

ENVIRONMENTAL
PROTECTION

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FUGRO WEST, INC.

January 21, 1996
Project No. 9537-1311

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Ms. Eva Chu
Hazardous Materials Specialist
Alameda Health Care Services
Environmental Protection Division
1131 Harbor Bay Parkway, #250
Alameda, California 94502-6577

Attention: Ms. Eva Chu

Revised Calculations
Risked-Based Corrective Action Evaluation
Housing Authority of the City of Alameda
1916 Webster Street
Alameda, California

Dear Ms. Chu:

In response to the Alameda County Department of Environmental Health (ACDEH) request, Fugro West Inc. (Fugro) has revised input data for the Tier 2 Risk-Based Corrective Action (RBCA) evaluation conducted for the Housing Authority of the City of Alameda (AHA) property, located at 1916 Webster Street, in Alameda, California (subject property). The site location is shown on Figure 1.

The ACDEH requested the revised data following their review of the document titled *Results of the Risked-Based Corrective Action Evaluation, City of Alameda Housing Authority*, dated December 2, 1996. This letter presents brief project background, discussion of the ACDEH comments on the RBCA evaluation and the revised data with resulting output.

Project Background

An underground storage tank (UST) was removed from the subject property in July 1986. Upon removal, it was determined that the UST had leaked and impacted subsurface with petroleum hydrocarbons. Removal of the impacted soil was conducted in March 1994 and August 1996. The March 1994 excavation removed petroleum impacted soil north of the former UST to within 6 feet of the property line (Figure 2). The evcavation in August 1996 removed



impacted soil from the area between the March 1994 excavation and the existing building (Figure 4). The majority of the impacted soil was removed, however, soil samples from the excavation sidewalls revealed that a limited area of impacted soils remained beneath the existing building and could not be feasibly removed.

Following the soil removal activities in August 1996, the ACHED requested that AHA conduct a RBCA to address the remaining impacted soils. The intent of the RBCA analysis was to determine risks to human health and the environment associated with residual hydrocarbons in the soils beneath the existing building.

ACDEH Comments Regarding RBCA Evaluation

Fugro submitted the results of the RBCA evaluation to the ACDEH during the first week of December 1996. During the week of January 6, 1997, the ACDEH contacted Fugro with the following comments:

1. The Site Specific Target Levels (SSTLs) should be recalculated using benzene, toluene, ethylbenzene and xylene (BTEX) concentrations detected in every sidewall confirmation soil sample obtained from the excavation in March 1994 and August 1996.
2. SSTL's should be recalculated without averaging the concentrations of BTEX detected samples from the south sidewall by depth.
3. Expand the lateral extent of the petroleum impacted soil to include the area excavated in March 1994.

The following sections discuss each of the above comments and describe Fugro's method to establish revised SSTLs. The results of the recalculated values are presented in the conclusions section. The parameters used in the calculations for the RBCA are presented in the attached *Output Table 1*.

Discussion of Comment 1 - Number of Samples for Representative BTEX Concentrations

For the initial SSTL calculations, Fugro used BTEX concentrations from excavation sidewall soil samples collected in August 1996 and subsurface soil samples obtained from within the building in May 1996 (Figures 3 and 5). It was Fugro's opinion that these concentrations best represented the source area soils left intact beneath the building.

For the initial SSTL calculations, Fugro did not use BTEX concentration from north, east and west sidewalls of the August 1996 excavation or those detected in the sidewalls of the March 1994 excavation. It was Fugro's opinion that because the March 1994 BTEX concentrations



were detected at the excavation limits north of the former UST, they were not representative of the impacted soil remaining beneath the building. However, the ACDEH requested that all confirmation sidewall samples that contained BTEX, collected in the March 1994 and August 1997 excavations, be considered for the calculations of the SSTLs.

to account for possible construction of a building over entire site.

To comply with the ACDEH request, Fugro has revised the input data used to calculate the representative BTEX concentrations. The revised input data includes BTEX concentrations of confirmation sidewall samples from the March 1994 excavation and from the north, east and west sidewalls of the August 1996 excavation. Soil sample data from March 1994 and May 1996 is also included. The revised representative BTEX concentrations are discussed in the next section (Comment 2). Soil sample concentrations collected from areas that were eventually excavated were not used in the revised calculation.

Table 1 lists the soil samples and the BTEX concentration used as revised input. Locations and concentrations of the soil boring and excavation sidewall samples from previous sampling (March 1994) are shown on attached Figure 2, prepared by Versar, Inc. and Figure 7 prepared by Environmental Science and Engineering Inc. (ESE) in March 1994. ESE analytical data tables are also attached.

Discussion of Comment 2 - Calculating SSTLs with Discrete BTEX Concentrations

During the soil removal activities in August 1996, Fugro collected soil samples from the south sidewall of the excavation, adjacent to the building (Figure 5). The south sidewall represents the limit that soil could be feasibly removed without compromising the structural integrity of the building. Soil samples were collected on this sidewall from 2, 3 and 4.5 feet bgs. Two soil samples were obtained at each depth., Fugro applied the average concentration at each depth to determine the representative BTEX concentration for the SSTL calculations.

The ACDEH commented that averaging the sidewall soil samples by depth may not yield a representative concentrations and requested that Fugro recalculate the SSTLs using BTEX concentrations from discrete samples.

The representative concentrations resulting from the revised input data are: benzene at 0.93 mg/kg, toluene at 0.22 mg/kg ethylbenzene at 0.29 mg/kg, and xylenes at 0.81 mg/kg. Table 1 lists the representative concentrations (95 % UCL) for BTEX using the soil samples discussed in Comment 1. Attached Worksheet 5.5 summarizes the representative BTEX concentration data used for the calculation of the SSTLs.

As in the initial analysis, the representative concentrations for surface soils are those used for the subsurface soils (Table 1). The representative concentrations are based on the assumption that if a construction worker contacted the source area, it would be during initial grading and installation of underground utilities.



TABLE 1 Soil used for Recalculation of Representative Concentrations.

