

Bay

CAMBRIA

To: Mr. Lee Douglas

Company: Douglas Parking

Address: 1721 Webster Street

Oakland, CA 94612

APR 02 2002



From: Mr. Bob Clark-Riddell, P.E.

Phone: 510-420-3303

Date: 3/29/02

Re: Subsurface Investigation Workplan

Transmittal

Dear Mr. Douglas:

Please find enclosed a copy of Cambria's Subsurface Investigation Workplan for your site at 1721 Webster Street, Oakland, California. Upon regulatory approval, Cambria will prepare an investigation cost estimate for submittal to the UST Cleanup Fund. If you have any questions or comments please contact me at (510) 420-3303.

Thank you,

Bob Clark-Riddell

Bob Clark-Riddell, P.E.
Principal Engineer

cc: Mr. Larry Seto, Alameda County Department of Environmental Health, 1131 Harbor Bay Parkway, 2nd Floor, Alameda, CA 94502

C A M B R I A

APR 02 2002

SUBSURFACE INVESTIGATION WORKPLAN

**Douglas Parking
1721 Webster Street
Oakland, California
Cambria Project No. 580-0197
ACHCSA Site # 4070**



March 28, 2002

Prepared for:

Mr. Lee Douglas
1721 Webster Street
Oakland, California 94612


Prepared by:

Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, California 94608

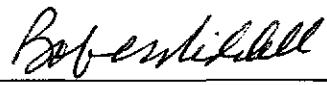
Oakland, CA
San Ramon, CA
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**Cambria
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1144 65th Street
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Kris Cejka
Senior Staff Geologist



Bob Clark-Riddell, P.E.
Principal Engineer

Table of Contents

1.0 INTRODUCTION 1

2.0 SITE DESCRIPTION 1

 2.1 Site Setting 1

 2.2 Previous Site Investigations 1

 2.3 Site Hydrogeology 3

3.0 PROPOSED INVESTIGATION WORKPLAN 3

 3.1 Groundwater Sampling Procedures 3

 3.2 Site Health and Safety Plan 3

 3.3 Utility Location 4

 3.4 Encroachment Permits 4

 3.5 Investigation Permits 4

 3.6 Analytical Methods 4

 3.7 Well Installation 4

 3.8 Well Construction 5

 3.9 Waste Management and Disposal 5

 3.10 Reporting 5

4.0 SCHEDULE 6

ATTACHMENTS


Figure 1: Proposed Well Locations and 4th Quarter Groundwater Elevation Contour and Benzene Concentration Map

Table 1: Groundwater Elevation and Analytical Data

Appendix A: Standard Field Procedures for Installation of Monitoring Wells



1.0 INTRODUCTION



On behalf of Douglas Parking, and as required by the Alameda County Health Care Services Agency (ACHCSA), Cambria Environmental Technology, Inc. (Cambria) has prepared this subsurface investigation workplan for 1721 Webster Street in Oakland, California (Site). This workplan was prepared at the request of ACHCSA in a letter dated August 15, 2001. The objective of the proposed investigation is to provide additional assessment of the upgradient and crossgradient extent of petroleum hydrocarbons in groundwater at the Site. The proposed investigation scope of work includes the installation of two (2) offsite groundwater monitoring wells. The site description, proposed investigation workplan, and schedule are described below.

2.0 SITE DESCRIPTION

A summary of the site setting and hydrogeology is presented below.

2.1 Site Setting

Site Location: The site is located on 1721 Webster Street between 17th and 19th Streets in downtown Oakland, California. The site is located approximately five miles east of the San Francisco Bay and one half-mile west of Lake Merritt. The site is currently being utilized as a parking garage and is surrounded by other commercially-zoned parcels.

2.2 Previous Site Investigations

1992 Tank Removal: On August 3 and 6, 1992, Parker Environmental Services of Pittsburg, California removed one 1,000-gallon and two 500-gallon gasoline underground storage tanks (USTs). The former UST locations are shown on Figure 1. Up to 1,500 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg) and up to 12 ppm benzene were detected in tank excavation and sidewall samples.

1994 Subsurface Investigation: On July 8 and September 8, 1994, Gen Tech/Piers Environmental, Inc. (Gen Tech) of San Jose, California drilled six exploratory borings (EB-1 through EB-6) and installed three groundwater monitoring wells (MW-1 through MW-3). Up to 650 ppm TPHg and 0.2 ppm benzene were detected at 20 feet (ft) depth in soil near the former USTs. Up to 350,000

parts per billion (ppb) TPHg and 10,000 ppb benzene were detected near and immediately down-gradient of the former USTs.

