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Alameda County
Environmental Health

**WORK PLAN FOR SOIL
AND GROUNDWATER INVESTIGATION**

**ABE Petroleum
17715 Mission Boulevard
Hayward, California 94539**

**Prepared for
Mr. Paul Garg
ABE Petroleum**

**Prepared by
Sierra Environmental, Inc.**

**July 28, 2008
Project 08-103.10**



Sierra Environmental, Inc.
Environmental Consultants

July 28, 2008
Project 08-103.10

Mr. Paul Garg
ABE Petroleum LLC
33090 Mission Boulevard
Union City, CA 94587

Subject: Fuel Leak Case No. RO0000257, Work Plan for Soil and Groundwater Investigation, 17715 Mission Boulevard, Hayward, California

Dear Mr. Garg:

Sierra Environmental, Inc. (Sierra) is pleased to present this work plan proposing scope of soil and groundwater investigation for the subject location, hereafter, referred to as Site. The Site location is shown in Figure 1. The work plan was requested in a letter prepared by Alameda County Health Care Services (ACHCS) dated May 29, 2008. Mr. Paresh Khatri is the case officer for the Site at ACHCS. The followings were requested in the ACHCS letter:

- Propose work to define vertical and horizontal extent of contamination in the source area.
- Provide sensitive receptor records (wells) obtained from Alameda County Water District (ACWD), Alameda County Department of Public Works (ACDPW), and California Department of Water Resources (DWR).
- Correct data in Table VII of July 30, 2006, Site Conceptual Model (SCM) report.
- After characterizing contaminant source (s), then prepare feasibility study/corrective action plan for the Site.

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- ACHCS also requested to prepare figures presenting on-site and off-site features in clearer manner; The former figures consisted of aerial photographs that may have become difficult to discern when transmitted electronically.

BACKGROUND

Please refer to Appendix A for the Site background information.

OBJECTIVE

Objective of the work proposed in this work plan is to respond to the above items requested by ACHCS.

DISCUSSION

Site's Present Condition

Presently, the Site is an active gasoline station with upgraded double-wall underground fuel storage tanks in compliance with the State requirements.

Extent of Soil Contamination

During removal of the former USTs from the Site (Figure A of Appendix A) in 1997, up to 2,700 mg/kg total petroleum hydrocarbons as gasoline (TPHG) was detected in soil samples collected at approximately 14 feet below ground surface (bgs) in northern section of the UST cavity. Groundwater monitoring well MW1 through MW3 exist at the Site (Figure 2). 17-720 mg/kg TPHG has been detected in Soil samples collected 20-30 feet bgs during construction of the monitoring wells. The wells are approximately 33-35 feet deep. First encountered groundwater was measured at 27-30 feet bgs and raised to 19-22 feet bgs. Above information suggest that bulk of soil contamination remains in the former UST cavity. Lower concentrations of gasoline impact (up to 720 mg/kg) is also present in the soil within 20-30 feet bgs at the Site. This may be due to presence of more sandy soil than clay in this depth. The vertical extent of soil contamination at the Site is extended to the saturated zone. The horizontal extent of soil contamination at the Site is unknown, at this time. As requested by Mr. Khatri, Sierra corrected the concentration units of the gasoline constituents in Table VII, and compare them with the most updated Environmental Screening Levels (ESLs). ESLs were developed to address environmental protection goals presented in the Water Quality Control Plan for San Francisco Bay Basin ("Basin Plan," RWQCBSF 2006). ESLs are presented in "Screening For Environmental Concerns At Sites with Contaminated Soil and Groundwater" Interim Final –November 2007. The most updated ESL for evaluation of potential vapor intrusion into building

requires soil gas concentrations. However the concentrations of the gasoline constituents in deep soil are below ESLs for evaluation of human direct exposure concern at the Site.

**TABLE VII
 TIER 1 ESLS FOR SOIL**

Parameters mg/kg	TPHG mg/kg	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes mg/kg	MTBE mg/kg
Average Concentration In Unsaturated Soil at the Former UST Complex (At 14' bgs)	815	0.139	1.295	0.835	2.36	ND
Site-Wide Average Concentration In Unsaturated Soil (Within 20' bgs)	125.6	0.436	4.37	2.57	11.68	1.07
RWQCB ESLs for Deep Soil (> 3m bgs) Table C-1 & C-2, Soil Screening Levels For Evaluation of Potential Vapor Intrusion Into Building (Commercial, Industrial/ Residential Exposure	Use Soil Gas =					
RWQCB ESLs for Soil Table C-1 & C-2-Deep Soil Screening Levels For Evaluation of Direct Human Exposure Concerns (Commercial, Industrial/ Residential Exposure	4200 4200	11 11	650 650	400 400	420 420	2600 2600

Extent of Groundwater Contamination

The most recent groundwater monitoring data (June 2008) show concentrations of TPHG ranging 15,000-48,000 µg/L beneath the Site. Groundwater flow direction has been consistently toward northwest at and near the Site. The highest TPHG concentrations have been recorded for water samples collected from MW1. Except for 27 µg/L TPHG detected in a water sample collected from MW7 in March 2007, No gasoline constituents have been detected in any of the off-site groundwater monitoring wells (Figure 3) suggesting that the horizontal extent of dissolved TPHG groundwater plume is within approximately 200 feet radius of the Site's boundaries. The vertical extent of groundwater

contamination at the Site is within the saturated zone. However, depth of the saturated zone has not been explored deeper than 35 feet at and near the Site, at the present time.

