



CAMBRIA ENVIRONMENTAL
PROTECTION

May 23, 1997

97 MAY 29 PM 3:17

Mr. Lynn Worthington
Golden Empire Properties
5942 MacArthur Boulevard, Suite B
Oakland, CA 94605

STID#
515
TP/bKroom

Re: **Investigation Report**
~~Former Exxon Service Station~~
~~3035 35th Avenue~~
Oakland, California 94614
Cambria Project No: 13-105

Dear Mr. Worthington:

Cambria Environmental Technology, Inc. (Cambria), on behalf of Golden Empire Properties, conducted a subsurface investigation at the site referenced above. The investigation objective was to further define the extent of petroleum hydrocarbons in ground water and collect data for a Risk-Based Corrective Action (RBCA) Assessment. The RBCA will be submitted shortly. Presented below are the results of our investigation including a brief site summary, our detailed scope of work, investigation results, conclusions and recommendations.

SITE BACKGROUND

Site Location: The site is a former Exxon Service Station located at the northeast corner of 35th Avenue and School Street in Oakland, California (Figure 1). Topography in the area slopes generally westward and ground water flows toward the northwest. The nearest surface water is Peralta Creek, which is about 0.1 miles north (cross gradient) of the site and flows westward.

Adjacent Hydrocarbon Sources: Two active or former gasoline service stations are located within one block of the site. An active British Petroleum (BP) site is on 35th Avenue one block east (upgradient) of the site. A former Texaco station is located across School Street immediately east (upgradient) of the site. Texaco's underground storage tanks were removed about 15 years ago. No soil samples were collected during the tank removal and no investigation has been conducted at the former Texaco site.

Previous Investigations

October 1990 Geotechnical Investigation: In October 1990, Geotechnical Engineering of Fremont, California drilled two soil borings at the site for an engineering analysis.

CAMBRIA
ENVIRONMENTAL
TECHNOLOGY, INC.
1144 65TH STREET,
SUITE B
OAKLAND,
CA 94608
PH: (510) 420-0700
FAX: (510) 420-9170

January 1991 Tank Removal: In January 1991, Pacific Excavators removed four gasoline underground storage tanks and one 500-gallon waste oil underground storage tank from the site. The former gasoline tanks appear to have had capacities between 4,000 and 6,000 gallons. According to a September 24, 1992 workplan prepared by Consolidated Technologies of San Jose, California (CT), soil samples were collected during the tank removal, but were not analyzed or reported by Pacific Excavators (CT, 1992).

November 1991 Subsurface Investigation: In November 1991, CT drilled twelve soil borings to depths of up to 35 ft (Figure 2). Total petroleum hydrocarbons as gasoline (TPHg) were detected in soil samples collected from 11 of the 12 soil borings, at up to 2,100 parts per million (ppm). No total petroleum hydrocarbons as diesel (TPHd) or oil and grease (O&G) were detected in boring B-7, which is immediately downgradient of the former waste oil tank.

May 1994 Subsurface Investigation: Between May 5 and 9, 1994, Cambria drilled seven soil borings and installed three monitoring wells at the site. TPHg were detected in soil from six of the seven borings, at concentrations up to 2,900 ppm. TPHg and benzene were detected in ground water at a maximum concentration of 130,000 and 22,000 parts per billion (ppb), respectively.

Quarterly Ground Water Monitoring: A quarterly ground water monitoring program began in May 1994 with all the wells sampled every quarter.

Site Geology and Hydrogeology

Site Hydrogeology: The site is underlain by clayey silts and sands to the maximum explored depth of 30 feet.

Ground Water Depth: The depth to ground water has ranged from approximately 8 to 22 ft.

Ground Water Flow Direction: Ground water flows consistently to the northwest.

INVESTIGATION RESULTS

To further assess the downgradient extent of hydrocarbons, Cambria installed monitoring well MW-4 in the northwest corner of the property (Figure 2). To assess the hydrocarbon distribution in soil and observe changes in lithology, the soil boring was continuously cored. Cambria collected soil samples at 5 ft intervals for chemical analysis and collected additional soil samples at 5 ft intervals to analyze for risk assessment parameters including porosity, moisture content and organic carbon content (f_{oc}). Soil samples were analyzed for TPHg, TPHd, benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tertiary-butyl ether (MTBE). The monitoring well locations are shown in Figure 2.

The results of Cambria's February 1997 subsurface investigation are summarized below. Tabulated analytic results for soil are presented in Table 1. Results of the quarterly ground water program are presented in Table 2. A monitoring well installation permit from Alameda County Flood Control and Water Conservation District (ACFCWCD) Zone 7 is presented as Attachment A. The boring log and well construction diagram for well MW-4 are presented as Attachment B. The laboratory analytic reports for soil and ground water are presented as Attachment C. Our standard field procedure for monitoring well installation is presented as Attachment D.

Soil Borings

Personnel Present: Staff Hydrogeologist Sam Rangarajan conducted all field work under the supervision of Registered Geologist Scott MacLeod of Cambria.

Permits: ACFCWCD - Zone 7 Monitoring Well Installation Permit # 96840 (Attachment A).

Drilling Company: Gregg Drilling and Testing, Inc. of Martinez, California.

Drilling Dates: We initially attempted to drill on December 6, 1996. However, the ground was saturated and we could not drive the drill rig on to the site. We waited for the site to dry and drilled on February 26, 1997.

Drilling Methods: 8-inch diameter hollow stem auger.

Number of Borings: One (Figure 2).

Boring Depths: 30 ft below ground surface (Attachment B).

Sediment Lithology: Soils at the site from ground surface to 30 ft depth are mostly clayey silts and sands.

Sampling Technique: The boring was sampled and logged continuously using split-barrel samplers lined with clean brass sampling tubes driven into undisturbed sediments at the bottom of the borehole. Soil samples were also collected at every 5 ft for chemical analysis and to analyze for risk assessment parameters.

Sample Screening: A GasTech photo ionization detector (PID) for vapor screening and observations of sheen and odor were used to screen soil samples from each boring.

Laboratory Analyses: Selected soil samples were analyzed for:

- Porosity, bulk density, moisture content, organic carbon content, permeability and air-filled voids;
- TPHg by modified EPA Method 8015;
- TPHd by modified EPA Method 8015;

- BTEX by EPA Method 8020; and,
- MTBE by EPA Method 8020.

Soil Disposal: Soil cuttings were stored on site in Department of Transportation (DOT) approved 55-gallon storage drums. The soil will be remediated on site concurrent with future site remediation.

Well Construction

Well Materials: Monitoring well MW-4 was constructed using two-inch diameter, schedule 40 PVC pipe with a screen size of 0.010" and #2 sand (Attachment B).

Screened Interval: Ground water stabilized in monitoring well MW-4 at 12.7 depth and the well was screened from 10 to 30 ft.

**Well Development/
Sampling:** Cambria Engineer Adam Sevi developed monitoring well MW-4 on February 28, 1997 using surge block agitation and bailer evacuation including purging at least ten well volumes of water. All the four monitoring wells were sampled on March 20, 1997. Results of the well sampling are presented in Table 2.

