	EP	SS		
WW2	7-16-91	12.85'	4.76	9.44			1 1/2 hr		12 gal Total	
										5.67 in 1 hour 5.23 = 90% rec.
										5.47 (1 hr 15 min) - spl wtr level



Alameda Housing 7703.22
 Monitoring Well Purging Table

James H. Jensen
 Field Representative Signature

(2)

X

MW 3 - dr. brown (or color)
mw 1 - or. brn cloudy color

WELL No.	DEPTH (ft)	TEMP (C) F	pH	Cond (mho/cm)	O.V.A. (ppm)	SHEEN	ODOR	FREE Product	TURBID (NTU)	Cumm. Volume Purged (gals)	NOTES
MW 2	4.76 4.76'	70°F	7.6	4000	—	none	trace of hydro-odor	none	cloudy	2.0	FT boiler - rusty red color subseq. - grey
		70°F	7.7	4100	—	trace of slm atm entering in duct	trace hydro-odor	"	"	4.0	grey gm cloudy
		70°F	7.7	4100	—	trace (aa) seems to break out often few	"	"	"	6.0	"
		70°F	7.7	4000	—	"	tr odor (o.a.)	"	"	8.0	"
		68°F	7.8	3900	—	"	"	"	"	10.0	"
	9.44'	68°F	7.8	36 3900	—	"	"	"	cloudy	12.0	"
	5.41	71°F	7.7	3700	—	none	trace odor	"	clean - orange		sample taken @ 3:25 PM orange colored - send to react w/ preserved H ₂ O in 40 ml vials
											MW 2

DATE: 7-16-91 LOCATION: Alameda Housing 7703.22



MW 2 - initial covered by 2 piles of dirt - grey pile & a brown pile
Don Gilmore "clean-fill"
Ground Water Monitoring Data Sheet

[Signature]
Field Representative Signature

6.25 - 0.50 - 1.00 - 1.50 - 2.00 - 2.50 - 3.00

$$14.41 - 4.50 = 9.91 \times .17 = 1.68 \text{ gal}$$

WELL No.	DATE (M/D)	DEPTH of WELL	DEPTH TO WATER (ft)			TIME			PURGE VOLUME (gals)	NOTES
			BP	AP	BS	SP	EP	SS		
MW 3	7-16-91	14.41	4.50	9.20	4.00	1 1/2 hrs		10 gal	undeveloped well	

Sample water level recovered in about 20 min.



Alameda Housing 7703.02
Monitoring Well Purging Table

James L. Jensen
Field Representative Signature

(2)

WELL No.	DEPTH (ft)	TEMP (C)	pH	Cond (mho/cm)	O.V.A. (ppm)	SHEEN	ODOR	FREE Product	TURBID (NTU)	Cumm. Volume Purged (gals)	NOTES
MW 3	4.50	60°F	7.7	2000	—	NONE	NONE	NONE	CLOUDY	2.0	DEVELOPING
MW 3		66 63°F	7.8	1900	—	NONE	NONE	NONE	CLOUDY	4.0	"
MW 3		66 63°F	7.8	1900	—	NONE	NONE	NONE	CLOUDY	6.0	"
MW 3		66 63°F	7.6	2100	—	"	"	"	"	8.0	PURGING
MW 3		66 63°F	7.6	2200	—	"	"	"	"	10.0	↓
MW 3		66 63°F	7.6	2200	—	"	"	"	"	12.0	
MW 3		66 63°F	7.6	2200	—	"	"	"	"	14.0	
MW 3	9.20	66 63°F	7.6	2200	—	"	"	"	"	16.0	
"	4.66	71°F	7.5	1600	—	"	"	"	"	Sample MW 3	

me -
100mm

DATE: 7-16-91 LOCATION: Alameda Housing 7703.22



Ground Water Monitoring Data Sheet

[Handwritten Signature]
Field Representative Signature

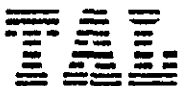
APPENDIX E

Laboratory Analytical Results and Chain-of-Custody for Soil
Samples Collected During July, 1991 Site Assessment

Trace Analysis Laboratory, Inc.

3423 Investment Boulevard, #8 • Hayward, California 94545

Telephone (415) 783-6960
Facsimile (415) 783-1512



August 01, 1991

Mr. James Jensen
Versar, Inc.
5330 Primrose Drive, Suite 228
Fair Oaks, California 95628

Dear Mr. Jensen:

Trace Analysis Laboratory received four soil samples on July 12, 1991, for your Project No. 7703.22,AH (our custody Log Number 1107).