Additional Sensitive Receptor Survey

As requested by ACHCS, Sierra completed well search forms and submitted to the DWR as well as ACDPW to obtain information for private and public water wells near the Site. ACDPW identified 9 irrigation wells within 1-mile radius of the Site. The closest well address is 779 Paradise Drive, Hayward, approximately 700 feet south of the Site. The well is 77 feet deep. The pertinent well information is presented in Appendix B. Considering the northwesterly groundwater flow direction at the Site, this well is situated at hydraulic up gradient of the Site.

Well log obtained from DWR identified total of 17 wells within a mile radius of the Site. Five of the well logs did not have street address and well type information due to being on old well log forms. 10 irrigation wells and 2 domestic wells were identified in the information. The well depths ranged 40-120 feet. The closest well to the Site, other than the one identified above, is another irrigation well located at 1151 Elgin Street, San Leandro, approximately 1,400 feet northwest of the Site. This well is situated at hydraulic down gradient of the Site. However, analytical results for groundwater samples obtained from B2 and MW5 (Figure 2) has shown no gasoline impact suggesting that migration of contaminants from the Site to this well is unlikely. The identified domestic wells are located at 17754 Meekland Avenue, and 29517 Shasta Street, approximately 2,000 feet southwest (up gradient) of the Site.

Based on the available information, migration of the pollutants in groundwater beneath the Site to the identified wells is unlikely.

SCOPE OF SOIL AND GROUNDWATER INVESTIGATION WORK

Sierra proposes to utilize a membrane interface probe (MIP) to identify horizontal and vertical extent of contamination in the source area at the Site. Sierra will obtain appropriate drilling permit, mark and clear drilling locations, and coordinate with local agencies, and the client to perform the filed work. Sierra will prepare a report summarizing the findings.

Sierra will perform its proposed work in accordance with the following tasks:

Task 1 - PREFIELD ACTIVITIES

Sierra will complete drilling permit application and submit to ACDPW with appropriate fee to obtain drilling permit. Sierra will coordinate the fieldwork with

a State-licensed drilling contractor, a State-certified analytical laboratory, and the client. Sierra will notify Underground Services Alert (USA) to identify all the utilities, and clear the drilling locations. Sierra will prepare a health and safety plan for its workers and sub-contractors. Sierra will notify ACHCS and ACDPW of the drilling time and date. Sierra will prepare necessary field equipment and material.

Task 2 - FIELD ACTIVITIES

Drilling and Sampling Activities

Sierra will retain Vironex Services (Vironex) to perform the drilling activities. Vironex is a State licensed drilling contractor (C57 #705927). Sierra anticipates to advance 9 soil borings (B1 through B9) to define horizontal and vertical extent of contamination at the Site. The boring locations are shown in Figure 3. They are selected to define extent of contamination near the former UST complex (original source of contamination), as well as along the boundaries of the Site.

MIP is a screening tool with semi-quantitative capabilities acting as an interface between the contaminants in the ground and gas phase detectors at the surface. The membrane is semi-permeable and is comprised of a thin film polymer impregnated into a stainless steel screen for support. The membrane is placed in a heated block attached to the probe. This block is heated to approximately 100-120 degrees C and is raised at the leading edge to protect the membrane. Heating the block helps accelerate diffusion of the contaminate through the membrane.

Diffusion occurs because of a concentration gradient between the contaminated soil and the clean carrier gas behind the membrane. A constant gas flow of 35-45 mL/min sweeps behind the membrane and carries the contaminants to the gas phase detectors at the surface.

Vironex will utilize photoionization detector (PID), electron capture detector (ECD) and the flame ionization detector (FID) to analyze contaminants concentration in each sample location. These detectors may be used in series with the least destructive detector being first and the most destructive detector coming last. The MIP system can process four detector signals at one time. These detector signals, in conjunction with the time in which a contaminant takes to return to the surface, are graphed versus depth. The concentrations will be averaged at 1-foot intervals to the bottom of each soil boring. Sierra anticipates that the borings will be advanced to bottom of the saturated zone, to approximately 40-45 feet bgs.

The detector information and the electrical conductivity of the soil are graphed by the FC4000 field instrument. The graphs will assist Sierra to determine the location of the contaminant, the relative concentration of the contaminant and the physical characteristics of soil in which the contaminant is located.