**Ground Water
Analyses:** Ground water samples from the wells were analyzed for:

- TPHg by modified EPA Method 8015;
- TPHd by modified EPA Method 8015;
- BTEX by EPA Method 8020; and,
- MTBE by EPA Method 8020.

**Ground Water
Flow Direction:** Ground water flows generally toward the northwest.

**Ground Water
Depth:** Ground water depth gauged on March 20, 1997 ranged from 13 to 16.7 ft (Table 2).

Waste Disposal: Purge water generated during well development and sampling was stored on site in DOT approved 55-gallon storage drums pending disposal.

HYDROCARBON DISTRIBUTION

Soil: The extent of TPHg in soil is shown in Figure 3. As indicated on Figure 3, the highest hydrocarbon concentrations are detected near the former tanks and southern pump island.

Ground Water: As indicated on Figure 4 and 5, TPHg and benzene are detected in on site wells, at a maximum of 56,000 ppb TPHg in well MW-3 and 11,000 ppb benzene in well MW-4 on March 20, 1997. To evaluate potential intrinsic bioremediation mechanisms, we also measured dissolved oxygen (DO) concentrations in the monitoring wells. The elevated DO levels in ground water indicates that bioattenuation of hydrocarbons is possible.

RISK ASSESSMENT PARAMETERS

Soil samples from 5, 10 and 15 ft depth from boring MW-4 were analyzed for porosity, bulk density, moisture content, organic carbon content, and air-filled voids. We also used a sieve analysis to estimate the composition and permeability of subsurface soils beneath the site. These parameters will be used in a health risk assessment that will evaluate the potential risk from petroleum hydrocarbons in soil and ground water to the nearby residential properties. The RBCA establishes target levels which will then be used to prepare a corrective action plan for the site. Laboratory measured values for these parameters are listed in the following table. A copy of the laboratory analytic report for these parameters is presented in Attachment C.

Sample ID	Parameter					
	Porosity (%)	Dry Bulk Density (lbs/ft ³)	Moisture Content (%)	Organic Carbon Content (%)	Air Voids (%)	pH
MW-4-5A	39.7	101.6	24	3.5	1.6	7.51
MW-4-10A	45.6	91.4	16.6	4.1	21.2	8.32
MW-4-15A	44.2	89.9	28.9	3.5	5	7.81

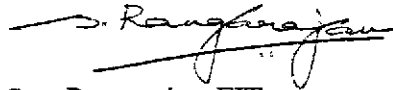
Mr. Lynn Worthington
May 23, 1997

CAMBRIA


CLOSING

We appreciate this opportunity to provide environmental consulting services to Golden Empire Properties.
Please call if you have any questions or comments.

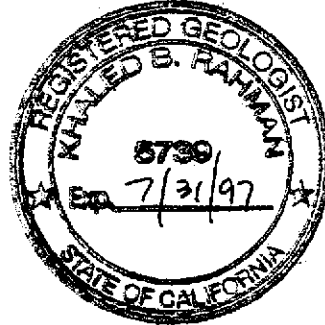
Sincerely,
Cambria Environmental Technology, Inc.



Sam Rangarajan, EIT
Hydrogeologist



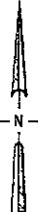
Khaled B. Rahman, R.G., C.H.G.
Senior Geologist



Attachments: A - Well Installation Permit
B - Boring Log/Well Construction Detail
C - Soil and Ground Water Analytic Data
D - Standard Field Procedures for Monitoring Well Installation

cc: Mr. Kevin Tinsley, Hazardous Materials Specialist
Alameda County Environmental Health Services
1131 Harbor Bay Parkway, # 250, Alameda, California 94502-6577

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SITE



Former Exxon Service Station
3055 35th Avenue
Oakland, California

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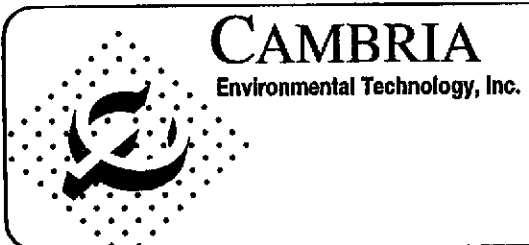
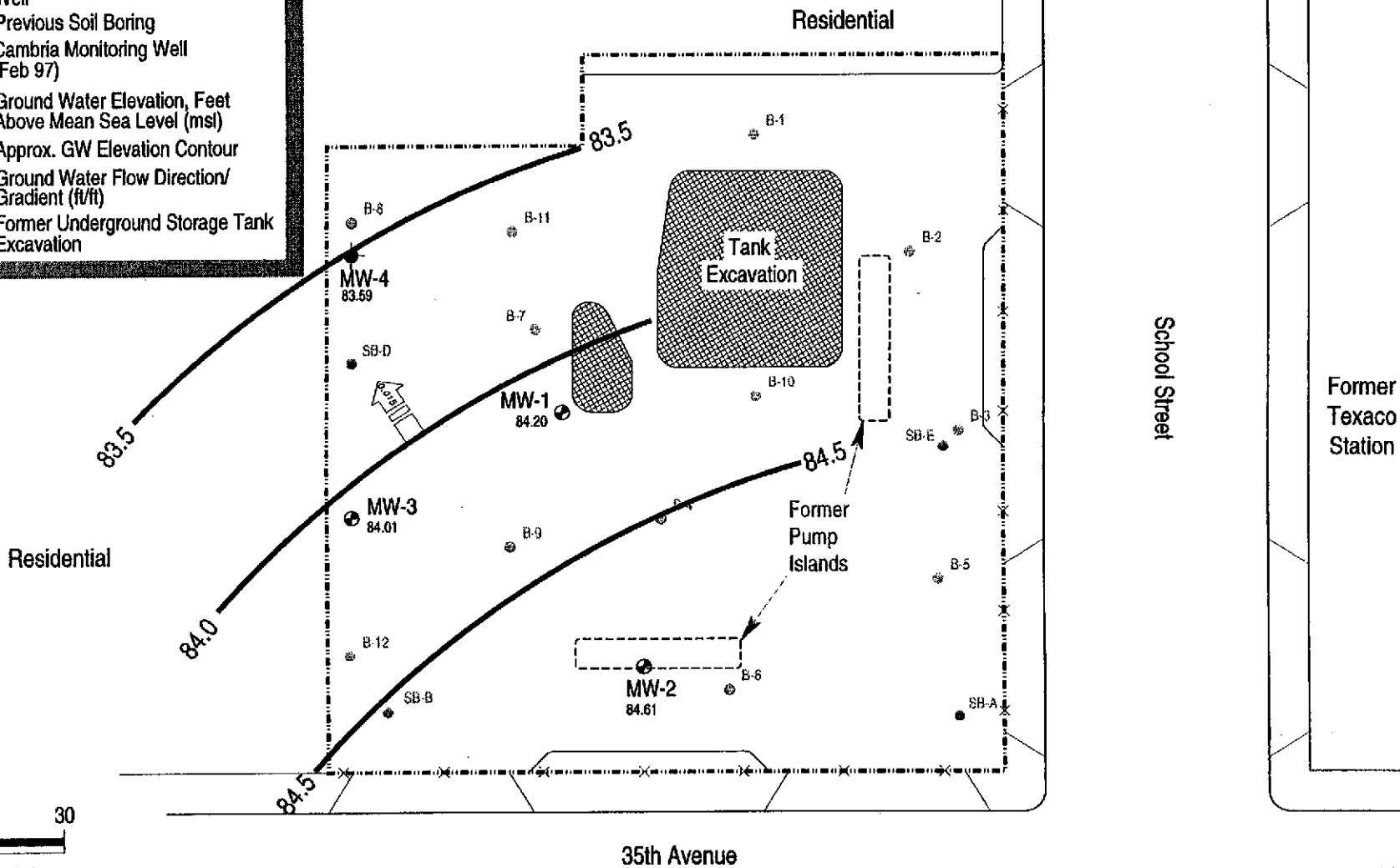
Site Map