Soil/Groundwater Sample Identification	Sampling Date	TPH - Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes (Total)
SOIL (mg/kg)						
N-3'	8/21/96	100	3.2	0.49	1.5	3.7
SSE-2'	8/21/96	70	2.1	5.0	1.1	4.6
S-2.5'	8/21/96	460	6.2	16	5.9	22
SSW-3'	8/21/96	190	6.2	1.7	3.9	13
SSE-3.5'	8/21/96	180	3.7	6.9	3.9	15
S-4.5'	8/21/96	330	5.3	13	5.0	14
SSW-4.5'	8/21/96	58	3.7	0.28	0.68	2.1
SSE(EXT)-3'	8/27/96	5	0.2	0.006	0.025	0.068
E(C)-3'	8/21/96	120	0.49	3.5	1.9	6.6
W(R)-3'	8/27/96	81	1.6	ND	0.8	1.9
WSW-3'	8/21/96	2.7	0.24	ND	0.044	0.11
WNW(R)-3''	8/21/96 ^{RL}	39	1.9	ND	0.27	14
FB-1	5/3/96	0.3	0.031	ND	ND	ND
FB-2	5/3/96	0.4	0.008	ND	ND	ND
FB-3	5/3/96	0.4	0.008	ND	ND	ND
FB-4	5/3/96	1.1	0.019	ND	0.007	0.028
FB-8	5/3/96	0.3	0.046	ND	ND	ND
FB-12	5/3/96	23	0.3	0.180	0.060	0.210
SW-3	3/5/94	71	3.5	0.24	0.70	1.9
SW-4	3/5/94	31	0.72	0.47	0.15	0.66
SW-5	3/5/94	8.6	0.69	0.035	0.013	0.042
SW-6	3/5/94	2.3	1.2	0.020	ND	0.061
SW-7	3/5/94	9.6	1.5	0.036	0.12	0.41
SW-8	3/5/94	2.6	0.36	0.021	0.014	0.079
B-15	3/5/94	3.3	0.19	0.021	ND	0.038
REPRESENTATIVE CONCENTRATION SOIL (95% UCL)			0.93 mg/kg	0.22 mg/kg	0.29 mg/kg	0.81 mg/kg

NOTES:

Parts per Million (ppm) = milligrams per Liter (mg/L)=1,000 x.ug/kg or parts per billion (ppb)
 ND - Not Detected above indicated method reporting limit.



Discussion of Comment 3 - Revised Limits of Estimated Source Area

The subsurface soil area impacted by petroleum, (source area), used for the initial RBCA analysis measured 22 feet by 15 feet and encompassed a total 330 square feet. This source area was considered the silty sand containing residual concentrations of petroleum hydrocarbons that remained beneath the building after the soil remediation in August 1996. The approximate limits of the soil source area were based on BTEX concentrations in soils, detected within the building (May 1996) and on the southern extent of the soil excavation (August 1996). The ACDEH commented that the estimated source area used to calculate SSTLs should include the area north of the former UST that was excavated in March 1994. The rationale for this request was based on concentrations of BTEX (3.5 parts per million benzene, maximum) detected in the sidewall samples collected after the March 1994 soil removal effort. It is the opinion of the ACDEH that these BTEX concentrations indicate that impacted soil, albeit limited in extent, remains beneath the parking lot. *(which could be under a building since site will be developed into commercial buildings in near future)*

To comply with the ACDEH request, Fugro increased the lateral extent of the estimated source area to 2,650 square feet to re-calculate the SSTLs. The source area has been revised to encompass the initial estimated source beneath the building (330 square feet) and the area previously excavated in 1994 (Figure 2). However, the area of the March 1994 excavation that was backfilled with clean fill is not included in the total square footage. The boundaries of the source area are described below.

- The north boundary is the northern fence line. Soil sampling conducted in 1994 indicated that subsurface soils on the adjacent property to the north were not impacted by petroleum hydrocarbons. The northern boundary runs approximately 55 feet along the northern fence line.
- The south boundary of the source area is set approximately 20 feet within the building. The east-west length of the southern boundary is approximately 55 feet. This boundary is based on results of the soil sampling conducted within the building in May 1996.
- The east boundary of the source area parallels the east wall of the existing building out to the north fence line. The east boundary is approximately 85 feet in length. This boundary is based on non-detected BTEX concentrations in soil samples from subsurface sampling conducted in 1994 and results of sidewall samples in August 1996.
- The west boundary of the source area is located a minimum of 10 feet beyond the extent of the March 1994 excavation. This line extends approximately 90 feet from within the building to the north fence line. The estimation of this boundary is based on



subsurface soil sampling conducted in 1994 which indicates non-detected concentrations of benzene 10 feet east of the excavation.

Conclusions of SSTL Re-calculation

The representative BTEX concentrations decreased as a result of applying the parameters requested by the ACDEH following their review of the initial RBCA analysis. Fugro determined that the representative concentrations for the source area (Table 1) do not exceed the calculated SSTLs (Table 2) for the critical pathway (subsurface soils to enclosed space). Tier 2 Worksheet 9.1 through 9.3 summarize the subsurface, surface and groundwater SSTL values established as a result of the re-calculation.

These SSTLs were based on a target risk of 10E-5 for commercial property, as specified by the ACHED. Based on the re-calculated values of the SSTLs, it is Fugro's opinion that the future risks associated with the hydrocarbon impacted soil remaining beneath the existing warehouse building is low.

Table 2. Applicable SSTL Values for Complete Exposure Pathways

Exposure Pathways	Applicable SSTL			
	Benzene	Toluene	Ethyl Benzene	Xylenes
Volatilization to ambient (outdoor) air from subsurface soils.	>Res	>Res	>Res	>Res
Volatilization to enclosed space from subsurface soils	1.5 mg/kg	>Res	>Res	>Res
Volatilization to ambient (outdoor) air from impacted groundwater	>Sol	>Sol	>Sol	>Sol
Volatilization to enclosed space from groundwater.	2.5 mg/l	300 mg/l	>Sol	>Sol
Direct ingestion or dermal contact of soil for construction workers.	32 mg/l	>Res	>Res	>Res

>Res = (Residual) Selected risk level is not exceeded for pure compound present at any concentration.
 >Sol = (Solubility) Selected risk level is not exceeded for all possible dissolved levels




Closure Remarks

The judgments, conclusions, and recommendations described in this report pertain to the conditions judged to be present or applicable at the time work was performed. Fugro's opinions were developed in accordance with accepted geologic, hydrogeologic, and engineering practices for this time and for this specific site. The interpretations and conclusions contained in this report represent our professional opinions. Other than this, no warranty is implied or intended.