1996 Subsurface Investigation: In February and May, 1996, Cambria drilled seven Geoprobe™ soil borings (SB-A through SB-G) and installed two groundwater monitoring wells (MW-4 and MW-5). Up to 660 ppm TPHg was detected at 20.5 ft depth in soil boring SB-D located down-gradient from the former USTs. Up to 63,000 parts per billion (ppb) TPHg and 7,400 ppb benzene were detected in groundwater from MW-2 immediately down-gradient of the former USTs.



Oxygen Releasing Compound (ORC) Update: To enhance the natural bioattenuation of dissolved hydrocarbons, Cambria installed a string of six one-foot ORC socks in well MW-2 on January 8, 1998. During groundwater monitoring activities, well MW-2 is not purged to maintain the effectiveness of the oxygenated well water. Since ORC installation, dissolved oxygen (DO) concentrations have been monitored in MW-2 and in the remaining wells prior to purging and have been significantly higher in well MW-2 compared to other wells.


Hydrogen Peroxide Injections: Cambria added a total of 120 gallons of 7.5% hydrogen peroxide solution into site groundwater via monitoring wells MW-2 and MW-3 to decrease dissolved hydrocarbon concentrations. The hydrogen peroxide injection events temporarily increased site groundwater DO concentrations, however the DO concentrations rapidly decreased once the injection activities were completed. Six weeks after the final hydrogen peroxide injection event, hydrocarbon concentrations at the Site increased to near or above historical high concentrations. However, the concentrations returned to approximately the same levels recorded prior to the hydrogen peroxide injection during the subsequent quarterly groundwater monitoring event.

Remedial Well Installation: Cambria installed one co-axial Soil Vapor Extraction/Air Sparging (SVE/AS) remediation well and two angled AS wells on March 4, 2000 to facilitate feasibility testing and possible future remediation via SVE, AS, or biosparging. The air injection would provide oxygen to enhance biodegradation of dissolved-phase hydrocarbons in groundwater. The three remediation wells are located in the remediation well vault shown on ^{not shown} Figure 1. The wells were set in two diamond-plated well vaults placed side-by-side and connected with a 4-inch PVC conduit to reduce excessive trenching along Webster Street, an area containing several underground utilities. The AS wells were installed at 30 degrees from vertical and angled toward the former USTs, the presumed former hydrocarbon source area.

2.3 Site Hydrogeology

Groundwater Monitoring: Since 1994, the depth to groundwater has ranged from 16.78 to 22.15 feet below grade surface (bgs), with groundwater consistently flowing towards the northeast (Table 1). Groundwater elevation contours for the fourth quarter of 2001 are shown on Figure 1, and indicate an approximate gradient of 0.007 ft/ft to the north.

3.0 PROPOSED INVESTIGATION WORKPLAN



To further assess the extent of hydrocarbons in groundwater, Cambria proposes to conduct an investigation along Webster Street (upgradient and crossgradient of the former USTs) followed by the installation of groundwater monitoring wells (Figure 1). Our scope of work for this project includes:

- Preparing a Site Health and Safety Plan,
- Coordinating drilling activities, marking the site for Underground Service Alert (USA) and locating subsurface utilities;
- Obtaining a well installation permit from the Alameda County Public Works Agency, and an encroachment permit from the City of Oakland Department of Public Works;
- Installing two monitoring wells to a depth of 30 feet bgs;
- Sampling wells and analyzing groundwater samples for TPHg, BTEX, and methyl tert butyl ether (MTBE); and
- Evaluating the investigation data and preparing an investigation report.

3.1 Groundwater Sampling Procedures

A trained Cambria Geologist will oversee the investigation activities, under the supervision of a California Registered Geologist or Professional Engineer. Cambria's Standard Field Procedures for Monitoring Wells are presented as Appendix A.

3.2 Site Health and Safety Plan

Cambria will prepare a site health and safety plan to protect site workers during the investigation activities. The plan will remain onsite at all times and be signed by all site workers conducting the subsurface investigation.

3.3 Utility Location

Cambria will notify USA prior to our drilling activities. USA will identify the utilities in the site vicinity. A private line locating firm will be used to identify the locations of known underground utilities, and to help clear the proposed drilling locations.