FIGURE

1

EXPLANATION

- MW-3 Previously Installed Monitoring Well
- SB-B/B-1 Previous Soil Boring
- MW-4 Cambria Monitoring Well (Feb 97)
- xx.xx Ground Water Elevation, Feet Above Mean Sea Level (msl)
- Approx. GW Elevation Contour
- Ground Water Flow Direction/Gradient (ft/ft)
- ▨ Former Underground Storage Tank Excavation

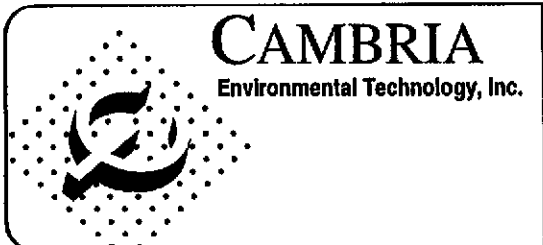
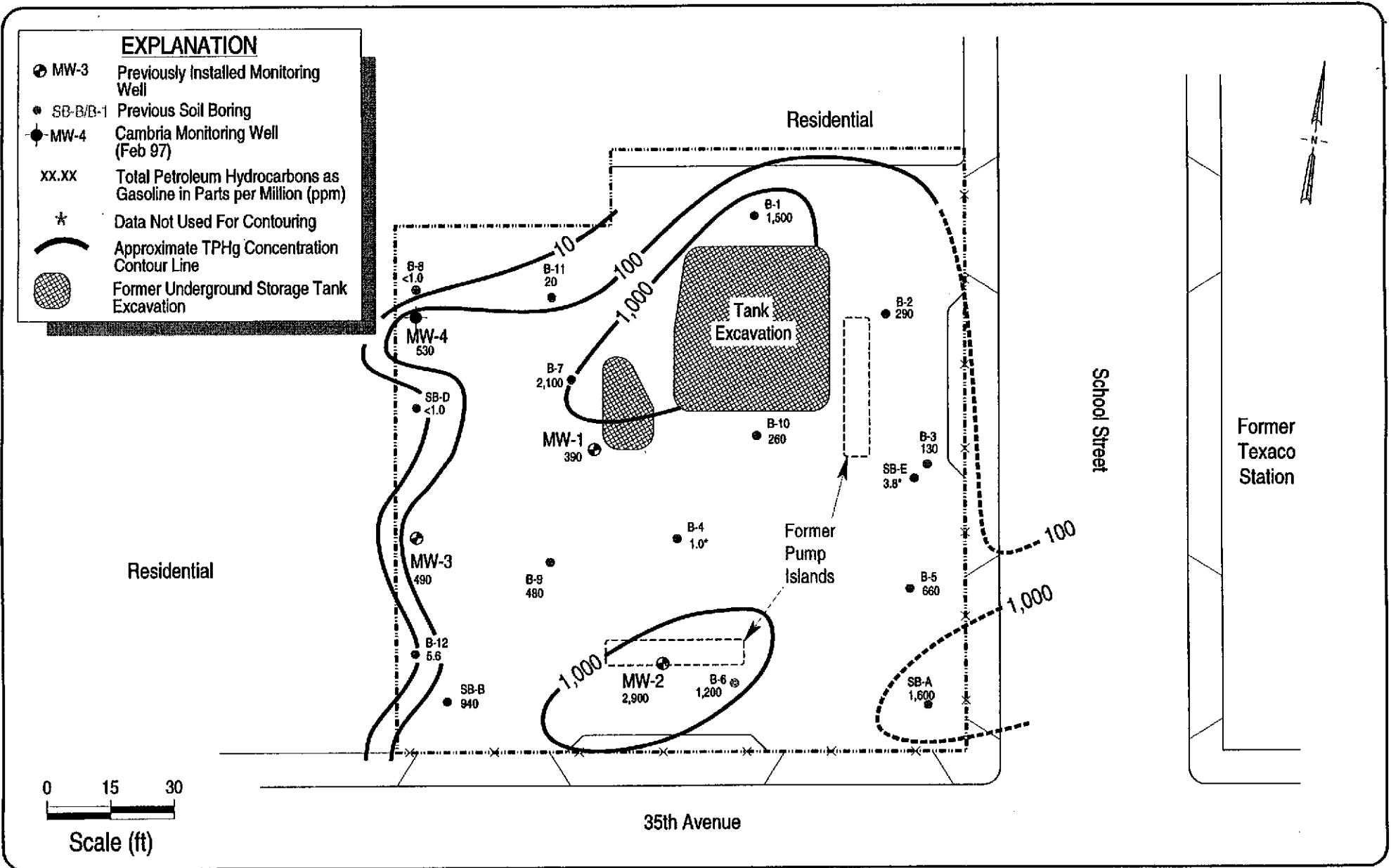


Former Exxon Service Station
 3055 35th Avenue
 Oakland, California

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Ground Water Elevation
 Contours
 March 20, 1997