Fugro has prepared this report for the Housing Authority of the City of Alameda for their property located at 1916 Webster Street, in Alameda, California. Use of this report is provided to the Housing Authority of the City of Alameda solely for their exclusive use and shall be subject to terms and conditions of the contract between the Housing Authority of the City of Alameda and Fugro West, Inc. Any reliance on this report by third parties shall be at such parties' sole risk. Fugro appreciates the opportunity to provide environmental consulting services to the AHA. If you have any additional questions or comments regarding this project, please contact me or Mr. Boudreau at (415) 296-1041.

Sincerely,

FUGRO WEST, INC



Peter B. Hudson
Project Geologist



Stephen J. Boudreau
Regional Branch Manager
Senior Environmental Engineer

cc: Ms. Eileen Duffy, Housing Authority of the City of Alameda

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Alameda Housing Authority Job Identification: 96371311
 Site Location: 1916 Webster St. Alameda Date Completed: 1/14/97
 Completed By: Fugro West Inc.

Software: GSI RBCA Spreadsheet
 Version: v 1.0

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined.

DEFAULT PARAMETERS

Exposure Parameter	Definition (Units)	Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (l/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing. rate (mg*yr/kg*d)	1.1E+02			9.4E+01	
IRa.in	Inhalation rate indoor (m ³ /day)	15			20	
IRa.out	Inhalation rate outdoor (m ³ /day)	20			20	10
SA	Skin surface area (dermal) (cm ²)	5.8E+03		2.0E+03	5.8E+03	5.8E+03
SAadj	Adjusted dermal area (cm ² *yr/kg)	2.1E+03			1.7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	Use EPA tox data for air (or PEL based)	TRUE				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways	Residential		Commercial/Industrial	
	Chronic	Constrctn	Chronic	Constrctn
Groundwater Pathways:				
GW.i	Groundwater Ingestion	FALSE		FALSE
GW.v	Volatilization to Outdoor Air	FALSE		TRUE
GW.b	Vapor Intrusion to Buildings	FALSE		TRUE
Soil Pathways				
S.v	Volatiles from Subsurface Soils	FALSE		TRUE
SS.v	Volatiles and Particulate Inhalation	FALSE		TRUE
SS.d	Direct Ingestion and Dermal Contact	FALSE		TRUE
S.l	Leaching to Groundwater from all Soils	FALSE		FALSE
S.b	Intrusion to Buildings - Subsurface Soils	FALSE		TRUE

Matrix of Receptor Distance and Location on- or off-site	Residential		Commercial/Industrial	
	Distance	On-Site	Distance	On-Site
GW	Groundwater receptor (cm)	FALSE		FALSE
S	Inhalation receptor (cm)	FALSE		TRUE

Matrix of Target Risks	Individual		Cumulative
	Individual	Cumulative	
TRab	Target Risk (class A&B carcinogens)	1.0E-05	
TRc	Target Risk (class C carcinogens)	1.0E-05	
THQ	Target Hazard Quotient	1.0E+00	
Opt	Calculation Option (1, 2, or 3)	2	
Tier	RBCA Tier	2	

Surface Parameters	Definition (Units)	Residential			Commercial/Industrial	
		Chronic	Construction	Chronic	Construction	
t	Exposure duration (yr)	30		25	1	
A	Contaminated soil area (cm ²)	<u>2.2E+06</u>			<u>2.2E+06</u>	
W	Length of affected soil parallel to wind (cm)	<u>1.5E+03</u>			<u>1.5E+03</u>	
W.gw	Length of affected soil parallel to groundwater (cm)					
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02				
delta	Air mixing zone height (cm)	2.0E+02				
Lss	Definition of surficial soils (cm)	<u>6.1E+01</u>				
Pe	Particulate areal emission rate (g/cm ² /s)	2.2E-10				
Groundwater Definition (Units)		Value				
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02				
I	Groundwater infiltration rate (cm/yr)	3.0E+01				
Ugw	Groundwater Darcy velocity (cm/yr)	<u>9.1E+02</u>				
Ugw.tr	Groundwater Transport velocity (cm/yr)	<u>2.4E+03</u>				
Ks	Saturated Hydraulic Conductivity(cm/s)	3.2E-03				
grad	Groundwater Gradient (cm/cm)	9.0E-03				
Sw	Width of groundwater source zone (cm)					
Sd	Depth of groundwater source zone (cm)					
BC	Biodegradation Capacity (mg/L)					
BIO?	Is Bioattenuation Considered	FALSE				
phi.eff	Effective Porosity in Water-Bearing Unit	3.8E-01				
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03				
Soil Definition (Units)		Value				
hc	Capillary zone thickness (cm)	<u>3.0E+01</u>				
hw	Vadose zone thickness (cm)	<u>1.1E+02</u>				
rho	Soil density (g/cm ³)	2.01				
foc	Fraction of organic carbon in vadose zone	<u>0.001</u>				
phi	Soil porosity in vadose zone	0.38				
Lgw	Depth to groundwater (cm)	<u>1.4E+02</u>				
Ls	Depth to top of affected soil (cm)	<u>6.1E+01</u>				
Lsubs	Thickness of affected subsurface soils (cm)	<u>9.1E+01</u>				
pH	Soil/groundwater pH	6.5				
		capillary	vadose	foundation		
phi.w	Volumetric water content	0.342	0.12	0.12		
phi.a	Volumetric air content	0.038	0.26	0.26		
Building Definition (Units)		Residential	Commercial			
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02			
ER	Building air exchange rate (s ⁻¹)	1.4E-04	2.3E-04			
Lcrk	Foundation crack thickness (cm)	1.5E+01				
eta	Foundation crack fraction	0.01				
Dispersive Transport Parameters Definition (Units)		Residential	Commercial			
Groundwater						
ax	Longitudinal dispersion coefficient (cm)					
ay	Transverse dispersion coefficient (cm)					
az	Vertical dispersion coefficient (cm)					
Vapor						
dcy	Transverse dispersion coefficient (cm)					
dcz	Vertical dispersion coefficient (cm)					