Confirmatory Soil Sampling, Analysis, and Testing

After reviewing the MIP results, Sierra will have Vironex to advance two soil borings near the MIP test locations having the highest concentrations of the contaminants. The borings will be selected in a manner to characterize soil type and permeability, and contaminant concentrations at wide-apart locations at the Site. Vironex will use Geoprobe® direct push equipped with 3.5-inch diameter sampling barrel lined with 2-inch diameter acetate tube collecting continuous soil samples. Sierra will document soil conditions in boring logs, and collect one undisturbed sample from unsaturated and one from saturated zones at each boring for chemical analysis, and permeability test. Additionally, duplicate samples will be tested for soil oxygen demand (SOD). The samples will be collected from depths presenting the highest concentrations of contaminants. After collection, the samples will be sealed with Teflon tape and plastic end-caps, labeled, placed on ice in a cooler to be delivered to laboratory for chemical analysis/permeability & SOD test. Sierra will compare the results with the MIP data.

Groundwater Sampling

Sierra will collect one grab groundwater sample from each MIP boring for chemical analysis. The samples will be collected using clean bailer or peristaltic pump. After collection, groundwater will be transferred into clean 40 ml volatile organic analysis vials. The vials will be sealed with Teflon-septum screw caps, labeled, placed on ice in a cooler, and delivered to Accutest with chain-of-custody documentation.

All drilling and sampling/testing equipment will be washed with Liqui-Nox® (a phosphate-free laboratory detergent) and rinsed with clean tap water at each sampling interval. The wash and rinse water will be placed in a 55-gallon drum and placed at the Site for future profiling and disposal.

Vironex will seal the borings with Portland cement and Bentonite mixture, after completing the drilling activities.

Task 3 - CHEMICAL ANALYSIS/PERMEABILITY AND SOD TEST

Sierra will deliver the samples to Accutest of Northern California (Accutest) of Santa Clara, California for chemical analysis. Accutest is an independent State-certified analytical laboratory (#2346).

The soil samples and groundwater samples will be analyzed for total petroleum hydrocarbons as gasoline (TPHG) using United States Environmental Protection Agency (EPA) method 8260B:GC/MS. They will be analyzed for benzene, toluene, xylenes, and ethylbenzene (BTEX), and for fuel oxygenates also using EPA method 8260B.

The soil samples will also be delivered to United Soil Engineering, Inc. (USE) of Santa Clara, California for permeability test using ASTM D2434 or 5084 method, and gradation analysis using ASTM D422 method. Additionally, they will be analyzed for SOD.

Task 4 - REPORT PREPARATION AND SUBMITTAL

Sierra will prepare a report documenting the field observations, soil boring logs, MIP results, and the analytical/tests results. The report will document the findings, and provide recommendations. A hard copy of the report will be submitted to the client. The report will be submitted to ACHCS and the State Geotracker database electronically.

Please feel welcome to call us if you have questions.

Very Truly Yours,
Sierra Environmental, Inc.