FIGURE
2



Former Exxon Service Station
3055 35th Avenue
Oakland, California

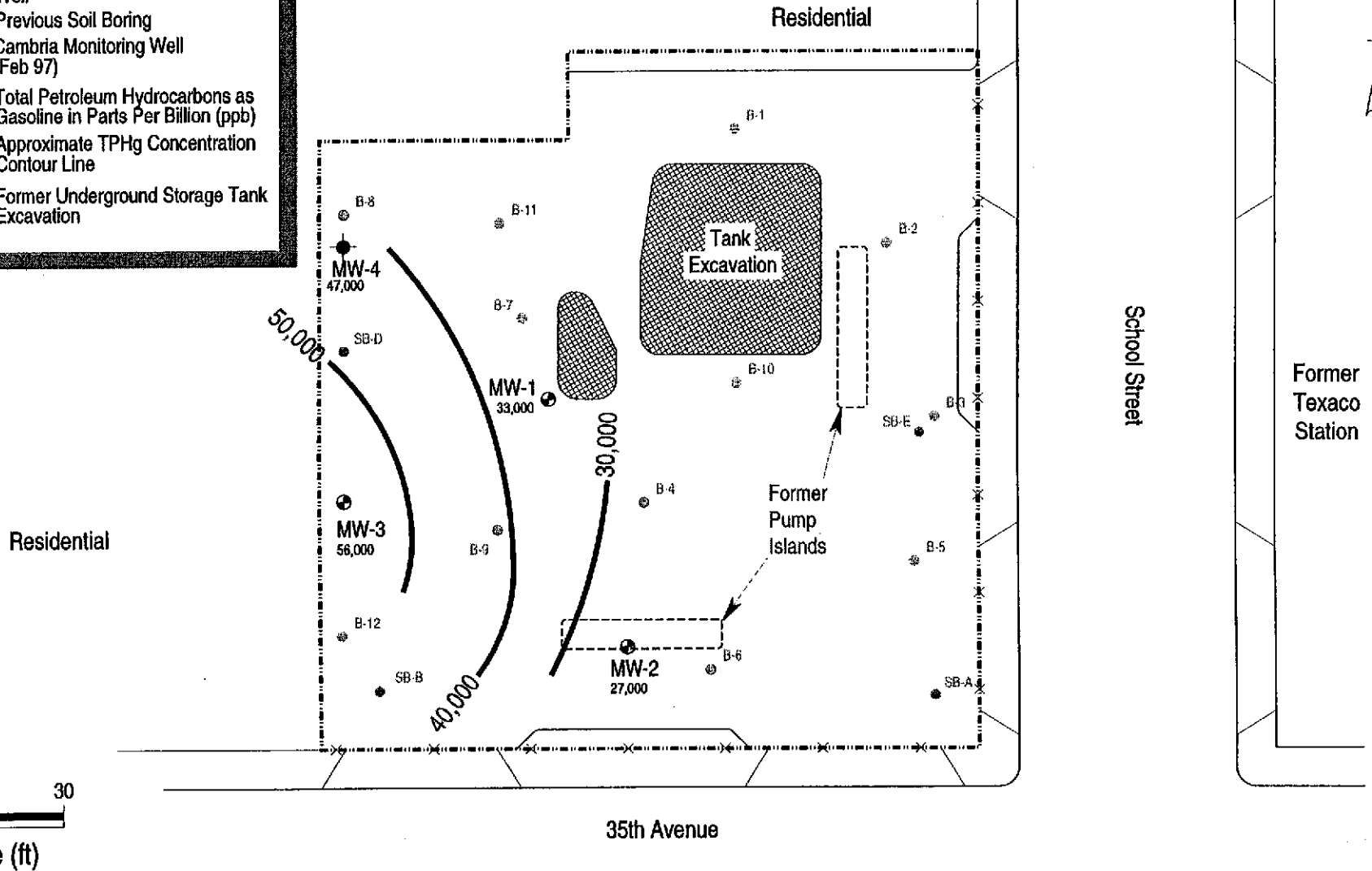
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Maximum TPHg Concentrations (ppm)
in Soil at 15 ft Depth
March 20, 1997

FIGURE
3

EXPLANATION

- MW-3 Previously Installed Monitoring Well
- SB-B/B-1 Previous Soil Boring
- MW-4 Cambria Monitoring Well (Feb 97)
- xx.xx Total Petroleum Hydrocarbons as Gasoline in Parts Per Billion (ppb)
- Approximate TPHg Concentration Contour Line
- ◻ Former Underground Storage Tank Excavation



CAMBRIA
Environmental Technology, Inc.

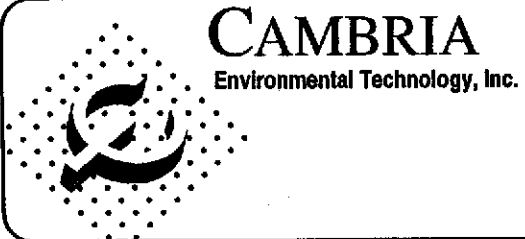
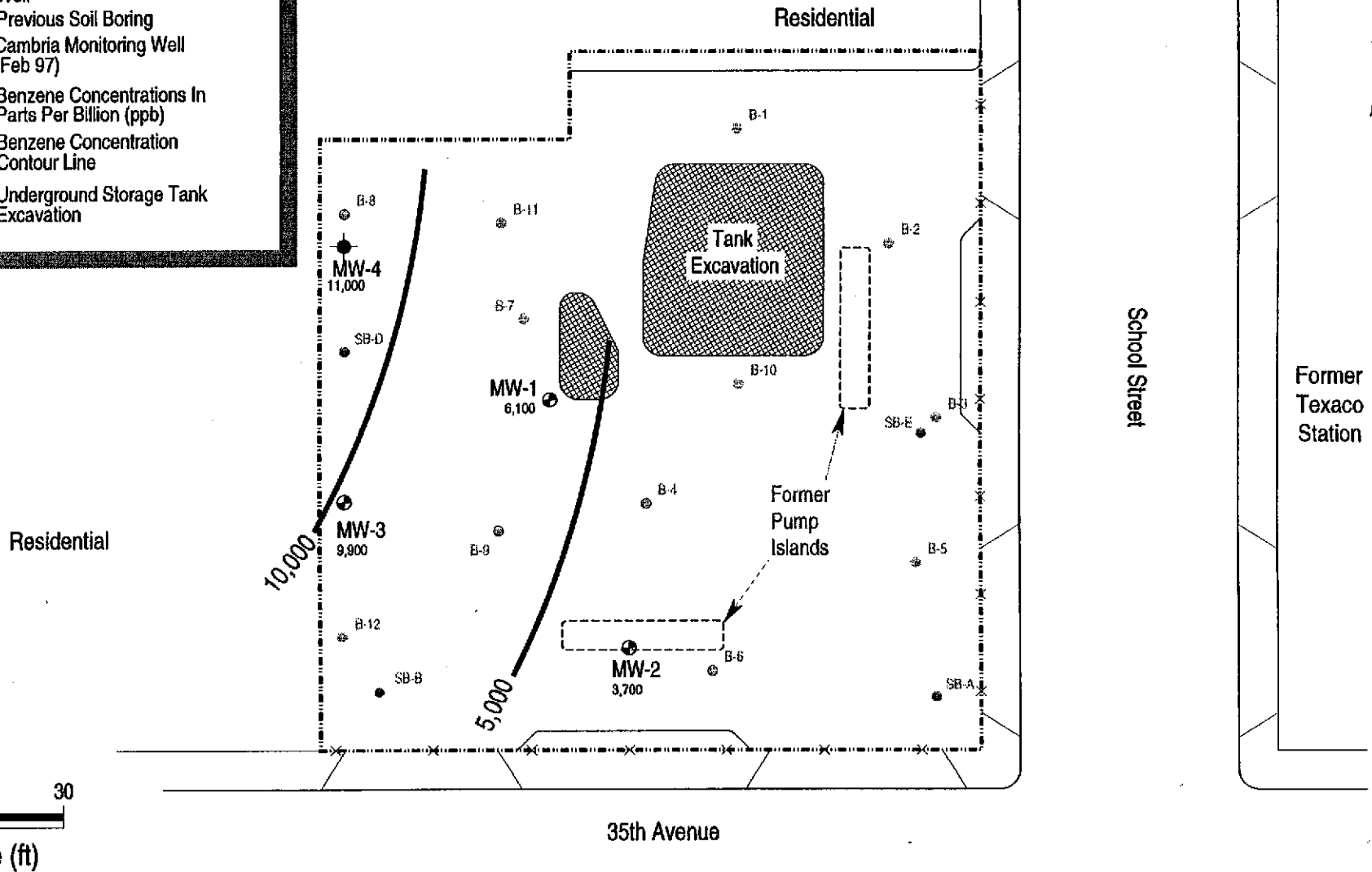
Former Exxon Service Station
3055 35th Avenue
Oakland, California