Site Name: Alameda Housing Authority
 Site Location: 1916 Webster St. Alameda

Completed By: Fugro West Inc.
 Date Completed: 1/14/1997 1 of 1

TIER 2 SUBSURFACE SOIL CONCENTRATION DATA SUMMAR (e.g., >3 FT BGS)

CONSTITUENTS DETECTED		Analytical Method	Detected Concentrations				
		Typical Detection Limit (mg/kg)	No. of Samples	No. of Detects	Maximum Conc. (mg/kg)	Mean Conc. (mg/kg)	UCL on Mean Conc. (mg/kg)
71-43-2	Benzene	5.0E-03	25	25	6.2E+00	4.4E-01	9.3E-01
100-41-4	Ethylbenzene	5.0E-03	25	25	1.6E+01	1.1E-01	2.9E-01
108-88-3	Toluene	5.0E-03	25	25	6.9E+00	8.2E-02	2.2E-01
1330-20-7	Xylene (mixed isomers)	5.0E-03	25	25	2.2E+01	2.9E-01	8.1E-01

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.1

Site Name: Alameda Housing Authority
 Site Location: 1916 Webster St. Alameda

Completed By: Fugro West Inc.
 Date Completed: 1/14/1997

1 OF 1

**SURFACE SOIL SSTL VALUES
 (< 3 FT BGS)**

Target Risk (Class A & B) 1.0E-5 MCL exposure limit?
 Target Risk (Class C) 1.0E-5 PEL exposure limit?
 Target Hazard Quotient 1.0E+0

Calculation Option: 2

SSTL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration (mg/kg)	Soil Leaching to Groundwater			X Ingestion, Inhalation and Dermal Contact		X Construction Worker	Applicable SSTL (mg/kg)	SSTL Exceeded ? * If yes	Required CRF Only if "yes" left
CAS No.	Name		Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Commercial: (on-site)			
71-43-2	Benzene	9.3E-1	NA	NA	NA	NA	3.2E+1	>Res	3.2E+1	<input type="checkbox"/>	<1
100-41-4	Ethylbenzene	2.9E-1	NA	NA	NA	NA	>Res	>Res	>Res	<input type="checkbox"/>	<1
108-88-3	Toluene	2.2E-1	NA	NA	NA	NA	>Res	>Res	>Res	<input type="checkbox"/>	<1
1330-20-7	Xylene (mixed isomers)	8.1E-1	NA	NA	NA	NA	>Res	>Res	>Res	<input type="checkbox"/>	<1

Site Name: Alameda Housing Authority
 Site Location: 1916 Webster St. Alameda

Completed By: Fugro West Inc.
 Date Completed: 1/14/1997

**SUBSURFACE SOIL SSTL VALUES
 (> 3 FT BGS)**

Target Risk (Class A & B) 1.0E-5 MCL exposure limit?
 Target Risk (Class C) 1.0E-5 PEL exposure limit?
 Target Hazard Quotient 1.0E+0

Calculation Option: 2

SSTL Results For Complete Exposure Pathways ("X" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration (mg/kg)	Soil Leaching to Groundwater			Soil Volatilization to Indoor Air		Soil Volatilization to Outdoor Air		Applicable SSTL (mg/kg)	SSTL Exceeded ? * If yes	Required CRF
CAS No.	Name		Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential: (on-site)	Commercial: (on-site)			
71-43-2	Benzene	9.3E-1	NA	NA	NA	NA	1.5E+0	NA	>Res	1.5E+0	<input type="checkbox"/>	<1
100-41-4	Ethylbenzene	2.9E-1	NA	NA	NA	NA	>Res	NA	>Res	>Res	<input type="checkbox"/>	<1
108-88-3	Toluene	2.2E-1	NA	NA	NA	NA	>Res	NA	>Res	>Res	<input type="checkbox"/>	<1
1330-20-7	Xylene (mixed isomers)	8.1E-1	NA	NA	NA	NA	>Res	NA	>Res	>Res	<input type="checkbox"/>	<1

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name: Alameda Housing Authority
 Site Location: 1916 Webster St. Alameda