Aug 5 2008
ML

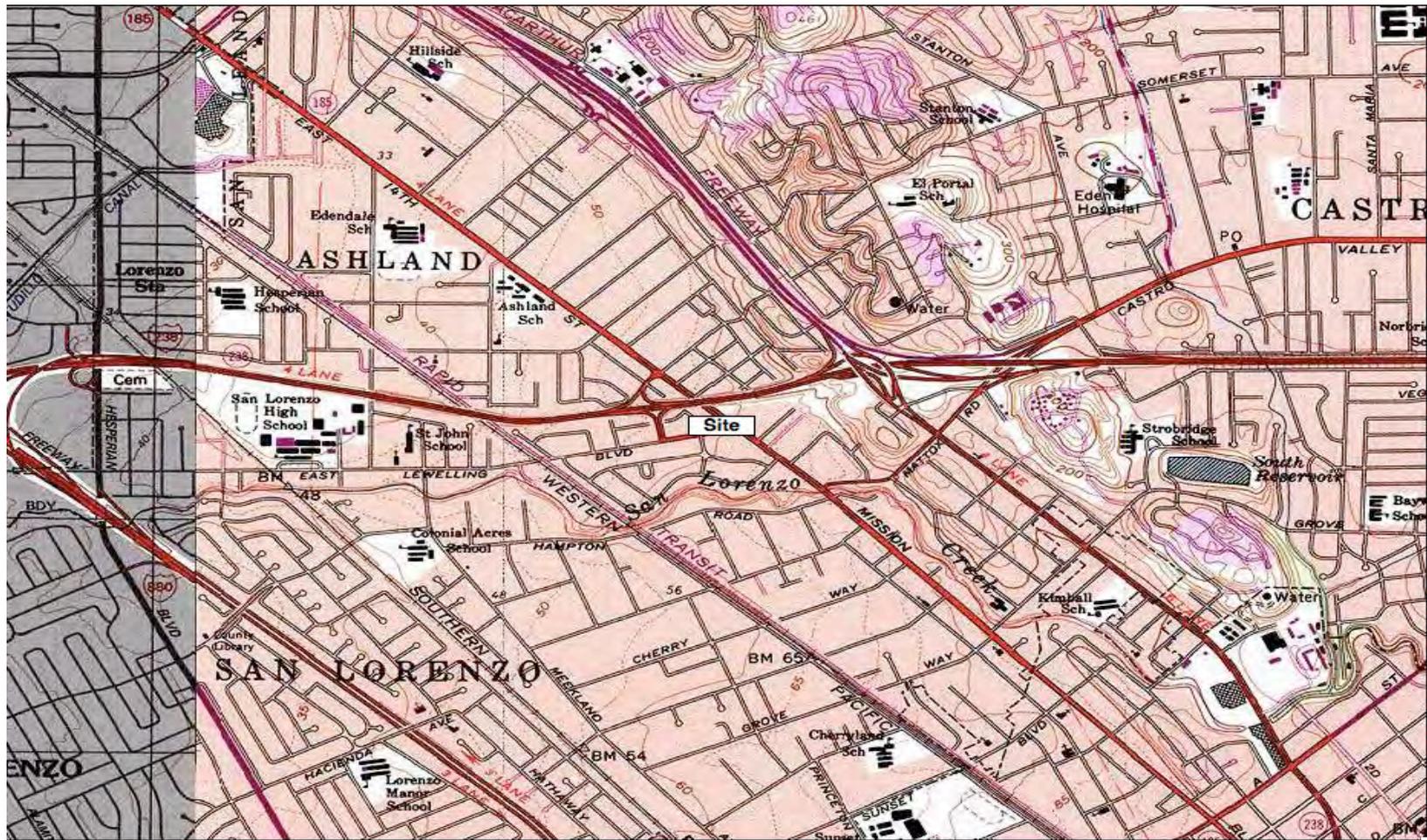
Reza Baradaran, PE, GE
principal

A large, stylized handwritten signature in black ink, appearing to read "Mitch Hajiaghai".

Mitch Hajiaghai, REA II, CAC
Principal

- Attachments:
- Figure 1 - Site Location Map
 - Figure 2 - On-Site and Off-Site Groundwater Monitoring well and Soil Boring Locations
 - Figure 3 - Proposed Soil Boring Locations
 - Appendix A - Site Background Information
 - Appendix B - Sensitive Receptors Information

cc: Mr. Paresh Khatri, ACHCS (Electronically)



TN \star MN
15°

0 1000 FEET 0 500 1000 METERS
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)



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SITE LOCATION MAP

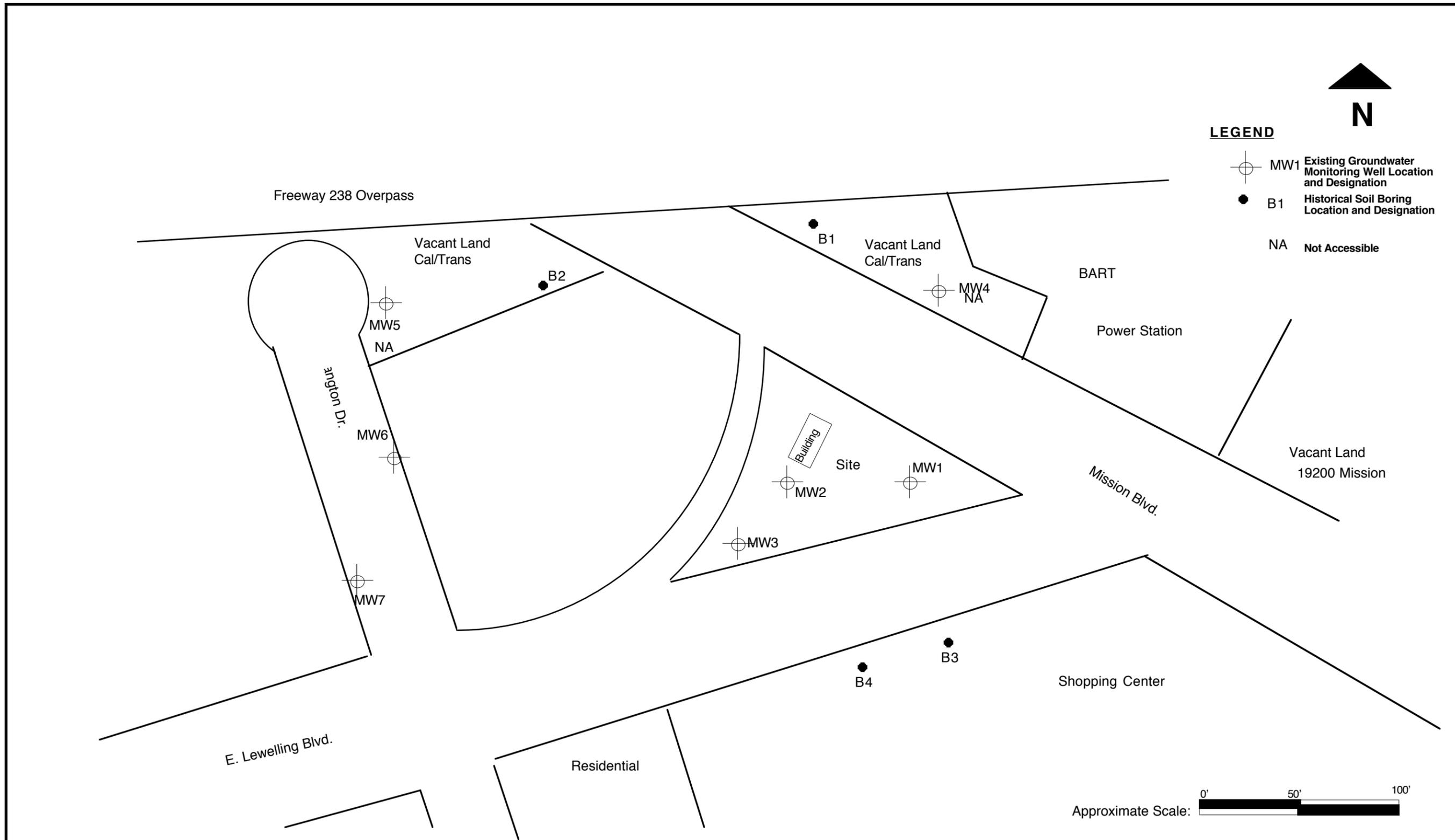
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FIGURE