3.4 Encroachment Permits

Cambria will obtain any necessary encroachment permits from the City of Oakland Department of Public Works for the proposed investigation activities.

3.5 Investigation Permits

Cambria will obtain permits for the installation of wells from the Alameda County Public Works Agency (ACPWA).


3.6 Analytical Methods

The groundwater samples will be submitted to a California-certified laboratory for analysis for TPHg by modified EPA Method 8015, and for benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl tert-butyl ether (MTBE) by EPA Method 8020. Because the investigation is assessing offsite groundwater quality, no soil sample analyses are anticipated. If field observations suggest the presence of hydrocarbons in unsaturated soil, soil samples will be collected and submitted for analysis.

3.7 Well Installation

Cambria plans to install two (2) groundwater monitoring wells at the Site where shown on Figure 1. To monitor groundwater quality upgradient of the Site, we propose installing monitoring well MW-6 southwest of the former USTs. To monitor groundwater quality crossgradient of the Site, we propose installing monitoring well MW-7 southeast of the former USTs. Cambria will coordinate the well installations with ACHCSA and other parties that may be involved during the sampling activities.

3.8 Well Construction



The monitoring wells will be constructed with 2-inch diameter, 0.010-inch slotted PVC well screen and well casing, with #2/12 sand. To be consistent with the existing site monitoring wells, the well screens will extend approximately 10 ft below and 5 ft above the static groundwater level. Eighteen inches of each 5-ft boring interval will be collected and logged to confirm lithology and ensure proper screening of water-bearing units. The wells will be developed in accordance with Alameda County Health Care Services Agency (ACHCSA) regulations, a minimum of 72 hours after installation. Groundwater samples will be collected a minimum of 72 hours after development, in accordance with ACHCSA regulations.

The well screens will be determined during drilling based on the observed field conditions. The wells will be installed in accordance with Cambria's Standard Field Procedures for Installation of Monitoring Wells presented as Appendix A.

3.9 Waste Management and Disposal

Soil cuttings and rinseate generated during drilling will be temporarily stored onsite in 55-gallon Department of Transportation approved drums. The drums will be labeled and sealed onsite pending transportation and disposal to an approved facility.

3.10 Reporting

Cambria will prepare a subsurface investigation report presenting the findings of the investigation. The report, at a minimum, will contain:

- A summary of the Site background;
- Descriptions of the drilling and sampling methods;
- Well logs;
- Tabulated soil and groundwater analytical results;
- Analytical reports and chain-of-custody forms;

- A discussion of the contaminant distribution in groundwater;
- Soil and groundwater disposal methods; and
- Cambria's conclusions and recommendations.

4.0 SCHEDULE



Cambria anticipates beginning permitting and coordination of the investigation field work within two weeks of receiving workplan approval from the ACHCSA and cost pre-approval from the California UST Cleanup Fund.

EXPLANATION

- MW-6 Proposed Groundwater Monitoring Well
- Groundwater Monitoring Well
- SB-A Soil Boring Location

Well	Well ID
ELEV	Groundwater Elevation
Benzene	Benzene Conc. in Groundwater in parts per billion (ppb); Date is most recent sampling event unless otherwise noted.

NS Not Sampled

7.50 Groundwater Elevation Contour (ft)

Groundwater Flow Direction and Gradient (ft/ft)

