

C A M B R I A

- Analyze GW sample w/ highest TPd for
PnAs.
- BMTBE is detected. confirm w/ 8260 - then
also quantify other oxygenates

July 15, 1999

Ms. Eva Chu
Alameda County Health Care Services Agency
Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Soil and Groundwater Investigation Workplan**
Clark's Home and Garden
23040 Clawiter Road
Hayward, California



Dear Ms. Chu:

On behalf of Mr. Ken Clark, the property owner, and Mr. and Mrs. Bob and Shirley Price, Mr. Clark's representatives, Cambria Environmental Technology, Inc. (Cambria) is submitting this Soil and Groundwater Investigation Workplan in response to a February 22, 1999 Alameda County Health Care Services Agency (ACHCSA) letter requesting additional downgradient groundwater monitoring wells at the site referenced above. The investigation objective is to further assess the lateral extent of hydrocarbons at the site. Presented below are the site background and the proposed investigation scope of work.

SITE BACKGROUND

The site is located near the intersection of Clawiter Road and National Avenue in Hayward, California. Currently the property is operated as a home and garden center in a commercial use area.

1988 Underground Storage Tank (UST) Removal: In November 1988 Kaprealian Engineering Inc. (KEI), of Benecia, California removed one 3,000 gallon unleaded UST and one 1,000 gallon diesel UST from the north side of the site's main office building. There were no leaks observed in the unleaded UST during removal. However, KEI observed several small holes in the diesel UST. Analytical results from samples collected underneath the diesel UST indicated the presence of up to 3,500 mg/kg total petroleum hydrocarbons as gasoline (TPHg) and 24,000 mg/kg total petroleum hydrocarbons as diesel (TPHd) beneath the site. KEI excavated soil to a depth of 18 feet below ground surface (bgs). Sidewall sample SW-1, collected after the excavation, reported TPHg and TPHd concentrations of 670 mg/kg and 1,100 mg/kg, respectively.

Oakland, CA
Sonoma, CA
Portland, OR
Seattle, WA

**Cambria
Environmental
Technology, Inc.**

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Oakland, CA 94608
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99 JUL 19 PM 3:31
ENVIRONMENTAL
PROTECTION

1991 Monitoring Well Installation: On August 1, 1991, groundwater monitoring well MW-1 was installed on the western edge of the former UST excavation. One sample analyzed from the capillary fringe at 15 feet bgs contained 6,700 mg/kg TPHg and 350 mg/kg TPHd, however, no benzene or toluene was detected.

1995 Soil Borings: On November 22, 1995, Geomatrix of San Francisco, California conducted an additional site assessment at the request of the ACHCSA. Four borings were advanced to collect grab groundwater samples across the site. Elevated concentrations of total petroleum hydrocarbons as diesel (TPHd), total petroleum hydrocarbons as gasoline (TPHg), and total petroleum hydrocarbons as motor oil (TPHmo) were detected in grab groundwater samples at 11,000, 270,000, and 3,300 micrograms per liter ($\mu\text{g/l}$), respectively.

1997 Soil Borings: Based on their November 22, 1995 findings, in February 1997 Geomatrix advanced four additional borings to collect additional grab groundwater samples in Clawiter Street, downgradient of the site. Grab groundwater samples reported maximum concentrations of 1,100,000 $\mu\text{g/l}$ TPHd, 8,600 $\mu\text{g/l}$ TPHg, and 4 $\mu\text{g/l}$ benzene. No methyl tertiary butyl ether (MTBE) was detected in any grab groundwater sample. Previous borings logs and tables are included as Attachment A.

PROPOSED INVESTIGATION SCOPE OF WORK

At the request of the ACHCSA, and to further assess the lateral extent of hydrocarbons in groundwater, Cambria proposes installing two groundwater monitoring wells near former borings B-6 and B-7. All field work will be conducted in accordance ACHCSA guidelines. We have included our standard field procedures for monitoring well installation as Attachment B.