Completed By: Fugro West Inc.
 Date Completed: 1/14/1997

1 OF 1

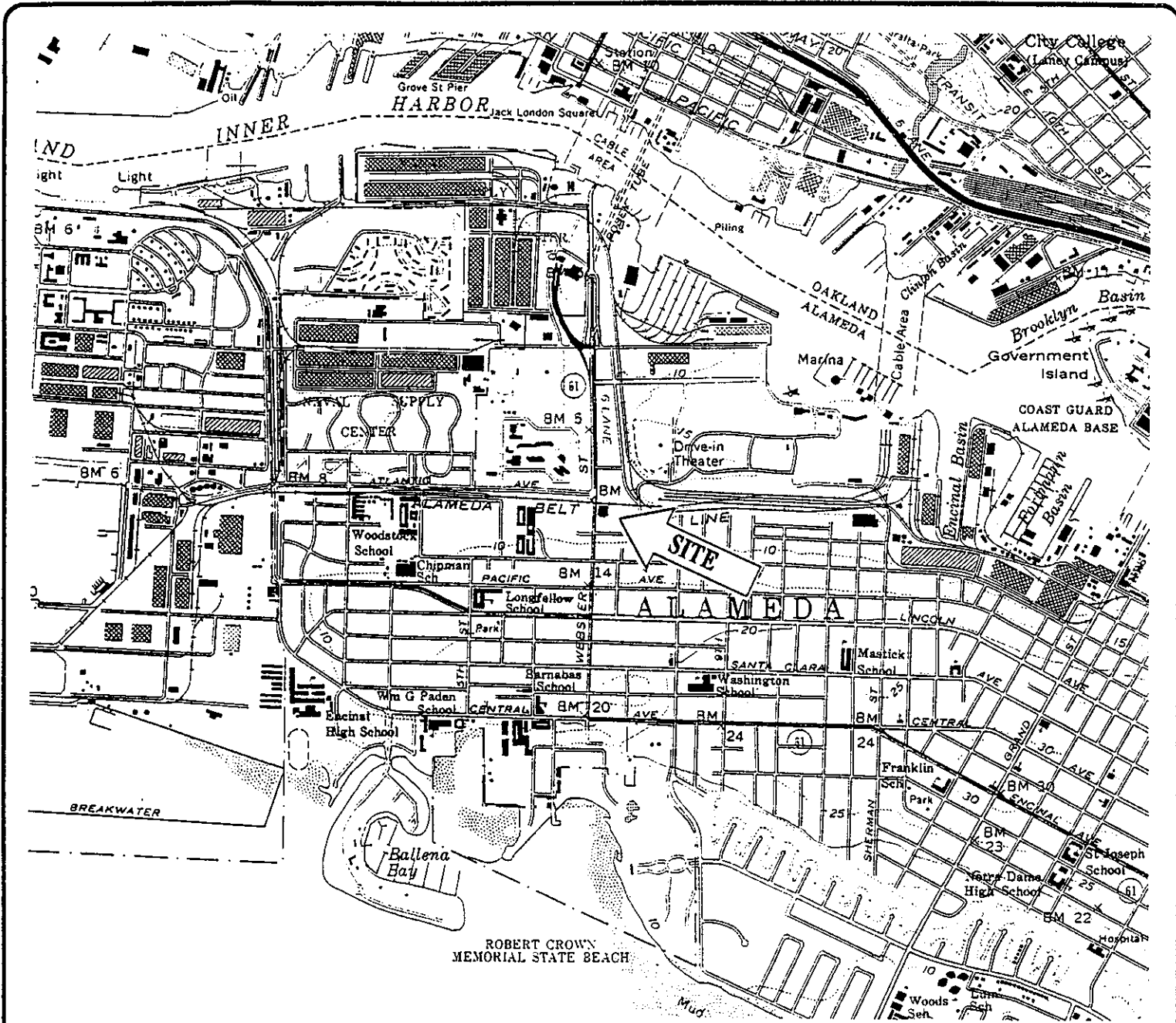
GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-5 MCL exposure limit?
 Target Risk (Class C) 1.0E-5 PEL exposure limit?
 Target Hazard Quotient 1.0E+0

Calculation Option: 2

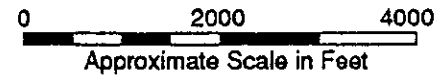
SSTL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration (mg/L)	Groundwater Ingestion			Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable SSTL (mg/L)	SSTL Exceeded? <input type="checkbox"/> If yes	Required CRF Only if "yes" left
			Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	X	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)			
71-43-2	Benzene	6.2E-1	NA	NA	NA	NA	2.5E+0	NA	9.4E+2	2.5E+0	<input type="checkbox"/>	<1
100-41-4	Ethylbenzene	5.0E-1	NA	NA	NA	NA	>Sol	NA	>Sol	>Sol	<input type="checkbox"/>	<1
108-88-3	Toluene	5.0E-1	NA	NA	NA	NA	3.0E+2	NA	>Sol	3.0E+2	<input type="checkbox"/>	<1
1330-20-7	Xylene (mixed isomers)	5.0E-1	NA	NA	NA	NA	>Sol	NA	>Sol	>Sol	<input type="checkbox"/>	<1



GENERAL NOTES:

BASE MAP FROM USGS
7.5 MINUTE TOPOGRAPHIC
OAKLAND WEST, CA



DRAWN BY: J. Paradis
DATE: September 19, 1996
REVISED BY:
DATE:

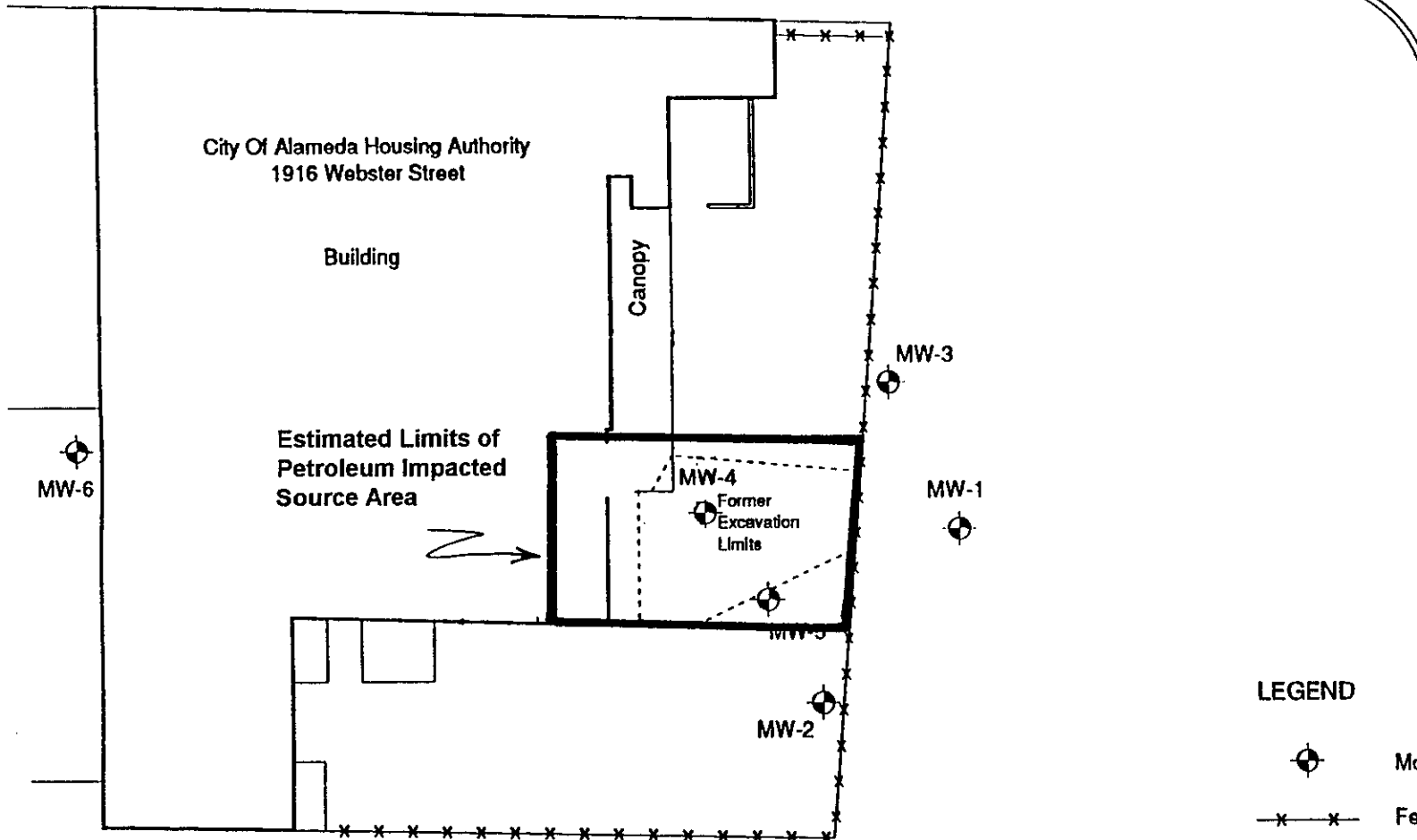
SITE LOCATION MAP

City of Alameda Housing Authority Property
1916 Webster Street
Alameda, CA


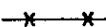
FIGURE

1

PROJECT NUMBER:
95-37-1311



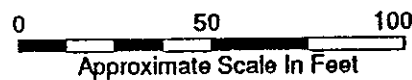
LEGEND

-  Monitoring Well
-  Fence

NOTES

Site Sketch After Map
By Ron Archer, Civil Engineer, Inc.

All Locations Are Approximate



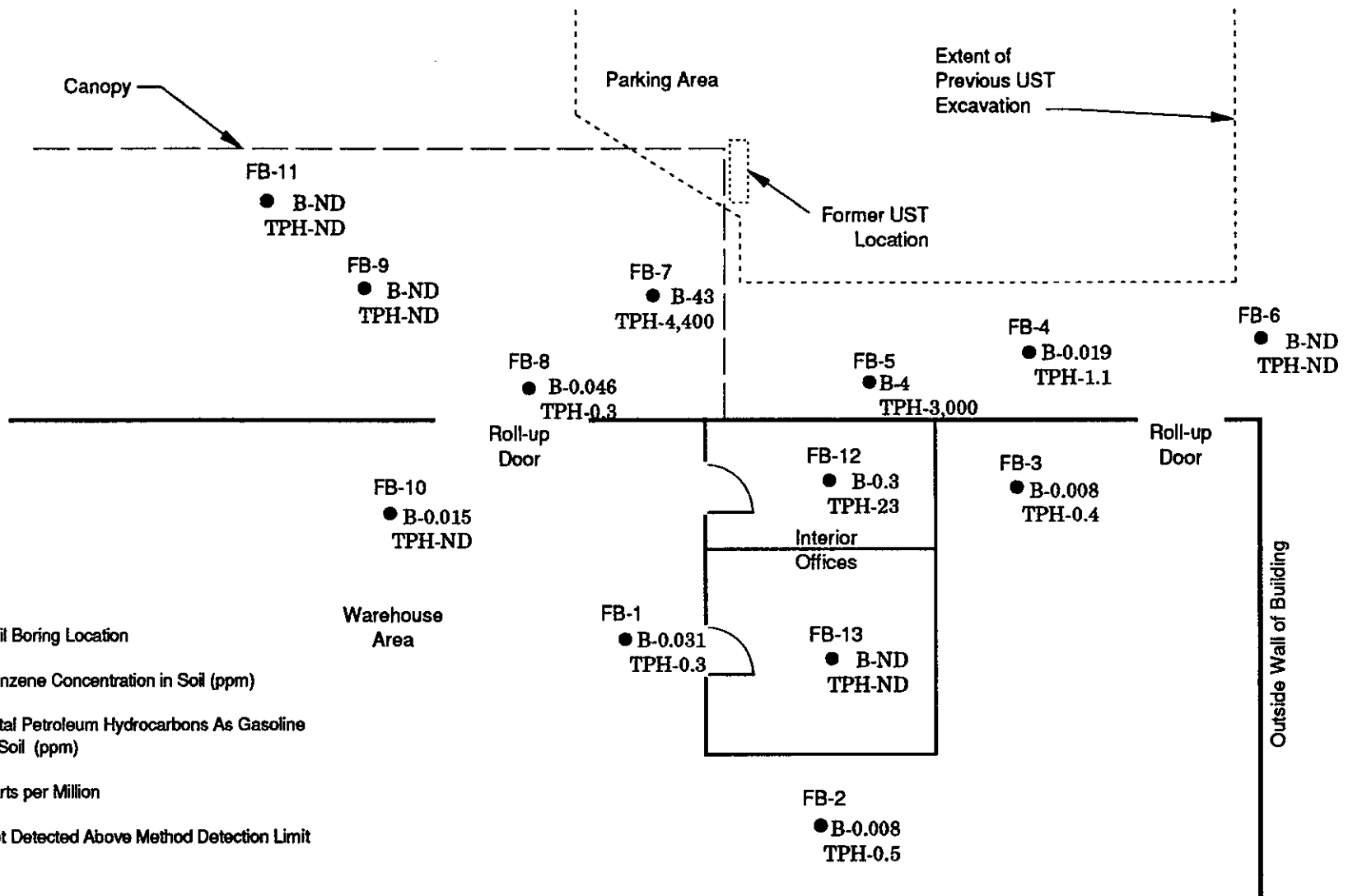
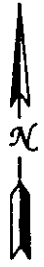
DRAWN BY: D. Hada
DATE: April 17, 1998
REVISED BY: J. Paradis
DATE: September 19, 1998

SITE AND PROJECT AREA MAP

City of Alameda Housing Authority Property
1916 Webster Street
Alameda, CA

FIGURE
2

PROJECT NUMBER:
95-37-1311



LEGEND

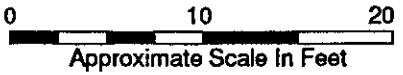
- FB-13 ● Soil Boring Location
- B- Benzene Concentration in Soil (ppm)
- TPH- Total Petroleum Hydrocarbons As Gasoline In Soil (ppm)
- ppm Parts per Million
- ND Not Detected Above Method Detection Limit