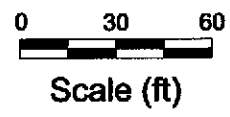
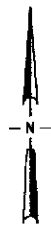
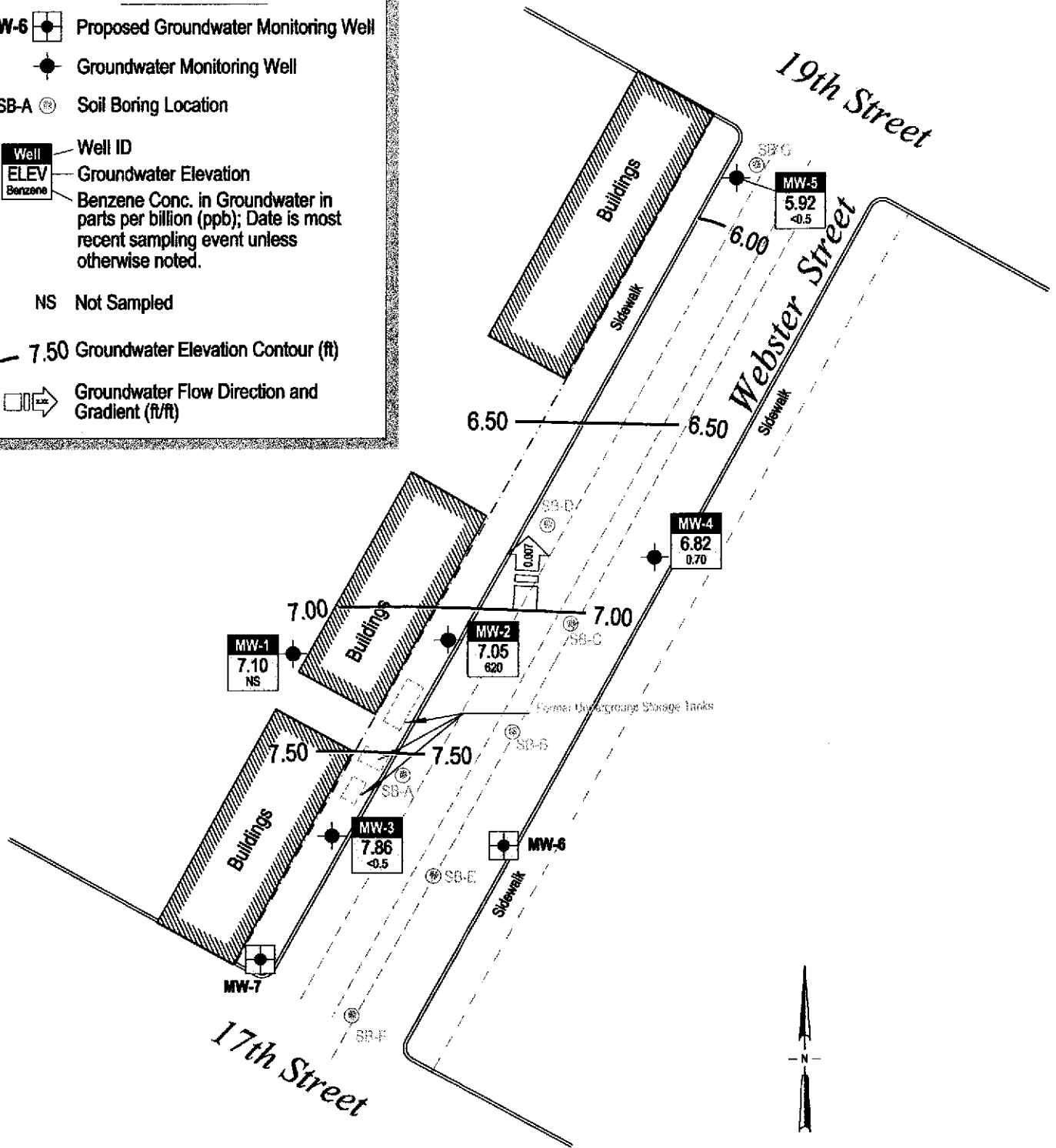


FIGURE 1

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Base map from Piers Environmental Services

Douglas Parking Facility
 1721 Webster Street
 Oakland, California



C A M R I A

Proposed Well Locations and 4th Qtr. Groundwater Elevation Contour and Benzene Concentration Map

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Table 1. Groundwater Elevation and Analytical Data - Douglas Parking Company, 1721 Webster Street, Oakland, CA