Cambria proposes the following task to achieve the investigation objective:


1. Prepare a site safety plan and coordinate field activities;
2. Obtain necessary monitoring well permits and notify Underground Service Alert to locate underground utilities prior to drilling;
3. Drill two borings to an estimated depth of 25 ft while logging the samples using the Unified Soil Classification System;
4. Collect soil samples at a minimum of 5 ft intervals and near the soil/groundwater interface from each boring and analyze select samples for TPHg, TPHd, BTEX, and MTBE.

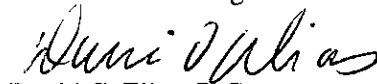
5. Complete the soil borings as monitoring wells screened five ft above and 10 ft below the groundwater table;
6. Develop each well after installing the filter pack and prior to sealing the well.
7. Collect groundwater samples and analyze for TPHg, TPHd, BTEX, and MTBE;
8. Survey the wells to mean sea level; and
9. After the analytic results are received, prepare a subsurface investigation report that, at a minimum, will contain: a summary of the site background; descriptions of the drilling, soil sampling, and water sampling methods; boring/well construction logs; tabulated soil and ground water analytic results; a figure presenting monitoring well locations; analytic reports and chain-of-custody forms; soil and water disposal methods; and a discussion of the hydrocarbon distribution.

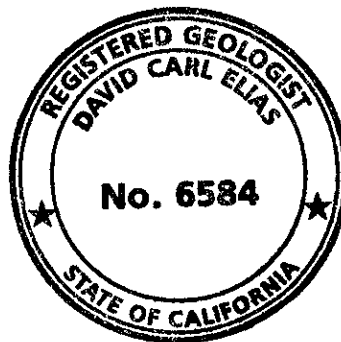


Please call John Riggi at (510) 420-3340 if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.


John A. Riggi
Senior Staff Geologist

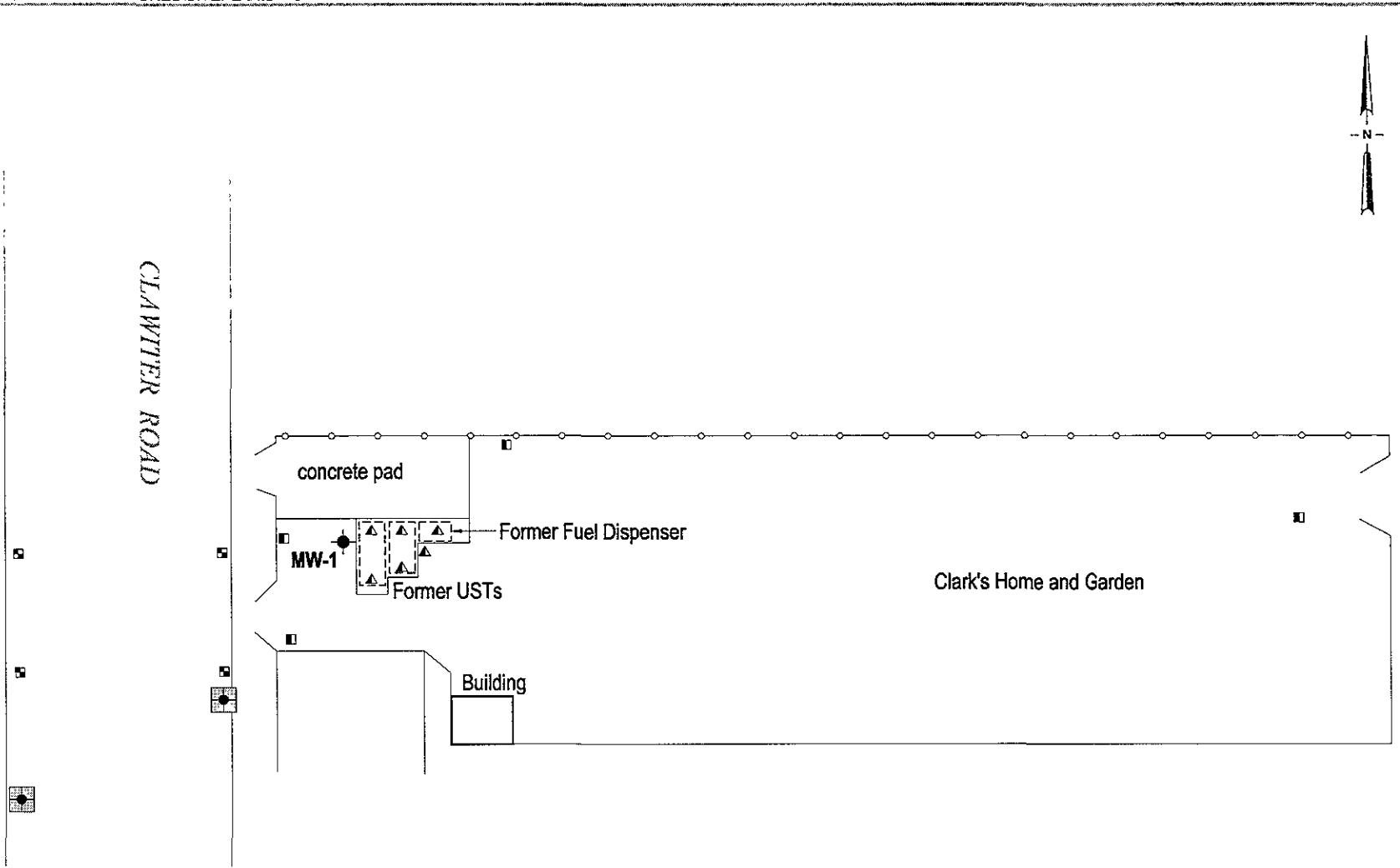
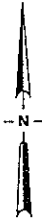