TPHg Concentrations In Ground
Water (ppb)
March 20, 1997

FIGURE
4

EXPLANATION

- ⊕ MW-3 Previously Installed Monitoring Well
- SB-B/B-1 Previous Soil Boring
- ⊕ MW-4 Cambria Monitoring Well (Feb 97)
- xx.xx Benzene Concentrations In Parts Per Billion (ppb)
- Benzene Concentration Contour Line
- ⊘ Underground Storage Tank Excavation



Former Exxon Service Station
 3055 35th Avenue
 Oakland, California

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Benzene Concentrations In
 Ground Water (ppb)
 March 20, 1997

FIGURE
5

Table 1. Soil Analytic Data - Former Exxon Service Station - 3055 35th Avenue, Oakland, California

Sample ID	Depth (ft)	Date	TPHg	TPHd	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	Notes
(Concentrations in ppm)										
MW-4-10	10	2/26/97	64	62	0.24	1.1	0.7	2.6	<0.2	a, b
MW-4-15	15	2/26/97	530	150	5.1	18	8.4	39	5.4	a, b

Abbreviations:

ft = feet

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

TPHd = Total petroleum hydrocarbons as diesel by modified EPA Method 8015

Benzene, ethylbenzene, toluene, and xylenes by EPA Method 8020

MTBE = Methyl Tertiary-Butyl Ether by EPA Method 8020

ppm = parts per million equivalent to milligrams per kilogram

Notes:

(a) Unmodified or weakly modified gasoline is significant (TPHg)

(b) Gasoline range compounds are significant (TPHd)

Table 2. Ground Water Elevation and Analytic Data - Former Exxon Service Station, 3055 35th Avenue, Oakland, California

Well ID	Date	GW	LPH	GW	TPHg	TPHd	TPHmo	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	DO
(quarters sampled)		Depth (ft)	(ft)	Elev. (ft)	(concentrations in parts per billion)								(mg/l)
MW-1 (all) TOC = 100.85	5/25/94	16.79	Sheen	84.06	120,000	25,000	<50,000	22,000	17,000	2,800	16,000	--	--
	7/19/94	20.77	--	80.08	--	--	--	--	--	--	--	--	--
	8/18/94	21.04	Sheen	79.81	925,000	--	--	16,500	6,200	1,000	9,400	--	--
	11/11/94	15.80	--	85.05	57,000	--	--	14,000	4,400	1,400	6,400	--	--
	2/27/95	15.53	--	85.32	45,000	--	--	2,900	2,500	760	4,100	--	--
	5/23/95	15.29	--	85.56	22,000	--	--	9,900	990	790	2,000	--	--
	8/22/95	20.90	--	79.95	23,000	--	--	6,900	340	1,200	1,900	--	--
	11/29/95	22.19	--	78.66	37,000	--	--	9,900	530	1,600	2,900	--	--
	2/21/96	11.69	--	89.16	33,000	4,300	--	10,000	480	1,000	1,800	3,300	--
	5/21/96	14.62	--	86.23	36,000	8,500	--	8,500	1,400	1,300	2,800	1,900	--
	8/22/96	22.30	--	78.55	41,000	6,200	--	8,600	1,300	1,500	2,900	<200	8.0
	11/27/96	17.24	Sheen	83.61	38,000	6,100	--	9,600	950	1,600	3,100	<400	5.6
	3/20/97	16.65	--	84.20	33,000	10,000	--	6,100	560	970	2,200	<400	8.5
MW-2 (all) TOC = 100.00	5/25/94	15.65	--	84.35	61,000	6,900	<5,000	9,900	7,400	960	4,600	--	--
	7/19/94	19.81	--	80.19	--	--	--	--	--	--	--	--	--
	8/18/94	20.37	--	79.63	88,000	--	--	10,750	10,500	1,850	9,600	--	--
	11/11/94	15.52	--	84.48	54,000	--	--	5,900	6,700	1,300	7,500	--	--
	2/27/95	14.46	Sheen	85.54	44,000	--	--	5,100	5,300	930	6,400	--	--
	5/23/95	14.17	--	85.83	33,000	--	--	8,200	5,600	900	6,600	--	--
	8/22/95	19.80	--	80.20	38,000	--	--	6,400	5,000	1,100	5,600	--	--
	11/29/95	21.05	--	78.95	46,000	--	--	7,100	5,300	1,300	6,000	--	--
	2/21/96	10.53	--	89.47	59,000	--	--	8,000	6,000	1,800	8,900	4,500	--
	5/21/96	13.47	--	86.53	51,000	3,400	--	8,200	5,200	1,300	6,600	2,400	--
	8/22/96	19.12	--	80.88	37,000	5,700	--	5,100	3,500	960	4,500	<200	3.0
	11/27/96	16.61	Sheen	83.39	54,000	10,000	--	9,800	7,000	1,800	7,900	<2,000	3.1
	3/20/97	15.39	--	84.61	27,000	6,100	--	3,700	2,300	580	2,800	<400	8.1

Table 2. Ground Water Elevation and Analytic Data - Former Exxon Service Station, 3055 35th Avenue, Oakland, California

Well ID (quarters sampled)	Date	GW Depth (ft)	LPH (ft)	GW Elev. (ft)	TPHg	TPHd	TPHmo	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	DO (mg/l)
(concentrations in parts per billion)													
MW-3	5/25/94	13.93	Sheen	82.94	56,000	14,000	<50,000	14,000	14,000	1,300	11,000	---	---
(all)	7/19/94	17.04	---	79.83	---	---	---	---	---	---	---	---	---
TOC = 96.87	8/18/94	17.75	---	79.12	116,000	---	---	28,300	26,000	2,400	15,000	---	---
	11/11/94	17.80	---	79.07	89,000	---	---	1,600	1,900	1,900	14,000	---	---
	2/27/95	11.86	Sheen	85.01	250,000	---	---	22,000	26,000	7,800	21,000	---	---
	5/23/95	11.60	Sheen	85.27	310,000	---	---	18,000	17,000	4,500	2,800	---	---
	8/22/95	17.10	---	79.77	74,000	---	---	14,000	13,000	1,900	11,000	---	---
	11/29/95	16.34	---	80.53	220,000	---	---	25,000	25,000	3,500	19,000	---	---
	2/21/96	7.92	---	88.95	60,000	---	---	10,000	7,800	1,500	8,800	3,400	---
	5/21/96	10.86	Sheen	86.01	69,000	13,000	---	17,000	9,400	1,700	9,400	2,600	---
	8/22/96	16.50	---	80.37	94,000	16,000	---	17,000	15,000	2,100	12,000	330	2.0
	11/27/96	13.47	Sheen	83.40	82,000	24,000	---	14,000	13,000	2,400	13,000	<1,000	2.4
	3/20/97	12.86	---	84.01	56,000	11,000	---	9,900	6,900	1,300	8,000	3,500	9.0
MW-4	3/20/97	13.75	---	83.59	47,000	3,100	---	11,000	4,500	1,100	5,200	3,400	8.4
TOC = 97.34													