Well ID	Date	TOC Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft)	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	DO (mg/L)	Notes
MW-1	12/2/1994	29.25	19.42	9.83	nd	nd	nd	nd	nd	-	-	1
	3/6/1995	29.73	20.69	9.04	nd	nd	nd	nd	nd	-	-	1
	7/11/1995	29.81	20.65	9.16	nd	nd	nd	nd	nd	-	-	
	5/10/1996	29.81	20.80	9.01	nd	nd	nd	nd	nd	-	-	
	10/2/1996	29.81	21.35	8.46	-	-	-	-	-	-	-	
	2/28/1997	29.81	20.57	9.24	-	-	-	-	-	-	-	2
	9/16/1997	29.81	21.50	8.31	-	-	-	-	-	-	-	2
	2/5/1998	29.81	20.91	8.90	-	-	-	-	-	-	-	2
	8/11/1998	29.81	20.50	9.31	-	-	-	-	-	-	1.90	2
	2/8/1999	29.81	21.42	8.39	-	-	-	-	-	-	0.06	2
	2/24/1999	29.81	22.99	6.82	-	-	-	-	-	-	6.00	2,3
	3/3/1999	29.81	20.84	8.97	-	-	-	-	-	-	2.00	2,3
	3/10/1999	29.81	20.89	8.92	-	-	-	-	-	-	3.80	2,3
	3/17/1999	29.81	20.84	8.97	-	-	-	-	-	-	3.40	2,3
	5/4/1999	29.81	20.80	9.01	-	-	-	-	-	-	2.80	2,3
	7/20/1999	29.81	21.25	8.56	-	-	-	-	-	-	3.50	2
	10/5/1999	29.81	21.37	8.44	-	-	-	-	-	-	3.07	2
	1/7/2000	29.81	21.65	8.16	-	-	-	-	-	-	5.40	2
	4/6/2000	29.81	21.05	8.76	<50	<0.5	<0.5	<0.5	<0.5	<5.0	2.10	2
	7/31/2000	29.81	21.13	8.68	-	-	-	-	-	-	3.90	4
	10/3/2000	29.81	21.69	8.12	-	-	-	-	-	-	1.80	2
	1/12/2001	29.81	22.00	7.81	-	-	-	-	-	-	1.42	2
	4/11/2001	29.81	22.16	7.65	-	-	-	-	-	-	0.68	
7/6/2001	29.81	22.57	7.24	-	-	-	-	-	-	0.51		
10/25/2001	29.81	22.71	7.10	-	-	-	-	-	-	-		
MW-2	12/2/1994	27.10	19.50	7.60	61,300	3,000	3,900	160	4,500	-	-	1
	3/6/1995	27.10	18.49	8.61	98,000	8,400	16,000	2,000	2,600	-	-	1
	7/11/1995	27.40	18.45	8.95	38,000	3,100	7,500	940	3,700	-	-	
	5/10/1996	27.40	18.56	8.84	63,000	7,400	16,000	1,500	6,000	-	-	
	10/2/1996	27.40	19.15	8.25	21,000	2,200	3,400	430	1,600	-	-	
	2/28/1997	27.40	18.43	8.97	39,000	4,700	9,600	950	4,200	nd	-	
	9/16/1997	27.40	19.26	8.14	29,000	3,300	5,800	690	2,900	<620	-	

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Table 1. Groundwater Elevation and Analytical Data - Douglas Parking Company, 1721 Webster Street, Oakland, CA

Well ID	Date	TOC Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft)	(Concentrations in µg/l)						DO (mg/L)	Notes
					TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE		
	2/5/1998	27.40	18.66	8.74	10,000	1,000	2,000	170	860	<330	7.90	
	8/11/1998	27.40	18.41	8.99	12,000	1,200	2,300	260	1,400	300	5.40	
	2/8/1999	27.40	19.84	7.56	5,500	740	1,200	150	780	60	3.70	
	2/17/1999	27.40	18.94	8.46	-	-	-	-	-	-	>20	3, 5
	2/24/1999	27.40	20.76	6.64	-	-	-	-	-	-	>20	3, 5
	3/3/1999	27.40	18.55	8.85	-	-	-	-	-	-	>20	3, 5
	3/10/1999	27.40	20.74	6.66	-	-	-	-	-	-	>20	3, 5
	3/17/1999	27.40	18.57	8.83	-	-	-	-	-	-	>20	3, 5
	5/4/1999	27.40	18.55	8.85	90,000	9,200	21,000	1,600	10,000	560	3.20	
	7/20/1999	27.40	18.98	8.42	28,000	2,100	3,700	900	4,200	<860	0.64	
	10/5/1999	27.40	19.10	8.30	11,000	870	180	30	1,400	<110	0.58	
	1/7/2000	27.40	19.41	7.99	15,000	1,300	2,100	440	1,800	<14	0.94	
	4/6/2000	27.40	18.80	8.60	17,000	1,800	3,100	500	2,200	<50	0.64	
	7/31/2000	27.40	18.87	8.53	17,000	1,500	2,700	430	2,100	<200	0.50	
	10/3/2000	27.40	19.45	7.95	27,000	2,500	4,000	660	2,900	<50	0.16	
	1/12/2001	27.40	19.80	7.60	25,000	2,700	4,100	670	3,000	<200	0.35	
	4/11/2001	27.40	20.03	7.37	97,000	9,500	21,000	2,200	7,900	<200	-	
	7/6/2001	27.40	20.19	7.21	3,500	500	150	11	420	<5.0	-	
	10/25/2001	27.40	20.35	7.05	3,800	620	230	70	400	<50	-	
MW-3	12/2/1994	29.50	22.15	7.35	394,000	1,200	nd	1,800	4,000	-	-	1
	3/6/1995	29.25	20.09	9.16	21,000	400	150	24	62	-	-	1
	7/11/1995	29.56	19.99	9.57	12,000	nd	10	16	99	-	-	
	5/10/1996	29.56	20.24	9.32	8,600	nd	7.6	16	84	-	-	
	10/2/1996	29.56	20.90	8.66	11,000	nd	7.4	19	92	-	-	
	2/28/1997	29.56	20.12	9.44	6,000	nd	4.4	17	88	50	-	
	9/16/1997	29.56	20.97	8.59	6,500	<0.5	1	1	7	<5.0	-	
	2/5/1998	29.56	20.39	9.17	5,400	<0.5	6.3	15	86	<63	1.90	
	8/11/1998	29.56	19.95	9.61	2,700	<0.5	3.5	3.2	12	<10	0.05	
	2/8/1999	29.56	20.58	8.98	6,100	<0.5	8.1	18	80	<140	2.20	
	2/17/1999	29.56	20.53	9.03	-	-	-	-	-	-	>20	3, 5
	2/24/1999	29.56	22.53	7.03	-	-	-	-	-	-	>20	3, 5