David C. Elias, R.G.
Senior Geologist



H:\Clarks H&G\WORKPLAN.WPD

Attachments: A - Historical Investigation Results
B - Standard Field Procedures

cc: Mr. and Mrs. Bob and Shirley Price, 537 Hidden Valley Road, Grants Pass, Oregon 97527



Clark's Home and Garden

CLAWITTER ROAD

concrete pad






Former Fuel Dispenser

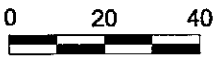
Former USTs

Building

MW-1

EXPLANATION

- MW-1  Monitoring Well Location
-  Proposed Monitoring Well Location
-  Soil Sample Location (Kaprealian Engineering, Inc.)
-  Grab Groundwater sample collected 11/22/95
-  Grab Groundwater Sample collected 02/19/97



Scale (ft)

FIGURE 1

Clark's Home and Garden
 23040 Clawitter Road
 Hayward, California



C A M B R I A

**Proposed Groundwater
 Monitoring Well Locations**

ATTACHMENT A

Historical Investigation Results

TABLE 1

SUMMARY OF HISTORICAL SOIL ANALYTICAL RESULTS¹

Clark's Home and Garden
23040 Clawiter Road
Hayward, California

Concentrations in milligrams per kilograms (mg/kg)

Sample Name	Date	Depth (feet bgs ²)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Ethyl-Benzene	Total Xylenes
A1	11/4/88	13	---3	5.1	<0.05	<0.01	<0.1	<0.1
A2	11/4/88	13	---	<1.0	<0.05	<0.1	<0.1	<0.1
B1	11/4/88	10	24,000	2700	0.43	33	61	350
B2	11/4/88	10	23,000	3500	0.57	46	63	350
SW-1	12/19/88	17.2	1100	670	1.1	23	67	15
DH-1	8/1/91	5.5	29	9.9	BTEX detected between 0.0027 and 0.3 mg/kg			
MW-1	8/1/91	5.5	ND ⁴	ND	ND	ND	ND	ND
MW-1	8/1/91	10.5	ND	ND	ND	ND	ND	ND
MW-1	8/1/91	15.0	350	6700	ND	ND	6.6	27
EPA Region IX Industrial PRG ⁵			NA ⁶	NA	1.4	880	230	320

Notes:

1. Soil samples analyzed by Sequoia Analytical of Redwood City, California, for total petroleum hydrocarbons (TPH) as diesel and gasoline using modified Environmental Protection Agency (EPA) Method 8015, and for benzene, toluene, ethylbenzene, and xylenes using EPA Method 8020.
2. feet bgs = feet below ground surface.
3. --- indicates not analyzed for that compound.
4. ND = not detected at or above reporting limit; reporting limit not available.
5. PRG = Preliminary Remediation Goal.
6. NA = No PRG established.