NOTES:

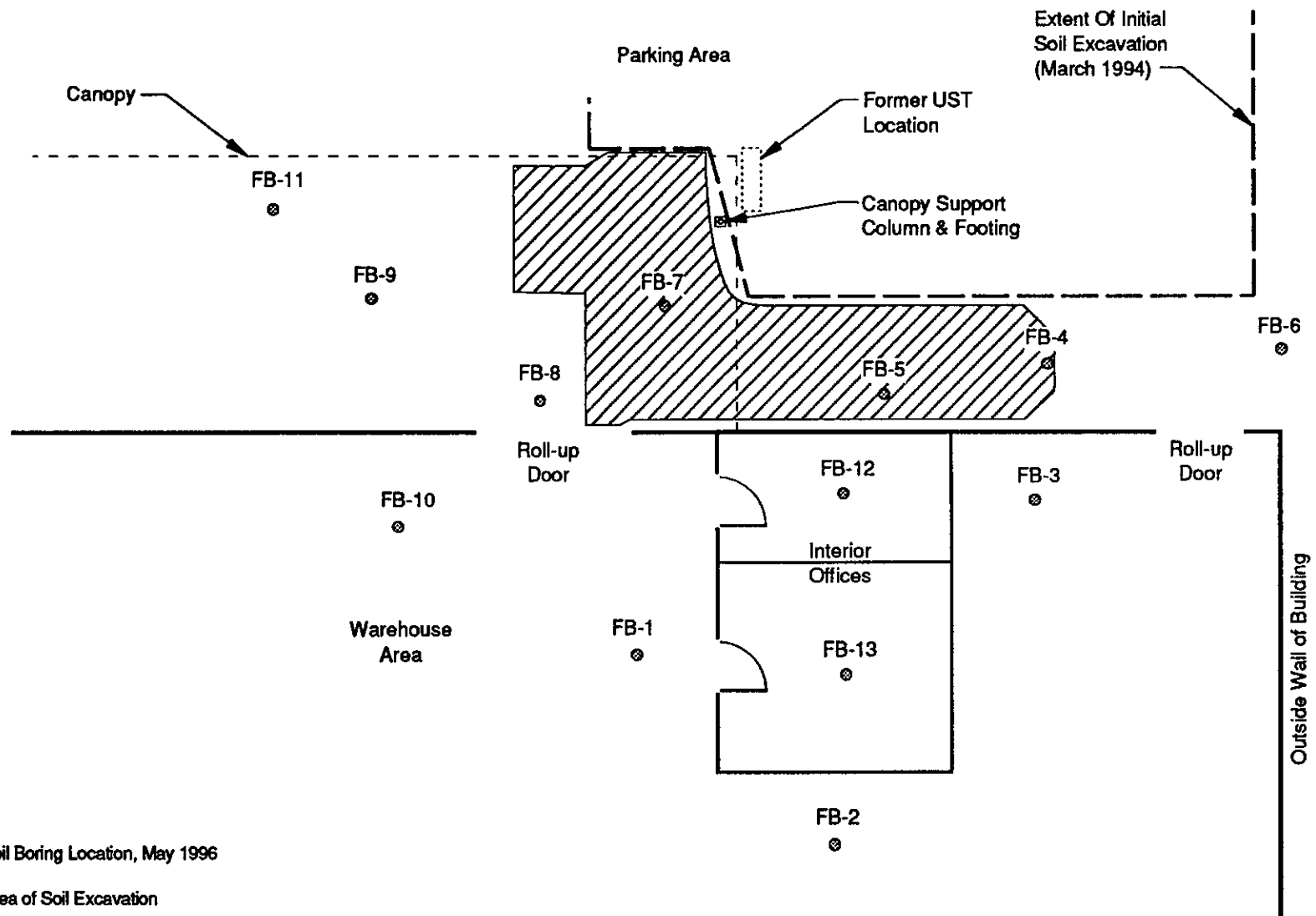
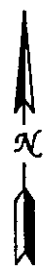
ppm = milligrams per kilogram (mg/kg)

Soil Sample Interval:
1.5-2.5 Foot Depth (typical)

All Locations Are Approximate



	DRAWN BY: J. Paradis	LOCATION OF SOIL BORINGS, DISTRIBUTION OF BENZENE AND GASOLINE CONCENTRATIONS IN SOIL MAY 1996	FIGURE 3
	DATE: May 31, 1996		
	REVISED BY: J. Paradis	City of Alameda Housing Authority Property 1916 Webster Street Alameda, CA	PROJECT NUMBER: 95-37-1311
	DATE: September 19, 1996		

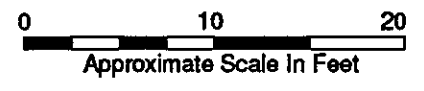


LEGEND

- FB-13 ● Soil Boring Location, May 1996
- Area of Soil Excavation

NOTES:

All Locations Are Approximate



DRAWN BY:	J. Paradis
DATE:	May 31, 1996
REVISED BY:	J. Paradis
DATE:	September 19, 1996

EXCAVATION AREA MAP
City of Alameda Housing Authority Property 1916 Webster Street Alameda, CA

FIGURE 4
PROJECT NUMBER: 95-37-1311

McCAMPBELL ANALYTICAL INC.	110 2nd Avenue South, #D7, Pacheco, CA 94553 Tele: 510-798-1620 Fax: 510-798-1622
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Environmental Science & Eng. 4090 Nelson Avenue, Suite J Concord, CA 94520	Client Project ID:# 6-94-5199; Alameda Housing Authority	Date Sampled: 03/05/94
		Date Received: 03/05/94
	Client Contact: Mac Quadir	Date Extracted: 03/05/94
	Client P.O:	Date Analyzed: 03/05/94