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Table 1. Groundwater Elevation and Analytical Data - Douglas Parking Company, 1721 Webster Street, Oakland, CA

Well ID	Date	TOC Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft)	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	DO	Notes
					←		(Concentrations in µg/l)			→	(mg/L)	
	3/3/1999	29.56	20.28	9.28	-	-	-	-	-	-	>20	3, 5
	3/10/1999	29.56	22.45	7.11	-	-	-	-	-	-	>20	3, 5
	3/17/1999	29.56	20.26	9.30	-	-	-	-	-	-	>20	3, 5
	5/4/1999	29.56	20.24	9.32	11,000	<2	<2	9.8	140	<10	3.10	
	7/20/1999	29.56	20.68	8.88	11,000	<0.5	3.1	13	88	<80	0.75	
	10/5/1999	29.56	20.81	8.75	31,000	62	<0.5	21	170	<90	0.68	
	1/7/2000	29.56	21.09	8.47	13,000	<0.5	<2	21	140	<80	1.96	
	4/6/2000	29.56	20.48	9.08	5,300	1.5	1.4	9.8	60	<30	4.15	
	7/31/2000	29.56	20.62	8.94	7,100	3.5	1.0	12	66	<5.0	0.35	
	10/3/2000	29.56	21.13	8.43	8,000	<0.5	3.3	11	70	<40	3.66	
	1/12/2001	29.56	21.45	8.11	11,000	4.3	6.7	11	73	<70	0.35	
	4/11/2001	29.56	21.69	7.87	10,000	<0.5	<0.5	11	65	<10	-	
	7/6/2001	29.56	21.60	7.96	13,000	5.3	1.6	11	58	<5.0	-	
	10/25/2001	29.56	21.70	7.86	11,000	<0.5	3.0	15	70	<10	-	
MW-4	5/10/1996	25.29	16.98	8.31	14,000	nd	1,200	720	3,100	-	-	
	10/2/1996	25.29	17.65	7.64	12,000	nd	650	580	2,200	-	-	
	2/28/1997	25.29	16.80	8.49	13,000	nd	1,100	750	2,700	110	-	
	9/17/1997	25.29	17.93	7.36	13,000	<2.5	820	750	2,900	<190	-	
	2/5/1998	25.29	16.78	8.51	13,000	<1.0	690	690	2,900	<170	2.10	
	8/11/1998	25.29	16.59	8.70	15,000	<5	360	520	1,900	280	2.80	
	2/8/1999	25.29	17.10	8.19	9,800	<5	680	770	2,200	300	1.80	3
	2/24/1999	25.29	18.95	6.34	-	-	-	-	-	-	2.20	3
	3/3/1999	25.29	16.80	8.49	-	-	-	-	-	-	4.60	3
	3/10/1999	25.29	16.86	8.43	-	-	-	-	-	-	3.70	3
	3/17/1999	25.29	16.82	8.47	-	-	-	-	-	-	4.30	3
	5/4/1999	25.29	16.86	8.43	11,000	46	600	620	1,900	<100	4.10	
	7/20/1999	25.29	17.30	7.99	13,000	<0.5	470	7.0	2,000	<150	0.38	
	10/5/1999	25.29	17.43	7.86	18,000	4.4	720	800	2,100	<120	0.71	
	1/7/2000	25.29	17.78	7.51	18,000	<2	930	990	2,700	<30	0.98	
	4/6/2000	25.29	17.17	8.12	8,000	31	390	530	1,300	<10	1.33	
	7/31/2000	25.29	17.21	8.08	6,200	13	170	460	850	<10	0.50	
	10/3/2000	25.29	18.00	7.29	14,000	42	820	730	2,000	<50	0.54	