TABLE 2

**SUMMARY OF HISTORICAL GROUNDWATER ANALYTICAL RESULTS¹
FOR MONITORING WELL MW-1**

Clark's Home and Garden
23040 Clawiter Road Site
Hayward, California

Concentrations in micrograms per liter ($\mu\text{g/l}$) unless otherwise noted.

Date	TPH as Diesel (mg/l) ²	TPH as Gasoline (mg/l)	Benzene	Toluene	Ethyl-Benzene	Total Xylenes
8/7/91	7.1	5.9	45	<25	130	520
9/5/91	2.8 ³	47.0	<50	<50	230	660
10/15/91	13.0	24.0	<50	<50	<50	390
1/7/92	9.0 ³	23.0 ⁴	<50	<50	270	800
4/8/92	3.5 ³	8.1	19	<5	350	210
7/7/92	6.3	7.0	<5	<5	190	170
11/23/93	1.6	2.4	1.5	3.7	41	24
1/31/94	1.9	3.9	1.9	4.2	56	49
4/11/94	3.0	2.2	1.2	4.6	11	11
7/27/94	4.4 ⁵	6.2	<1	<1	50	74
10/31/94	1.8	1.7	2.1	4.9	20	42
10/9/95	1.3	0.87	<0.5	<0.5	12	10.4
1/17/96	1.8	1.8	10 ⁶	<5 ⁶	16	19.8
4/25/96	1.5	1.7	11	5.7	26	25
2/19/97 ⁷	0.43 ⁸	2.8	9	6	33	50

Notes:

1. Samples analyzed for total petroleum hydrocarbons (TPH) as diesel and gasoline using modified Environmental Protection Agency (EPA) Method 8015, and for benzene, toluene, ethylbenzene, and xylenes using EPA Method 8020.
2. mg/l = milligrams per liter.
3. Laboratory notes that TPH detected as diesel due to both diesel and a petroleum hydrocarbon lighter than diesel.
4. Laboratory notes that TPH as gasoline does not appear to have a typical gasoline pattern.
5. Laboratory reports quantitation in the kerosene range, diesel range not reported due to overlap of hydrocarbon ranges.
6. Sample analyzed for volatile organic compounds using EPA Method 8240.
7. Sample also analyzed for MtBE using EPA Method 8020. MtBE was not detected above the analytical reporting limit of 0.5 $\mu\text{g/l}$
8. Sample analyzed following silica gel cleanup.

TABLE 3

**SUMMARY OF GRAB GROUNDWATER ANALYTICAL RESULTS
22 NOVEMBER 1995 INVESTIGATION¹**

Clark's Home and Garden
23040 Clawiter Road
Hayward, California

Concentrations in micrograms per liter ($\mu\text{g/l}$) unless otherwise indicated.

Sample Name	Date	TPH ² as Gasoline ³ (mg/l) ⁴	TPH as Diesel ³ (mg/l)	TPH as Motor Oil ³ (mg/l)	Benzene ⁵	Toluene ⁵	Ethylbenzene ⁵	Total Xylenes ⁵
B-1	11/22/95	9.2	51.0	0.84	18	15	80	8
B-2/B-12 ⁶	11/22/95	2.5/1.2	0.75/0.22	<0.2/<0.2	<0.5/<0.5	<0.5/<0.5	7.1/8.3	<0.5/<0.5
B-3	11/22/95	<0.05	<0.05	<0.2	<0.5	<0.5	<0.5	0.6
B-4	11/22/95	11.0	270.0	3.3	<1 ⁷	18	150	81

Notes:

1. Analyses conducted by Friedman & Bruya, Inc., of Seattle, Washington.
2. TPH = total petroleum hydrocarbon.
3. TPH as gasoline, diesel, and motor oil analyzed using modified EPA Method 8015 (silica gel cleanup performed on extractions prior to analysis for TPH as diesel and motor oil).
4. mg/l = milligrams per liter.
5. Benzene, toluene, ethylbenzene, and total xylenes analyzed using EPA Method 8020.
6. Duplicate sample result.
7. Sample was diluted by the laboratory and detection limit raised due to dilution.