Samples MW3-2, MW3-4, B7-2 and B7-4 were analyzed for Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Xylenes and Ethylbenzene. Our analytical report, the completed chain of custody form, and our analytical methodologies are enclosed for your review.

Trace Analysis Laboratory is certified under the California Environmental Laboratory Accreditation Program. Our certification number is 1199.

If you should have any questions or require additional information, please call me.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Jennifer Pekol'. The signature is written in a cursive, flowing style.

Jennifer Pekol
Project Specialist

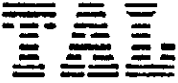
Enclosures

Trace Analysis Laboratory, Inc.

3423 Investment Boulevard, #8 • Hayward, California 94545

Telephone (415) 783-6960

Facsimile (415) 783-1512



LOG NO.: 1107
 DATE SAMPLED: 7/12/91
 DATE RECEIVED: 7/12/91
 DATE EXTRACTED: 7/17/91
 DATE ANALYZED: 7/20/91 and 7/25/91
 DATE REPORTED: 8/01/91

CUSTOMER: Versar, Inc.
 REQUESTER: James Jensen
 PROJECT: No. 7703.22, AH

Sample Type: Soil

Method and Constituent	Units	MW3-2		MW3-4		B7-2	
		Concentration	Reporting Limit	Concentration	Reporting Limit	Concentration	Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	ND	500	ND	500	1,300,000	48,000
Modified EPA Method 8020:							
Benzene	ug/kg	ND	5.0	ND	5.0	130,000	2,300
Toluene	ug/kg	ND	5.0	5.2	5.0	390,000	4,200
Xylenes	ug/kg	ND	15	45	15	190,000	16,000
Ethylbenzene	ug/kg	ND	5.0	8.6	5.0	42,000	3,500

Why diff. detection limit?

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NO.: 1107
 DATE SAMPLED: 7/12/91
 DATE RECEIVED: 7/12/91
 DATE EXTRACTED: 7/17/91
 DATE ANALYZED: 7/20/91
 DATE REPORTED: 8/01/91
 PAGE: Two

Sample Type: Soil


Method and Constituent	Units	B7-4		Method Blank	
		Concentration	Reporting Limit	Concentration	Reporting Limit
DHS Method:					
Total Petroleum Hydrocarbons as Gasoline	ug/kg	59,000	9,700	ND	500
Modified EPA Method 8020:					
Benzene	ug/kg	2,200	460	ND	5.0
Toluene	ug/kg	6,400	840	ND	5.0
Xylenes	ug/kg	7,300	3,200	ND	15
Ethylbenzene	ug/kg	2,100	690	ND	5.0

QC Summary:

% Recovery: 130 and 80*
 % RPD: 19 and 20

* The recovery is for the laboratory control sample, due to interference in the spiked sample.

Concentrations reported as ND were not detected at or above the reporting limit.


 Louis W. DuPuis
 Quality Assurance/Quality Control Manager

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPH-G) FOR SOIL,
BY PURGE AND TRAP

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative column, flow rate, and temperature program as specified below.

Sample Preparation:

Approximately 15 grams of the soil sample are added to 10 ml of methanol. The sample is extracted by agitation.

Sample Introduction:

Methanol extracts are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A flame ionization detector (FID) is used to detect total petroleum hydrocarbons as gasoline (TPH-G). The FID is preceded by a photoionization detector (PID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240° C
DETECTOR TEMPERATURE:	270° C
INITIAL TEMPERATURE:	50° C
Hold for 2 minutes	
PROGRAM RATE:	6° C/min.
FINAL TEMPERATURE:	90° C
Hold for 17 minutes	

Calculation:

Total Petroleum Hydrocarbons as Gasoline is quantified by comparing the sum of the area of peaks from the sample to the sum of the area of peaks in the gasoline standard.

3/13/91



BENZENE, TOLUENE, XYLENES, AND ETHYLBENZENE (BTXE) FOR SOIL,
BY PURGE AND TRAP

Method:

This method is EPA Method 8020 as referenced in the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative carrier gas as specified below.

Sample Preparation:

Approximately 15 grams of the soil sample are added to 10 ml of methanol. The sample is extracted by agitation.