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Table 1. Groundwater Elevation and Analytical Data - Douglas Parking Company, 1721 Webster Street, Oakland, CA

Well ID	Date	TOC Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft)	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	DO (mg/L)	Notes
					(Concentrations in µg/l)							
	1/12/2001	25.29	18.20	7.09	<50	<0.5	<0.5	<0.5	<0.5	<5.0	0.39	
	4/11/2001	25.29	18.31	6.98	<50	<0.5	<0.5	<0.5	<0.5	<5.0	-	
	7/6/2001	25.29	18.35	6.94	470	2.3	1.6	0.81	43	<5.0	-	
	10/25/2001	25.29	18.47	6.82	110	0.70	<0.5	<0.5	3.3	<5.0	-	
MW-5	5/10/1996	21.97	14.60	7.37	nd	nd	nd	nd	nd	-	-	
	10/2/1996	21.97	15.25	6.72	nd	nd	nd	nd	nd	-	-	
	2/28/1997	21.97	14.31	7.66	nd	nd	nd	nd	nd	nd	-	
	9/17/1997	21.97	15.18	6.79	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0	-	
	2/5/1998	21.97	13.64	8.33	<50	<0.5	<0.5	<0.5	<0.5	<5.0	2.80	
	8/11/1998	21.97	13.92	8.05	<50	<0.5	<0.5	<0.5	<0.5	<5.0	0.05	
	2/8/1999	21.97	14.19	7.78	<50	<0.5	<0.5	<0.5	<0.5	<5.0	3.00	
	2/24/1999	21.97	16.18	5.79	-	-	-	-	-	-	4.90	3
	3/3/1999	21.97	14.23	7.74	-	-	-	-	-	-	3.40	3
	3/10/1999	21.97	14.32	7.65	-	-	-	-	-	-	3.60	3
	3/17/1999	21.97	14.25	7.72	-	-	-	-	-	-	3.90	3
	5/4/1999	21.97	14.41	7.56	<50	<0.5	<0.5	<0.5	<0.5	<5.0	3.20	
	7/20/1999	21.97	14.44	7.53	<50	<0.5	<0.5	<0.5	<0.5	<5.0	0.99	
	10/5/1999	21.97	14.79	7.18	<50	<0.5	<0.5	<0.5	<0.5	<5.0	1.52	
	1/7/2000	21.97	15.23	6.74	-	-	-	-	-	-	-	Well inaccessible
	4/6/2000	21.97	14.74	7.23	<50	<0.5	<0.5	<0.5	<0.5	<5.0	1.67	
	7/31/2000	21.97	14.52	7.45	<50	<0.5	<0.5	<0.5	<0.5	<5.0	2.55	
	10/3/2000	21.97	15.37	6.60	<50	<0.5	<0.5	<0.5	<0.5	<5.0	1.51	
	1/12/2001	21.97	15.70	6.27	6,400	13	290	450	1,100	<40	0.71	
	4/11/2001	21.97	15.78	6.19	<50	<0.5	<0.5	<0.5	<0.5	<5.0	-	
7/6/2001	21.97	15.97	6.00	<50	<0.5	<0.5	<0.5	<0.5	<5.0	-		
10/25/2001	21.97	16.05	5.92	<50	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0	-	

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Table 1. Groundwater Elevation and Analytical Data - Douglas Parking Company, 1721 Webster Street, Oakland, CA

Well ID	Date	TOC Elevation (ft-msl)	Depth to Water (ft)	Groundwater Elevation (ft)	TPHg ←	Benzene →	Toluene ←	Ethylbenzene →	Xylenes →	MTBE →	DO (mg/L)	Notes
(Concentrations in µg/l)												
Trip Blank	01/12/01	-	-	-	<50	<0.5	<0.5	<0.5	<0.5	<5.0	-	
	4/11/2001	-	-	-	<50	<0.5	<0.5	<0.5	<0.5	<5.0	-	
	7/6/2001	-	-	-	<50	<0.5	<0.5	<0.5	<0.5	<5.0	-	

Notes and Abbreviations:

Benzene, Toluene, Ethylbenzene, and Xylenes by EPA Method 8020.