TABLE 4

**SUMMARY OF GRAB GROUNDWATER ANALYTICAL RESULTS
19 FEBRUARY 1997 INVESTIGATION¹**

Clark's Home and Garden
23040 Clawiter Road
Hayward, California

Concentrations in micrograms per liter ($\mu\text{g/l}$) unless otherwise noted.

Sample Name	Sample Date	TPH as Diesel ² (mg/l)	TPH as Gasoline (mg/l)	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE
B-5	2/19/97	25 ³	4.7	2	5	37	9	<2 ⁴
B-5F ⁵	2/19/97	0.55 ³	--- ⁶	---	---	---	---	---
B-6	2/19/97	1100 ⁷	8.6	4	13	90	10	<2 ⁴
B-6F ⁵	2/19/97	180 ⁷	---	---	---	---	---	---
B-7	2/19/97	12 ⁷	3.4	2	5	3	8	<0.5
B-7 dup	2/19/97	2.1 ⁷	3.5	1.9	5.3	<0.5	11	<0.5
B-7F ⁵	2/19/97	0.4 ^{7,8}	---	---	---	---	---	---
B-8	2/19/97	7.6	6.3	4	8	10	16	<2 ⁴
B-8F ⁵	2/19/97	0.36 ^{7,8}	---	---	---	---	---	---
EB-1	2/19/97	<0.05	<0.05	<0.5	<0.05	<0.5	<0.5	<0.5
EB-1F ⁵	2/19/97	5/0.17 ⁹	---	---	---	---	---	---

Notes:

- Grab groundwater samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington, for total petroleum hydrocarbons (TPH) as diesel and gasoline using modified Environmental Protection Agency (EPA) Method 8015; and for benzene, toluene, ethylbenzene, total xylenes, and methyl tertiary butyl ether (MTBE) using EPA Method 8020.
- Grab groundwater sample extracts were passed through a silica gel column prior to TPH as diesel analysis.
- Laboratory notes the pattern of peaks in the chromatogram is not indicative of diesel #2.
- Detections limits raised due to dilution.
- The sample was filtered with a 0.7-micron glass fiber filter.
- indicates not analyzed.
- Laboratory notes the pattern of peaks present is indicative of a mixture of petroleum products, a portion of which is indicative of diesel.
- The sample was extracted after hold time had expired.
- This sample was re-analyzed to confirm results.

PROJECT: CLARK'S HOME AND GARDEN
Hayward, California

Boring Log Explanation

BORING LOCATION:

ELEVATION AND DATUM:

DRILLING CONTRACTOR:

DATE STARTED:

DATE FINISHED:

DRILLING METHOD:

TOTAL DEPTH:

MEASURING POINT:

DRILLING EQUIPMENT:

DEPTH TO WATER: FIRST

COMPL.

SAMPLING METHOD:

LOGGED BY:

HAMMER WEIGHT:

DROP:

RESPONSIBLE PROFESSIONAL:

REG. NO.

DEPTH (feet)	SAMPLES				OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., consistency, structure, cementation, react. w/HCl. geo. inter	REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
						Surface Elevation	
						Notes	
						1. Soil descriptions are in accordance with the USCS as set forth by ASTM D2488-90 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."	
						2. Soil color described according to Munsell Color Chart.	
						3. Dashed lines separating soil strata represent inferred boundaries between sampled intervals that may be abrupt or gradual transitions. Solid lines represent approximate boundaries observed within sample intervals.	
						4. OVM = organic vapor meter, reading in parts per million.	
						5. Odor, if noted, is subjective and not necessarily indicative of specific compounds or concentrations	
						Interval of recovered soil core collected with split-barrel sampler	
						Interval of recovered soil core collected with split-spoon drive sampler	
						Interval of no recovery	
						Sample collected for chemical analysis and sample identification	
	B1-4						

B-1 (3/97)