Sample Introduction:

Methanol extracts are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A photoionization detector (PID) is used to detect BTXE. The PID is followed by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240 ^o C
DETECTOR TEMPERATURE:	270 ^o C
INITIAL TEMPERATURE:	50 ^o C
	Hold for 2 minutes
PROGRAM RATE:	6 ^o C/min.
FINAL TEMPERATURE:	90 ^o C
	Hold for 17 minutes

Calculation:

BTXE are identified by comparing the retention times of the sample peaks to those of the standards. BTXE are quantified by comparing the area of the sample peaks to those of the standards. If BTX or E is present and Total petroleum Hydrocarbons as Gasoline (TPH-G) is not, the analysis is confirmed by using a second column or a gas chromatograph mass spectrometer (GC/MS).

3/13/91

Run as per Tom Jensen 7/15/91

PROJECT NO. 7703.22		PROJECT NAME AH				PARAMETERS					INDUSTRIAL HYGIENE SAMPLE Y N		
SAMPLERS: (Signature) <i>[Signature]</i>				(Printed) JAMES G. JENSEN								REMARKS	
FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TPH	TPH/100	TPH/1000	TPH/10000	TPH/100000	REMARKS	
MW3-2	7/12/91	1010		✓		1	X					Hold	
MW3-4	7/12/91	1015		✓		1	X					Hold	
MW3-6	7/12/91	1020		✓		1						Hold	
MW3-8	7/12/91	1025		✓		1						Hold	
MW3-10	7/12/91	1030		✓		1						Hold	
MW3-12	7/12/91	1035		✓		1						Hold	
MW3-14	7/12/91	1040		✓		1						Hold	
B7-2	7/12/91	1145		✓		1	X					Hold	
B7-4	7/12/91	1155		✓		1	X					Hold	
						Soil 1 BTea, ice Y-4 M							
						1 day TAT							
Relinquished by: (Signature) <i>[Signature]</i>			Date / Time 7-12-91 145P		Received by: (Signature) <i>[Signature]</i>			Relinquished by: (Signature) <i>[Signature]</i>		Date / Time		Received by: (Signature) <i>[Signature]</i>	
(Printed) JAMES G. JENSEN					(Printed)			(Printed)				(Printed)	
Relinquished by: (Signature) <i>[Signature]</i>			Date / Time		Received for Laboratory by: (Signature) FORTAB <i>[Signature]</i>			Date / Time 7-12-91 2:45P		Remarks Hold samples for confirmation			
(Printed)					(Printed)								

APPENDIX F

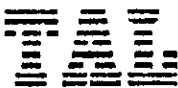
Laboratory Analytical Results and Chain-of-Custody for Water
Samples Collected During July, 1991 Site Assessment

Trace Analysis Laboratory, Inc.

3423 Investment Boulevard, #8 • Hayward, California 94545

Telephone (415) 783-6960

Facsimile (415) 783-1512



August 01, 1991

Mr. James Jensen
Versar, Inc.
5330 Primrose Drive, Suite 228
Fair Oaks, California 95628

Dear Mr. Jensen:

Trace Analysis Laboratory received three water samples on July 16, 1991, for your Project No. 7703.22 Alameda Housing (our custody Log Number 1120).

These samples were analyzed for Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Xylenes and Ethylbenzene. Our analytical report, the completed chain of custody form, and our analytical methodologies are enclosed for your review.

Trace Analysis Laboratory is certified under the California Environmental Laboratory Accreditation Program. Our certification number is 1199.

If you should have any questions or require additional information, please call me.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Jennifer Pekol'. The signature is written in a cursive, flowing style.

Jennifer Pekol
Project Specialist

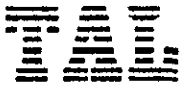
Enclosures

Trace Analysis Laboratory, Inc.

3423 Investment Boulevard, #8 • Hayward, California 94545

Telephone (415) 783-6960

Facsimile (415) 783-1512



LOG NO.: 1120
DATE SAMPLED: 7/16/91
DATE RECEIVED: 7/16/91
DATE ANALYZED: 7/19/91
DATE REPORTED: 8/01/91

CUSTOMER: Versar, Inc.
REQUESTER: James Jensen
PROJECT: No. 7703.22, Alameda Housing

Sample Type: Water

Method and Constituent	Units	MW1		MW2		MW3	
		Concen- tration	Reporting Limit	Concen- tration	Reporting Limit	Concen- tration	Reporting Limit
DHS Method:							
Total Petroleum Hydro- carbons as Gasoline	ug/l	ND	50	ND	50	ND	50
Modified EPA Method 8020:							
Benzene	ug/l	ND	0.50	3.7	0.50	ND	0.50
Toluene	ug/l	ND	0.50	ND	0.50	ND	0.50
Xylenes	ug/l	ND	1.5	5.1	1.5	ND	1.5
Ethylbenzene	ug/l	ND	0.50	0.50	0.50	ND	0.50

Concentrations reported as ND were not detected at or above the reporting limit.