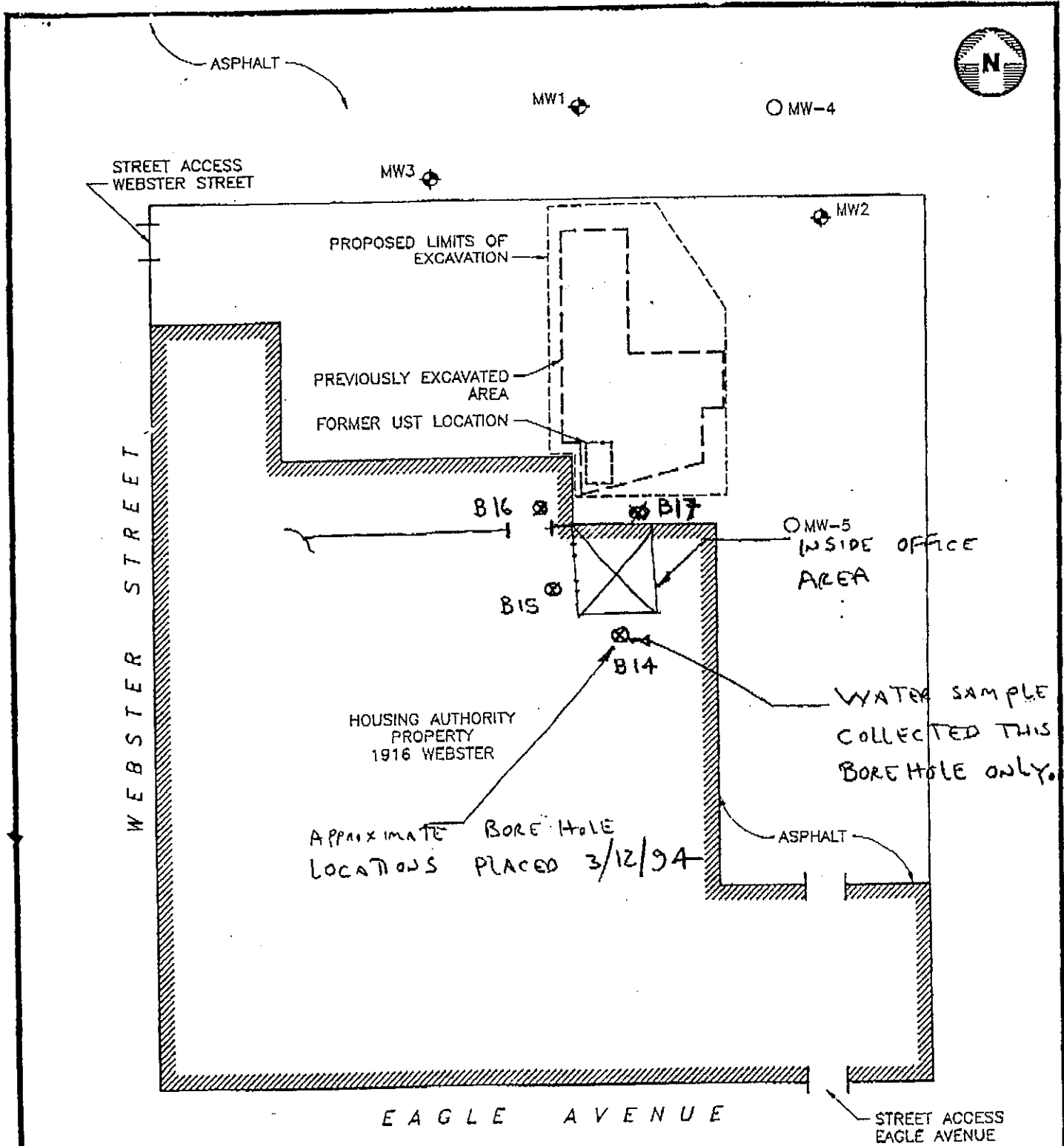
Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with BTEX*
EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g) ⁺	Benzene	Toluene	Ethylbenzene	Xylenes	% Rec. Surrogate
34562	SW-1	S	4.2,c	0.12	0.045	0.024	0.049	146 [#]
34563	SW-2	S	1800,a	21	60	24	98	130 [#]
34564	SW-3	S	71,c,a	3.5	0.24	0.70	1.9	102
34565	SW-4	S	31,c,a	0.72	0.47	0.15	0.66	107
34566	SW-5	S	8.6,c	0.69	0.035	0.013	0.042	128 [#]
34567	SW-6	S	2.3,c,a	0.12	0.020	ND	0.061	115 [#]
34568	SW-7	S	9.6,b,c	1.5	0.036	0.12	0.41	106
34569	SW-8	S	2.6,c,b	0.36	0.021	0.014	0.079	109
34570	CSP-1,2,3	S	110,b,a	0.71	1.2	0.78	2.0	107
34571	SP-1,2	S	810,a	5.8	25	9.3	33	114 [#]
34572	SP-3,4	S	1900,a	15	68	15	52	120 [#]
34573	SP-5,6	S	380,b	0.97	4.8	2.3	8.5	107
34574	SP-7,8	S	1600,a	13	46	12	41	128 [#]
34575	SP-9,10	S	210,a	2.0	6.3	1.7	5.6	145 [#]
34576	SP-11,12	S	2100,a	14	72	17	65	117 [#]
Detection Limit unless otherwise stated; ND means Not Detected		W	50 ug/L	0.5	0.5	0.5	0.5	
		S	1.0 mg/kg	0.005	0.005	0.005	0.005	

*water samples are reported in ug/L, soil samples in mg/kg, and all TCLP extracts in mg/L

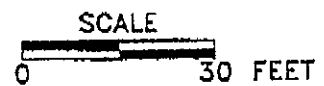
[#] cluttered chromatogram; sample peak co-elutes with surrogate peak

⁺ The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant (aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds are significant; no recognizable pattern; e) TPH pattern that does not appear to be derived from gasoline (?); f) one to a few isolated peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible phase is present.




LEGEND

- ◆ GROUND WATER MONITORING WELL
- PROPOSED GROUND WATER MONITORING WELL



3/12/94 SOIL BORING LOCATIONS

 Environmental Science & Engineering, Inc. <small>A GILDORP Company</small>	DATE 2/94	PROPOSED MONITORING WELL LOCATIONS AND LIMITS OF EXCAVATION	FIGURE NO. 7
	REVISED		ALAMEDA HOUSING AUTHORITY 1916 WEBSTER STREET
4090 NELSON AVENUE, SUITE J CONCORD CA 94520	CAD FILE		