PROJECT: CLARK'S HOME AND GARDEN
Hayward, California

Log of Boring No. B-5

BORING LOCATION: East side of Clawiter Boulevard		ELEVATION AND DATUM: Feet below ground surface (BGS)	
DRILLING CONTRACTOR: Precision Sampling, Inc.		DATE STARTED: 2/19/97	DATE FINISHED: 2/19/97
DRILLING METHOD: Direct Push Technology		TOTAL DEPTH: 22 feet	MEASURING POINT: ---
DRILLING EQUIPMENT: XD-1		DEPTH TO WATER:	FIRST: --- COMPL: ---
SAMPLING METHOD: 3-foot x 2.5-inch continuous Envirocore		LOGGED BY: N. Taylor	
HAMMER WEIGHT: ---	DROP: ---	RESPONSIBLE PROFESSIONAL: R. Steenson	REG. NO. RG 6592

DEPTH (feet)	SAMPLES			OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol) color, moist, % by weight, plast., consistency, structure, cementation, react. w/HCl, geo. inter.	REMARKS
	Sample No.	Sample	Blows/Foot			
Surface Elevation: ---						
1					Asphalt	
					Baserock	
2				4.4	CLAYEY SAND with GRAVEL (SC) Dark brown (10YR 3/3), moist, 50% fine to coarse sand, 25% low to medium plasticity fines, 25% subangular gravel	
3						
4						
5						
6				4.4	SILTY GRAVEL with SAND (GM) Very pale brown (10YR 8/3), moist, 70% subrounded poorly-graded gravel, 15% low plasticity fines, 15% fine sand	
7						
8						
9						
10				4.6		
11						
12	B5-13			1.9	CLAYEY SAND (SC) Olive brown (2.5Y 4/4), moist, 70% fine sand, 30% medium plasticity fines	
13					LEAN CLAY (CL) Light olive brown (2.5Y 4/3), wet, 95% low plasticity fines, 5% fine sand	
14				1.8	Zone of red mottling Color change to dark greenish gray (5GY 4/1)	Odor
15						

DEPTH (feet)	SAMPLES			OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., consistency, structure, cementation, react. w/HCl. geo. inter.	REMARKS
	Sample No	Sample	Blows/ Foot			
16				300	LEAN CLAY (CL) (continued)	Drive casing retracted to 14 feet BGS. One-inch-diameter PVC temporary well installed with 0.01-inch slot well screen from 12 to 22 feet BGS for collection of grab groundwater sample B-5. Boring destroyed by backfilling the borehole through the casing with cement grout and then removing the casing.
17				170		
18					2-inch sand layer, wet	
19				81	1-inch sand layer, wet Color change to dark greenish gray (5GY 3/1)	
20						
21				46		
22					Bottom of boring at 22.0 feet.	
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						

PROJECT: CLARK'S HOME AND GARDEN
Hayward, California

Log of Boring No. B-6

BORING LOCATION: East side of Clawiter Boulevard on grass strip

ELEVATION AND DATUM:
Feet below ground surface (BGS)

DRILLING CONTRACTOR:

DATE STARTED:
2/19/97

DATE FINISHED:
2/19/97

DRILLING METHOD: Direct Push Technology

TOTAL DEPTH:
22 feet

MEASURING POINT:

DRILLING EQUIPMENT: XD-1

DEPTH TO WATER:

FIRST

COMPL.

SAMPLING METHOD: 3-foot x 2.5-inch continuous Envirocore

LOGGED BY:
N. Taylor

HAMMER WEIGHT: ---

DROP: ---

RESPONSIBLE PROFESSIONAL:
R. Steenson

REG. NO.
RG 6592

DEPTH (feet)	SAMPLES				OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., consistency, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: ---	REMARKS
	Sample No.	Sample	Blows/ Foot				
1						1 foot organic material (landscaping)	
2						LEAN CLAY (CL) Black (10YR 2/1), moist, 90% medium plasticity fines, 10% fine sand, trace plant material	
3						Color change to very dark grayish brown (10YR 3/2)	
4						Color change to brown (10YR 4/3)	
5					1.8	CLAYEY SAND (SC) Brown (10YR 5/3), moist, 70% fine sand, 30% low to medium plasticity fines	
6							
7						SANDY LEAN CLAY (CL) Brown (10YR 5/3), moist, 70% low to medium plasticity fines, 30% fine sand	
8							
9							
10							
11					0.9	CLAYEY SAND (SC) Brown (10YR 5/3), moist, 60% fine sand, 40% low to medium plasticity fines	
12							
13						Wet	
14							
15							