Abbreviations:

TOC = Top of casing elevation with respect to an onsite benchmark
 GW = Ground water
 LPH = Liquid-phase hydrocarbons
 TPHg = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015
 TPHd = Total petroleum hydrocarbons as diesel by modified EPA Method 8015
 TPHmo = Total petroleum hydrocarbons as motor oil by modified EPA Method 8015
 Benzene, Ethylbenzene, Toluene, and Xylenes by EPA Method 8020
 MTBE = Methyl Tertiary-Butyl Ether by EPA Method 8020
 DO = Dissolved oxygen
 parts per billion equivalent to micrograms per liter
 mg/l = milligrams per liter equivalent to parts per million

Notes:

TOC Elevation of MW-4 surveyed relative to an arbitrary site datum by David Hop
 Licensed Surveyor on April 19, 1997

Attachment A

Well Installation Permit



ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94586

VOICE (510) 464-2600

FAX (510) 462-3914

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

LOCATION OF PROJECT 3055 35th Avenue
Oakland, CA

PERMIT NUMBER 96840
LOCATION NUMBER _____

CLIENT
Name Golden Empire Properties - Lynn Worthington
Address 547 MacArthur Blvd Voice (510) 567-8600
City Oakland, CA Zip 94605

PERMIT CONDITIONS

Circled Permit Requirements Apply

APPLICANT
Name Cambria Environmental
Chuck Headlee Fax (510) 420-9170
Address 1446 65th St, Suite B Voice (510) 420-0700
City Oakland Zip 94608

A. GENERAL

1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

B. WATER WELLS, INCLUDING PIEZOMETERS

1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

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

TYPE OF PROJECT

Well Construction	Geotechnical Investigation
Cathodic Protection _____	General _____
Water Supply _____	Contamination _____
Monitoring <input checked="" type="checkbox"/>	Well Destruction _____

PROPOSED WATER SUPPLY WELL USE

Domestic _____	Industrial _____	Other _____
Municipal _____	Irrigation _____	

DRILLING METHOD:

Mud Rotary _____	Air Rotary _____	Auger <input checked="" type="checkbox"/>
Cable _____	Other _____	

DRILLER'S LICENSE NO. C57 484288

WELL PROJECTS

Drill Hole Diameter <u>8</u> in.	Maximum Depth <u>30</u> ft.
Casing Diameter <u>7</u> in.	Number <u>1</u>
Surface Seal Depth <u>5</u> ft.	<u>MW-4</u>

GEOTECHNICAL PROJECTS

Number of Borings _____	Maximum Depth _____ ft.
Hole Diameter _____ in.	

ESTIMATED STARTING DATE Dec 6, 1996

ESTIMATED COMPLETION DATE Dec 6, 1996

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

Approved Wyman Hong Date 2 Dec 96
Wyman Hong

APPLICANT'S SIGNATURE Chuck Headlee Date November 25, 1996

Attachment B

Boring Log/Well Construction Diagram

DRILLING LOG

Well ID **MW-4**

Boring ID

MW-4

Client: **Lynn Worthington**

Location **3055 35th Ave, Oakland**

Project No: **13-105**

Phase

Task**150**

Surface Elev. **NA ft,**

Page **1** of **2**

Depth (feet)	Blow Count	Sample Interval	Lithologic Description	TPH ₉ (ppm)	Graphic Log	Well Construction Graphics	Depth (feet)	Well Construction Details
0	Ground Surface						0	T.O.C. Elev.
			Clayey Silty GRAVEL: (GC); light brown; damp; 20% clay, 30% silt, 50% 0.25" - to 0.5"-diameter gravel; low to medium plasticity; low to moderate estimated permeability.					
			Clayey SILT: (MH); light to dark brown; damp; 40% clay, 60% silt; medium to high plasticity; low to moderate estimated permeability.					
5			Silty SAND: (SM); light brown with black mottling; 5% clay, 40% silt, 50% fine to medium sand, 5% gravel.				5	
			Gravelly Silty SAND: (SP); brown; damp; 30% silt, 50% sand, 20% 0.5"-diameter gravel; no plasticity; medium to high estimated permeability.					
10			20% silt, 50% sand, 30% 0.25" - to 0.5"-diameter gravel, increasing gravel content				10	
			Sandy GRAVEL: (GP); light brown; damp; 5% clay, 10% silt, 30% sand, 55% 1"-diameter gravel; no plasticity; moderate to high estimated permeability.	64.0				
			Silty Sandy GRAVEL: (GP); brown-green; damp; 5% clay, 15% silt, 15% sand, 65% gravel, increasing clay content; low plasticity; moderate estimated permeability.					
15			10% clay, 20% silt, 30% sand, 40% gravel; low to medium plasticity				15	Static water level @ 12.7 ft.

Continued Next Page

Driller Gregg Drilling	Development Yield NA	Bentonite Seal 7' to 8'
Logged By SR	Well Casing 2" Dia. 0 to 10'	Sand Pack 8' to 30'
Drilling Started 2/26/97	Casing Type Schedule 40 PVC	Sand Pack Type #2/16 Sand
Drilling Completed 2/26/97	Well Screen 2" Dia. 10' to 30'	Static Water Level 12.70 ft Depth
Construction Completed 2/26/97	Screen Type Schedule 40 PVC	Date 2/26/97
Development Completed 3/20/97	Slot Size 0.010"	Notes: In north-west corner of
Water Bearing Zones NA	Drilling Mud NA	site.
	Grout Type Portland Type I/II	

WELL 20105 5/27/97

DRILLING LOG

Client: Lynn Worthington

Project No: 13-105

Phase

Task 150

Well ID MW-4

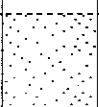
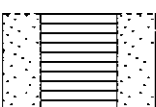
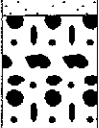
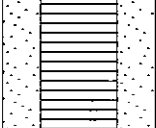
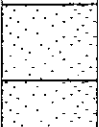
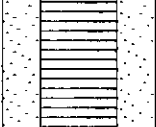
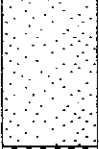
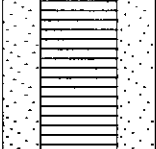

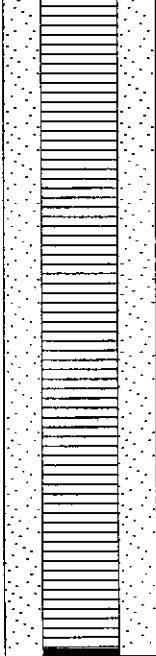
Boring ID

MW-4

Location 3055 35th Ave, Oakland

Surface Elev. NA ft.