TPHg = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015.

MTBE = methyl tertiary butyl ether by EPA Method 8020.

µg/L = micrograms per liter

mg/L = milligrams per liter

ft-msl = feet above mean sea level

TOC = top of casing

nd = not detected

DO = dissolved oxygen

1 = Data prior to 7/11/95 from Gen Tech and Piers Environmental Quarterly Groundwater Monitoring Reports dated December 2, 1994 and March 6, 1995, respectively.

2 = Sampling no longer required in well MW-1 per September 17, 1996, ACDEH letter to Douglas Parking.

3 = DO monitoring event (no hydrocarbon analyses), as described in November 11, 1998 Remedial Workplan.

4 = Sampled well once to confirm well is still not impacted.

5 = Hydrogen peroxide injection occurring per our Remedial Workplan, dated November 11, 1998.

APPENDIX A

Standard Field Procedures for Installation of Monitoring Wells

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STANDARD FIELD PROCEDURES FOR INSTALLATION OF MONITORING WELLS

This document presents standard field methods for drilling and sampling soil borings and installing, developing and sampling ground water monitoring wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

SOIL BORINGS

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor or staining, and to collect samples for analysis at a State-certified laboratory. All borings are logged using the Unified Soil Classification System by a trained geologist working under the supervision of a California Registered Geologist (RG).

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or direct-push technologies such as the Geoprobe®. Soil samples are collected at least every five ft to characterize the subsurface sediments and for possible chemical analysis. Additional soil samples are collected near the water table and at lithologic changes. Samples are collected using lined split-barrel or equivalent samplers driven into undisturbed sediments at the bottom of the borehole.

Drilling and sampling equipment is steam-cleaned prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Analysis

Sampling tubes chosen for analysis are trimmed of excess soil and capped with Teflon tape and plastic end caps. Soil samples are labeled and stored at or below 4° C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

Field Screening

One of the remaining tubes is partially emptied leaving about one-third of the soil in the tube. The tube is capped with plastic end caps and set aside to allow hydrocarbons to volatilize from the soil.

After ten to fifteen minutes, a portable volatile vapor analyzer measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. Volatile vapor analyzer measurements are used along with the field observations, odors, stratigraphy and ground water depth to select soil samples for analysis.

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Water Sampling

Water samples, if they are collected from the boring, are either collected using a driven Hydropunch® type sampler or are collected from the open borehole using bailers. The ground water samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe.

MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

Well Construction and Surveying

Ground water monitoring wells are installed to monitor ground water quality and determine the ground water elevation, flow direction and gradient. Well depths and screen lengths are based on ground water depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically extend 10 to 15 ft below and 5 ft above the static water level at the time of drilling. However, the well screen will generally not extend into or through a clay layer that is at least three ft thick.

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. A rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two ft above the well screen. A two ft thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of Portland type I,II cement.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security.

The well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark.

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Well Development

Wells are generally developed using a combination of ground water surging and extraction. Surging agitates the ground water and dislodges fine sediments from the sand pack. After about ten minutes of surging, ground water is extracted from the well using bailing, pumping and/or reverse air-lifting through an eductor pipe to remove the sediments from the well. Surging and extraction continue until at least ten well-casing volumes of ground water are extracted and the sediment volume in the ground water is negligible. This process usually occurs prior to installing the sanitary surface seal to ensure sand pack stabilization. If development occurs after surface seal installation, then development occurs 24 to 72 hours after seal installation to ensure that the Portland cement has set up correctly.

All equipment is steam-cleaned prior to use and air used for air-lifting is filtered to prevent oil entrained in the compressed air from entering the well. Wells that are developed using air-lift evacuation are not sampled until at least 24 hours after they are developed.

Ground Water Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of ground water are purged prior to sampling. Purging continues until ground water pH, conductivity, and temperature have stabilized. Ground water samples are collected using bailers or pumps and are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

SITE & SAMPLING PLAN: 6335 SAN PABLO AVENUE, OAKLAND.

P. 15

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