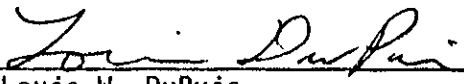
LOG NO.: 1120
 DATE SAMPLED: 7/16/91
 DATE RECEIVED: 7/16/91
 DATE ANALYZED: 7/19/91
 DATE REPORTED: 8/01/91
 PAGE: Two

Sample Type: Water

Method and Constituent	Units	Method Blank	
		Concentration	Reporting Limit
DHS Method:			
Total Petroleum Hydrocarbons as Gasoline	ug/l	ND	50
Modified EPA Method 8020:			
Benzene	ug/l	ND	0.50
Toluene	ug/l	ND	0.50
Xylenes	ug/l	ND	1.5
Ethylbenzene	ug/l	ND	0.50

QC Summary:
 % Recovery: 96
 % RPD: 6.2

Concentrations reported as ND were not detected at or above the reporting limit.



 Louis W. DuPuis
 Quality Assurance/Quality Control Manager

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPH-G) FOR WATER,
BY PURGE AND TRAP

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative column, flow rate, and temperature program as specified below.

Sample Preparation:

There is no sample preparation other than dilution.

Sample Introduction:

Water samples are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap. Up to 5 ml of sample is purged by this method.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A flame ionization detector (FID) is used to detect total petroleum hydrocarbons as gasoline (TPH-G). The FID is preceded by a photoionization detector (PID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240 ^o C
DETECTOR TEMPERATURE:	270 ^o C
INITIAL TEMPERATURE:	50 ^o C
Hold for 2 minutes	
PROGRAM RATE:	6 ^o C/min.
FINAL TEMPERATURE:	90 ^o C
Hold for 17 minutes	

Calculation:

Total Petroleum Hydrocarbons as Gasoline is quantified by comparing the sum of the area of peaks from the sample, to the sum of the area of peaks in the gasoline standard.

1/2/90

**BENZENE, TOLUENE, XYLENES, AND ETHYLBENZENE (BTXE) FOR WATER,
BY PURGE AND TRAP**

Method:

This method is EPA Method 8020 as referenced in the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative carrier gas as specified below.

Sample Preparation:

There is no sample preparation other than dilution.

Sample Introduction:

Water samples are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A photoionization detector (PID) is used to detect BTXE. The PID is followed by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240 ^o C
DETECTOR TEMPERATURE:	270 ^o C
INITIAL TEMPERATURE:	50 ^o C
	Hold for 2 minutes
PROGRAM RATE:	6 ^o C/min.
FINAL TEMPERATURE:	90 ^o C
	Hold for 17 minutes

Calculation:

BTXE are identified by comparing the retention times of the sample peaks to those of the standards. BTXE are quantified by comparing the area of the sample peaks to those of the standards. If BTX or E is present and Total petroleum Hydrocarbons as Gasoline (TPH-G) is not, the analysis is confirmed by using a second column or a gas chromatograph mass spectrometer (GC/MS).

1/2/90

Specimen Jensen 7/17/91

PROJECT NO. 7703.22		PROJECT NAME ALAMEDA HOUSING					PARAMETERS										INDUSTRIAL HYGIENE SAMPLE	Y				
SAMPLERS: (Signature) <i>[Signature]</i>					(Printed) JAMES G. JENSEN					NO. OF CONTAINERS TPHG/BIBX TPH [Diagonal lines]										REMARKS		
FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION																	
MW1	7-16-91	2:15P		✓	Mon. well #1					4	X											log 1120 Hold Hold Hold 1-12, 3-40ml/HClcc white <i>[Signature]</i>
MW2	7-16-91	3:25P		✓	Mon. well #2					4	X											
MW3	7-16-91	11:55A		✓	Mon. Well #3					4	X											
Relinquished by: (Signature)			Date / Time		Received by: (Signature)			Relinquished by: (Signature)			Date / Time		Received by: (Signature)									
(Printed)					(Printed)			(Printed)					(Printed)									
Relinquished by: (Signature)			Date / Time		Received for Laboratory by: (Signature)			Date / Time		Remarks												
<i>[Signature]</i>			7-16-91 5P		<i>[Signature]</i>			7-16-91 5:00		HOLD FOR CONFIRM.												
(Printed)					(Printed)																	
JAMES G. JENSEN																						