Page 2 of 2

Depth (feet)	Blow Count	Sample Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Well Construction Graphics	Depth (feet)	Well Construction Details
15			Continued from previous page				15	
			Silty SAND; (SP); brown-green; damp; 5% clay, 30% silt, 60% sand, 5% gravel; low plasticity; moderate estimated permeability.	530.0				
			Silty Sandy GRAVEL; (GP); brown-green; damp; 5% clay, 20% silt, 35% sand, 40% 1"-round gravel, increasing gravel content; low plasticity; moderate to high estimated permeability.					
			Silty Gravelly SAND; (SP); brown-green; moist; 10% clay, 20% silt, 40% sand, 30% gravel; low plasticity; moderate to high estimated permeability.					
20			Clayey Silty Gravelly SAND; (SP); moist; 15% clay, 15% silt, 50% sand, 20% medium gravel; low to medium plasticity; moderate estimated permeability.				20	
			Sandy Clayey SILT; (MH); wet; 25% clay, 50% silt, 25% sand; medium to high plasticity; low to moderate estimated permeability.					
25			25% clay, 60% silt, 15% fine to medium sand				25	Water first encountered @ 23 ft.
30							30	Bottom of boring @ 30 ft.
35							35	

WELL 20105 5/27/97

CONFIDENTIAL

STATE OF CALIFORNIA DWR
WELL COMPLETION REPORT
(WELL LOGS)

REMOVED

Attachment C

Soil and Ground Water Analytic Data

McCAMPBELL ANALYTICAL INC.

110 2nd Avenue South, #D7, Pacheco, CA 94553
Tele: 510-798-1620 Fax: 510-798-1622

03/07/97

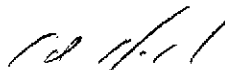
Dear Sam:

Enclosed are:

- 1). the results of 2 samples from your # 13-105; Lynn Worthington project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,



Edward Hamilton, Lab Director

Cambria Environmental Technology 1144 65th Street, Suite C Oakland, CA 94608	Client Project ID: # 13-105; Lynn Worthington	Date Sampled: 02/26/97
	Client Contact: Sam Rangarajan	Date Received: 02/28/97
	Client P.O:	Date Extracted: 02/28-03/03/97
		Date Analyzed: 02/28-03/03/97

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & 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) ⁺	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	% Rec. Surrogate
73967	MW-4-10	S	64,a	ND < 0.2	0.24	1.1	0.70	2.6	98
73969	MW-4-15	S	530,a	5.4	5.1	18	8.4	39	97
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit	W	50 ug/L	5.0	0.5	0.5	0.5	0.5	0.5	
	S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	0.005	

* water and vapor samples are reported in ug/L, soil and sludge samples in mg/kg, and all TCLP extracts in mg/L
 # cluttered chromatogram; sample peak coelutes 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 having broad chromatographic peaks are significant; biologically altered gasoline?; 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 sheen is present; i) liquid sample that contains greater than ~ 5 vol. % sediment; j) no recognizable pattern.

Cambria Environmental Technology 1144 65th Street, Suite C Oakland, CA 94608	Client Project ID: # 13-105; Lynn Worthington	Date Sampled: 02/26/97
		Date Received: 02/28/97
	Client Contact: Sam Rangarajan	Date Extracted: 02/28/97
	Client P.O:	Date Analyzed: 02/28/97

Diesel Range (C10-C23) Extractable Hydrocarbons as Diesel *

EPA methods modified 8015, and 3550 or 3510; California RWQCB (SF Bay Region) method GCFID(3550) or GCFID(3510)

Lab ID	Client ID	Matrix	TPH(d) ⁺	% Recovery Surrogate
73967	MW-4-10	S	62,d	108
73969	MW-4-15	S	150,d	106
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit	W	50 ug/L		
	S	1.0 mg/kg		

* water samples are reported in ug/L, soil and sludge samples in mg/kg, and all TCLP and STLC extracts in mg/L
 # cluttered chromatogram resulting in coeluted surrogate and sample peaks, or; surrogate peak is on elevated baseline, or; surrogate has been diminished by dilution of original extract.
 + 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 diesel is significant; b) diesel range compounds are significant; no recognizable pattern; c) aged diesel? is significant); d) gasoline range compounds are significant; e) medium boiling point pattern that does not match diesel (?); f) one to a few isolated peaks present; g) oil range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~ 5 vol. % sediment.

Cambria Environmental Technology 1144 65th Street, Suite C Oakland, CA 94608		Client Project ID: # 13-105; Lynn Worthington		Date Sampled: 02/26/97
		Client Contact: Sam Rangarajan		Date Received: 02/28/97
		Client P.O:		Date Extracted: 03/04/97
				Date Analyzed: 03/04/97
			pH	
Analytical methods			EPA 150.1, 9040, 9045	
Lab ID	Client ID	Matrix	pH	
73966	MW-4-5A	S	7.51	
73968	MW-4-10A	S	8.32	
73970	MW-4-15A	S	7.81	
Reporting Limit or Method Accuracy unless otherwise stated; ND		W	± 0.05	
means not detected above the reporting limit; N/A means not applicable		S	± 0.1	
Reporting Units		W,S	- log(aH ⁺) at 25°C	

QC REPORT FOR HYDROCARBON ANALYSES

Date: 02/28/97

Matrix: Soil

Analyte	Concentration (mg/kg) Sample (#68840)			Amount Spiked	% Recovery		RPD
	MS	MSD			MS	MSD	
TPH (gas)	0.000	1.977	1.974	2.03	97	97	0.2
Benzene	0.000	0.198	0.204	0.2	99	102	3.0
Toluene	0.000	0.204	0.210	0.2	102	105	2.9
Ethylbenzene	0.000	0.196	0.204	0.2	98	102	4.0
Xylenes	0.000	0.584	0.604	0.6	97	101	3.4
TPH (diesel)	0	317	315	300	106	105	0.7
TRPH (oil and grease)	0.0	18.9	17.6	20.8	91	85	7.1

* Rec. = (MS - Sample) / amount spiked x 100

RPD = (MS - MSD) / (MS + MSD) x 2 x 100

QC REPORT FOR HYDROCARBON ANALYSES

Date: 03/03/97

Matrix: Soil

Analyte	Concentration (mg/kg)			Amount Spiked	% Recovery		RPD
	Sample (#68848)	MS	MSD		MS	MSD	
TPH (gas)	0.000	1.818	1.831	2.03	90	90	0.7
Benzene	0.000	0.194	0.192	0.2	97	96	1.0
Toluene	0.000	0.188	0.196	0.2	94	98	4.2
Ethylbenzene	0.000	0.194	0.194	0.2	97	97	0.0
Xylenes	0.000	0.574	0.574	0.6	96	96	0.0
TPH (diesel)	0	325	318	300	108	106	2.0
TRPH (oil and grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

$$\% \text{ Rec.} = (\text{MS} - \text{Sample}) / \text{amount spiked} \times 100$$

$$\text{RPD} = (\text{MS} - \text{MSD}) / (\text{MS} + \text{MSD}) \times 2 \times 100$$