1

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On-Site & Off-Site Groundwater Monitoring Well and Soil Boring Locations

Soil and Groundwater Investigation

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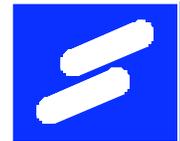
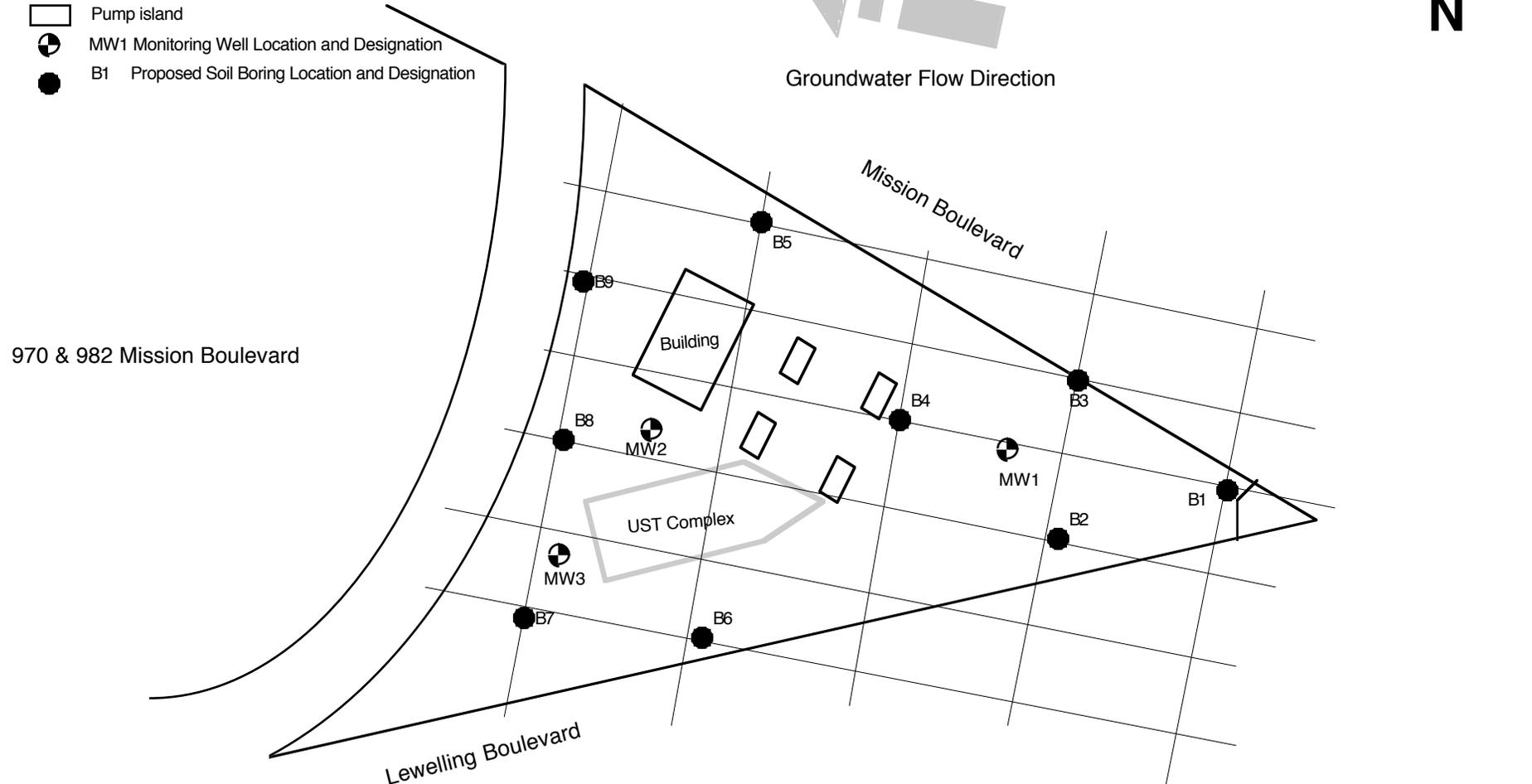
FIGURE