B-1 (12/95)

Project No. 2611.01

Geomatrix Consultants

Figure A-3

DEPTH (feet)	SAMPLES			OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., consistency, structure, cementation, react w/HCl, geo. inter.	REMARKS
	Sample No	Sample	Blows/ Foot			
16				3.9	CLAYEY SAND (SC) (continued)	
17					WELL-GRADED SAND Brown (10YR 4/3), wet, 80% fine to medium sand, 20% nonplastic fines	Odor
18				226	LEAN CLAY (CL) Dark greenish gray (10Y 4/1), moist to wet, 95% fines, 5% fine sand, medium plasticity	Drive casing retracted to 17 feet BGS. One-inch-diameter PVC temporary well installed with 0.01-inch slot well screen from 12 to 22 feet BGS for collection of grab groundwater sample B-6.
19					2-inch lens of sand, wet	
20					2-inch lens of sand, wet	
21					Color change to dark greenish gray (10Y 3/1)	
22					Bottom of boring at 22.0 feet.	Boring destroyed by backfilling the borehole through the casing with cement grout and then removing the casing.
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						

PROJECT: CLARK'S HOME AND GARDEN
Hayward, California

Log of Boring No. B-7

BORING LOCATION: West side of Clawiter Boulevard

ELEVATION AND DATUM:
Feet below ground surface (BGS)

DRILLING CONTRACTOR: Precision Sampling, Inc.

DATE STARTED: 2/19/97
DATE FINISHED: 2/19/97

DRILLING METHOD: Direct Push Technology

TOTAL DEPTH: 22 feet
MEASURING POINT: ---

DRILLING EQUIPMENT: XD-1

DEPTH TO WATER: FIRST --- COMPL. ---

SAMPLING METHOD: 3-foot x 2.5-inch continuous Envirocore

LOGGED BY:
N. Taylor

HAMMER WEIGHT: ---

DROP: ---

RESPONSIBLE PROFESSIONAL: R. Steenson
REG. NO. RG 6592

DEPTH (feet)	SAMPLES			OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., consistency, structure, cementation, react. w/HCl, geo. inter.	REMARKS
	Sample No.	Sample	Blows/Foot			
Surface Elevation: ---						
1					Asphalt	
1					Baserock	
2					CLAYEY SAND with GRAVEL (SC) Dark brown (10YR 3/3), moist, 50% fine to medium sand, 25% low to medium plasticity fines, 25% subangular gravel	
3						
4						
5						
6						
7					Lens of silty sand (SM), brown (10YR 5/3), slightly moist, 80% fine to medium sand, 20% nonplastic fines	
8						
9						
10					LEAN CLAY with SAND (CL) Brown (10YR 5/3), moist, 80% low to medium plasticity fines, 10-20% fine sand, hard	
11					SILTY SAND (SM) Brown (10YR 5/3), moist, 80% fine to medium sand, 20% non to low plastic fines	
12					Wet	
13					WELL-GRADED GRAVEL with SAND and SILT (GW-GM) Brown (10YR 5/3), wet, 60% subrounded gravel, 30% fine to medium sand, 10% low plasticity fines	
14					SILTY SAND (SM) Brown (10YR 5/3), wet, 80% fine sand, 20% non to low plastic fines	
15						

B-1 (12/95)

DEPTH (feet)	SAMPLES				OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol); color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter.	REMARKS
	Sample No	Sample	Blows/ Foot				
16						LEAN CLAY (CL) Brown (10YR 5/3), 80% medium plasticity fines, 20% fine sand, soft	
17						Decrease in sand to 5% Color change to dark greenish gray (10YR 4/1), medium hard	Odor
18						2-inch sand layer	Drive casing retracted to 17 feet BGS.
19						2-inch sand layer	One-inch-diameter PVC temporary well installed with 0.01-inch slot well screen from 12 to 22 feet BGS for collection of grab groundwater sample B-7.
20						Color change to dark greenish gray (10Y 3/1)	
21							
22						Bottom of boring at 22.0 feet.	Boring destroyed by backfilling the borehole through the casing with cement grout and then removing the casing.
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							