2

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LEGEND

-  Pump island
-  MW1 Monitoring Well Location and Designation
-  B1 Proposed Soil Boring Location and Designation



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Proposed Soil Boring Locations

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FIGURE

3

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Appendix A
SITE BACKGROUND INFORMATION

BACKGROUND

On September 16, 1997, Balch Petroleum Contractors & Builders, Inc. (Balch) of Milpitas, California, removed one 2,000-gallon, two 6,000-gallon, one 10,000-gallon single-wall steel gasoline, and one 500-gallon single-wall steel waste oil USTs from the Site. Former UST locations are shown in Figure A of this appendix.

No hole or damage was observed in the tanks. No groundwater was encountered in the tank excavations. After UST removal, Sierra collected soil samples from the tank excavations for chemical analysis.

Up to 2,300 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHG) was detected in the soil samples collected from beneath the tanks at approximately 14 feet below ground surface (bgs). The soil sample locations are shown in Figure A.

On August 14, 2000, Sierra drilled three exploratory soil borings and converted them to groundwater monitoring well MW1 through MW3. The wells are approximately 35 feet deep. Sierra collected soil and groundwater samples from the borings/wells for chemical analysis. The analytical results showed up to 720 ppm TPHG, 2.2 ppm benzene, and 3.4 ppm methyl tertiary butyl ether (MTBE) in the soil samples. Up to 290000 ppb TPHG, 10000 ppb benzene, and 4300 ppb MTBE were detected in the groundwater samples. Gasoline constituents were detected in groundwater samples collected from all three monitoring wells. Groundwater monitoring well locations are shown on Figure 2.

Starting March 30, 2001, Sierra performed quarterly groundwater monitoring at the Site. The field and analytical results are presented in Table I and II.

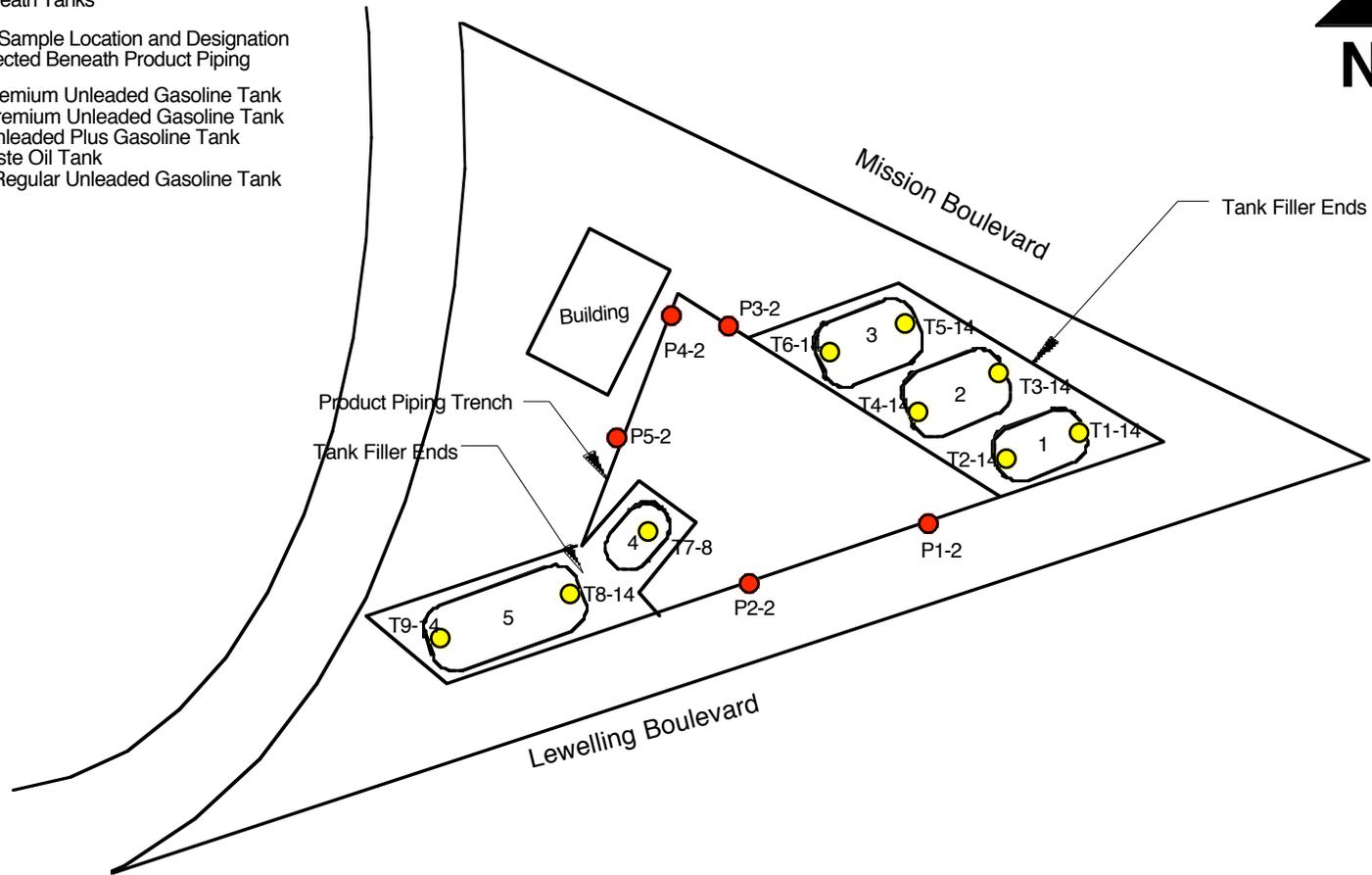
On May 4, 2006, Sierra retained services of Vironex Environmental Services (Vironex) to drill soil boring B1 through B4 at the Jack In The Box and Cal/Trans properties. Sierra collected grab groundwater samples from the borings for chemical analysis. Up to 370 $\mu\text{g/l}$ total petroleum hydrocarbons as gasoline (TPHG), 16 $\mu\text{g/l}$ toluene, 15 $\mu\text{g/l}$ ethylbenzene, and 100 $\mu\text{g/l}$ xylenes were detected in the water sample collected from the borings (B3 and B4) advanced at the Jack In The Box property. No benzene or MTBE was detected in water samples collected at this property. 3.2 $\mu\text{g/l}$ MTBE was detected in the water samples collected from the borings advanced at the Cal/Trans properties. The MTBE was detected in boring B2 located within 300 feet northwest at hydraulic down gradient of the Site. On May 10 and 11, 2006, Sierra retained services of Hew Drilling Company, Inc. (Hew) to construct 4 groundwater monitoring wells (MW4 through MW7) at the Cal/Trans properties, and Langton Drive. After the well construction, Sierra had the wellheads surveyed, developed the wells, and collected groundwater samples from the wells for chemical analysis. No gasoline constituents were detected in the groundwater samples collected from the wells. The analytical results for the soil and groundwater samples collected from the boring and the wells suggest the tip of the dissolved MTBE plume in the