PROJECT: CLARK'S HOME AND GARDEN
Hayward, California

Log of Boring No. B-8

BORING LOCATION: West side of Clawiter Boulevard		ELEVATION AND DATUM: Feet below ground surface (BGS)	
DRILLING CONTRACTOR: Precision Sampling, Inc.		DATE STARTED: 2/19/97	DATE FINISHED: 2/19/97
DRILLING METHOD: Direct Push Technology		TOTAL DEPTH: 22 feet	MEASURING POINT: ---
DRILLING EQUIPMENT: XD-1		DEPTH TO WATER: FIRST 12.5 feet	COMPL. ---
SAMPLING METHOD: 3-foot x 2.5-inch continuous Envirocore		LOGGED BY: N. Taylor	
HAMMER WEIGHT: ---	DROP: ---	RESPONSIBLE PROFESSIONAL: R. Steenson	REG. NO. RG 6592

DEPTH (feet)	SAMPLES				OVM Reading (ppm)	DESCRIPTION <small>NAME (USCS Symbol); color, moist, % by weight, plast., consistency, structure, cementation, react. w/HCl, geo. inter.</small>	REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
Surface Elevation: ---							
1						Asphalt	
1						Baserock	
2						CLAYEY SAND with GRAVEL (SC) Dark brown (10YR 3/3), slightly moist, 50% fine to coarse sand, 25% low to medium plasticity fines, 25% subangular gravel	
3							
4							
5							
6						SANDY LEAN CLAY (CL) Brown (10YR 5/3), moist, 70% low to medium plasticity fines, 30% fine sand, hard, root fragments	
7							
8							
9					1.1	SILT with SAND (ML) Yellowish brown (10YR 5/4), moist, 80% nonplasticity fines, 20% fine sand	
10							
11						SILTY SAND (SM) Yellowish brown (10YR 5/4), moist, 80% fine to medium sand, 20% non to low plastic fines	
12						LEAN CLAY (CL) Yellowish brown (10YR 5/4), wet, 80% low to medium plasticity fines, 20% fine sand	ATD
13					1.1	SILTY SAND (SM) Yellowish brown (10YR 5/4), wet, 80% fine to medium sand, 20% non to low plastic fines	
14						LEAN CLAY (CL) Yellowish brown (10YR 5/4), wet, 95% medium plasticity fines, 5% fine sand, soft	
15							

DEPTH (feet)	SAMPLES			OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol); color, moist. % by weight., plast., consistency, structure, cementation, react. w/HCl geo inter	REMARKS
	Sample No.	Sample	Blows/ Foot			
16					CLAY (CL) (continued) 2-inch lens of well-graded sand	No odor
17				93	Color change to dark greenish gray (10Y 4/1), medium hard, odor	Odor
18					2-inch lens of well-graded sand	Drive casing retracted to 17 feet BGS. One-inch-diameter PVC temporary well installed with 0.01-inch slot well screen from 12 to 22 feet BGS for collection of grab groundwater sample B-8.
19					2-inch lens of well-graded sand	
20				35	Color change to dark greenish gray (5GY 3/1)	Boring destroyed by backfilling the borehole through the casing with cement grout and then removing the casing.
21						
22					Bottom of boring at 22.0 feet.	
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33						

B-2 (12/95)

ATTACHMENT B

Standard Field Procedures

CAMBRIA

STANDARD FIELD PROCEDURES FOR MONITORING WELLS

This document describes Cambria Environmental Technology's standard field methods for drilling, installing, developing and sampling groundwater monitoring wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Well Construction and Surveying

Groundwater monitoring wells are installed in soil borings to monitor groundwater quality and determine the groundwater elevation, flow direction and gradient. Well depths and screen lengths are based on groundwater depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically extend 10 to 15 feet below and 5 feet 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 feet 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 feet 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.

Well Development

Wells are generally developed using a combination of groundwater surging and extraction. Surging agitates the groundwater and dislodges fine sediments from the sand pack. After about ten minutes of surging, groundwater 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 groundwater are extracted and the sediment volume in the groundwater 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.

Groundwater Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of groundwater are purged prior to sampling. Purging continues until groundwater pH, conductivity, and temperature have stabilized. Groundwater 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.