groundwater is confined within 300 feet northwest of the Site. The length of the dissolved plume of other gasoline constituents in groundwater is shorter than the MTBE plume. Figure 2 shows the groundwater monitoring well locations.

Sierra has been monitoring the groundwater at on-site and off-site wells on quarterly intervals. Please refer to Table I and II for the information

LEGEND

- T1-14 Soil Sample Location and Designation Collected Beneath Tanks
 - P1-2 Soil Sample Location and Designation Collected Beneath Product Piping
- 1 = 2,000-Gallon Premium Unleaded Gasoline Tank
 2 = 6,000-Gallon Premium Unleaded Gasoline Tank
 3 = 6,000-Gallon Unleaded Plus Gasoline Tank
 4 = 500-Gallon Waste Oil Tank
 5 = 10,000-Gallon Regular Unleaded Gasoline Tank



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Former UST and Soil Sample Locations

**Soil and Groundwater Investigation
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FIGURE

A

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Appendix B
SENSITIVE RECEPTORS INFORMATION

**Well Search Addresses By DWR
17715 Mission Boulevard
Hayward, California**

Well Address	Well Depth	Well Type
1310 Elgin Street, San Leandro, CA	51'	Not Known
1151 Elgin Street, San Leandro, CA	37'	Irrigation
467 E. Leweling Blvd., San Lorenzo, CA	60'	Irrigation
779 Paradise Blvd., Hayward, CA	73'	Irrigation
Cambridge & Hampton, Hayward, CA	120'	Not Known
65 Cambridge Avenue, San Leandro, CA	120'	Irrigation
Unreadable Address	88'	Not Known
17754 Meekland Ave., Hayward, CA	85'	Domestic
249 Medford Avenue, Hayward, CA	83'	Irrigation
540 Cherry Way, Hayward, CA	86'	Not Known
19751 Western Blvd., Hayward, CA	88'	Not Known
310 Cherry Way, Hayward, CA	81'	Irrigation
268 Cherry Way, Hayward, CA	83'	Irrigation
559 Cherry Way, Hayward, CA	63'	Irrigation
850 Cherry Way, Hayward, CA	100'	Irrigation
21065 Western Blvd., Hayward, CA	100'	Irrigation
29065 Shasta Street, Hayward	40'	Domestic

County	Township	Section	Tract	Sequence	Log Number
ALA01	03S02W		8		107446
ALA01	03S02W		8		01-1468
ALA01	03S02W		8		106608
ALA01	03S02W		8		Jan-67
ALA01	03S02W		8		01-543A
ALA01	03S02W		8		01-543B
ALA01	03S02W		8		01-543C
ALA01	03S02W		8		01-415B
ALA01	03S02W		8		33315
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ALA01	03S02W		8		403286
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ALA01	03S02W		8		01-471E
ALA01	03S02W		8		01-471F
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ALA01	03S02W		8		01-471H
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ALA01	03S02W		8		01-546S
ALA01	03S02W		8		01-546T
ALA01	03S02W		8		33214
ALA01	03S02W		8		01-1471
ALA01	03S02W		8		NN
ALA01	03S02W		8		33224
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ALA01	03S02W		8		33205
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ALA01	03S02W		8		612

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51018044.tif	View Log 612

<u>Permit</u>	<u>Tr</u>	<u>Section</u>	<u>Address</u>	<u>Longcity</u>
	3S/2W	8A 1	17040 ESTEBON ST	San Leandro
	3S/2W	8B 1	1440 168TH AVE	San Leandro
	3S/2W	8G 3	779 PARADISE DR ✓	Hayward
	3S/2W	8G 1	17577 MELOY WAY	San Leandro
	3S/2W	8G 2	1460 172ND AVE	San Leandro
	3S/2W	8H 2	GILBERT & E. 14TH ST	Castro Valley
	3S/2W	8H	18555 Mission Blvd.	Hayward
	3S/2W	8H 3	19100 Mission Blvd.	Hayward
	3S/2W	8H 1	19610 E. 14TH ST	San Leandro
	3S/2W	8J 2	E. 14TH ST	San Leandro
	3S/2W	8J 1	CAMBRIDGE & HAMPTON RD ✓	Hayward
	3S/2W	8J80	65 Cambridge Avenue ✓	San Leandro
	3S/2W	8J 3	65 Cambridge Avenue ✓	San Leandro
	3S/2W	8K 1	654 HAMPTON RD	San Leandro

<u>Waterdepth</u>	<u>Diameter</u>	<u>Use</u>
	0	10 IRR
	0	0 IRR
	36	6 IRR
	0	0 IRR
	0	6 IRR
	0	4 STO
	35	2 MON
	32	2 MON
	0	8 IRR
	0	0 GEO*
	0	0 IRR
	0	0 DES
	0	5 IRR
	0	6 IRR

Well Legend

DOM=Domestic well

IRR=Irrigation well

MUN= Municipal well

IND=Industrial well

CAT=Cathodic well

DES=well destroyed (through permit)

ABN=Abandoned and not being used (but has not been destroyed through permit process)

TES=Test well

BOR= Geotechnical investigation

MON= Monitoring well

EXT=Extraction/ Vapor wells

PIE=Piezometers

REC=Recovery well (extraction/ vapor)

? = Unknown or no information found or given

<u>Owner</u>	<u>Update</u>	<u>Xcoord</u>	<u>Ycoord</u>	<u>Matchlevel</u>
M. LUCAS	8/3/84	1.2E+08	3.8E+07	9
PETERSON'S SANITORIUM	8/3/84	1.2E+08	3.8E+07	9
ANTONE BRUN	8/3/84	1.2E+08	3.8E+07	9
FERNANDES	8/3/84	1.2E+08	3.8E+07	9
MUSIL	8/3/84	1.2E+08	3.8E+07	9
?	8/3/84	1.2E+08	3.8E+07	9
Burger King (Krone Ent.)	3/8/91	1.2E+08	3.8E+07	9
NIP Associates	4/8/93	1.2E+08	3.8E+07	1
RODGERS	8/3/84	1.2E+08	3.8E+07	9
?	8/3/84	1.2E+08	3.8E+07	2
J. POINTER	8/3/84	1.2E+08	3.8E+07	9
Mr. Domenic Lima	7/26/90	1.2E+08	3.8E+07	0
Mr.Dominic Lima	7/26/90	1.2E+08	3.8E+07	0
G. FREITAS	8/3/84	1.2E+08	3.8E+07	9

<u>Tsrqq</u>	<u>Rec_code</u>	<u>Phone</u>	<u>City</u>	<u>Drilldate</u>	<u>Elevation</u>	<u>Totaldepth</u>
3S/2W 8A	4387		0 SLE	3/48	70	132
3S/2W 8B	4388		0 SLE	?	54	80
3S/2W 8G	4404		0 HAY	4/76	0	77
3S/2W 8G	4402		0 SLE	?	60	47
3S/2W 8G	4403		0 SLE	/54	60	51
3S/2W 8H	4406		0 CSV	?	75	0
3S/2W 8H	1148		0 HAY	1/91	250	50
3S/2W 8H	8382		0 HAY	Nov-92	0	43
3S/2W 8H	4405		0 SLE	/10	54	85
3S/2W 8J	4408		0 SLE	?	0	0
3S/2W 8J	4407		0 HAY	3/33	0	120
3S/2W 8J	701		0 SLE	Jul-90	0	0
3S/2W 8J	700		0 SLE	Jul-90	0	120
3S/2W 8K	4409		0 SLE	/55	60	60