MOISTURE AND DENSITY DETERMINATIONS

CLIENT McCampbell Amalytical
 LOCATION Dakeland

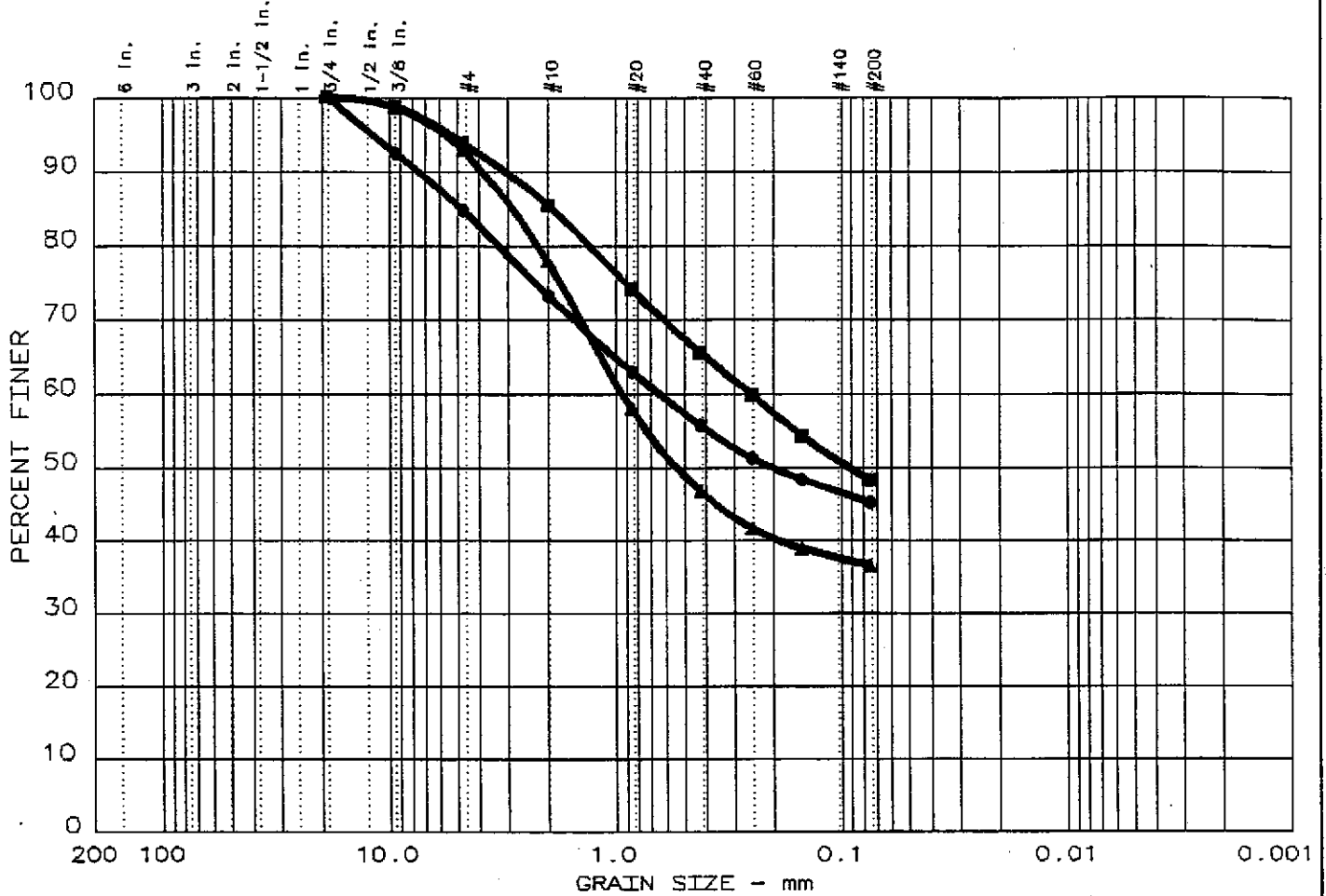
JOB NO. 13-105
 Lynn Worthington

* Porosity, n.	39.7%	45.6%	44.2%
* Air Voids, Va	1.6%	21.2%	5.0%
Organic Cont. ^{ASTM} D2974(c)	3.5%	4.1%	3.5%
BORING	MW-4-SA	MW-4-10A	MW-4-15A
SAMPLE NO.	73966	73968	73970
SAMPLE DEPTH			
DATE SAMPLED BY	2-26-97	2-26-97	2-26-97
DATE TESTED BY	3-4-97 MA.		
SOIL TYPE	Soft, moderate brown clayey coarse SAND	Dense, olive gray clayey coarse SAND	Soft, brown clayey coarse SAND
LABORATORY IDENTIFICATION	USCS SC	SC	SC
NO. OF RINGS	3.7	4.3	4.0
WT. OF WET SOIL & RINGS	509.2	513.5	518.0
WT. OF RINGS	150.9	161.4	162.0
WT. OF WET SOIL	358.3	352.1	356.0
WET DENSITY (LBS./CU.FT.)	126.0	106.6	115.8
DRY DENSITY (LBS./CU.FT.)	101.6	91.4	89.9
DISH NO.	39	22	1
WT. OF WET SOIL & DISH	121.7	87.7	118.4
WT. OF DRY SOIL & DISH	104.3	79.9	99.2
NET LOSS OF MOISTURE	17.4	7.8	19.2
WT. OF DISH	31.7	32.8	32.8
WT. OF DRY SOIL	72.6	47.1	66.4
MOISTURE CONTENT (% DRY WT.)	24.0	16.6	28.9

↳ Strong gaseous odour.

* Calculated values on assumed specific gravity of 2.70

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	0.0	15.3	39.5	45.2		SC		
▲	0.0	7.2	56.3	36.5		SC		
■	0.0	6.2	45.5	48.3		SC		

SIEVE inches size	PERCENT FINER		
	●	▲	■
0.75	100.0	100.0	100.0
0.375	92.5	98.6	98.7
GRAIN SIZE			
D ₆₀	0.65	0.93	0.25
D ₃₀			
D ₁₀			
COEFFICIENTS			
C _c			
C _u			

SIEVE number size	PERCENT FINER		
	●	▲	■
4	84.7	92.8	93.8
10	73.2	77.9	85.4
20	62.9	58.0	74.1
40	55.7	46.7	65.5
60	51.2	41.6	59.8
100	48.4	38.8	54.3
200	45.2	36.5	48.3

Sample information:

- MW-4-5A 73966
Moderate brown clayey
COARSE SAND.
- ▲ MW-4-10A 73968
Olive grey clayey
COARSE SAND.
- MW-4-15A 73970
Brown clayey COARSE
SAND.

Remarks:

**Soil
Mechanics
Lab**

Project No.: 13-105
 Project: Lynn Worthington
 Date: 3-4-97
 Data Sheet No. _____

GRAIN SIZE DISTRIBUTION TEST DATA

Test No.: 4

Date: 3-4-97
 Project No.: 13-105
 Project: Lynn Worthington

Sample Data

Location of Sample: MW-4-5A 73966
 Sample Description 1: Moderate brown clayey
 Sample Description 2: COARSE SAND.
 USCS Class: SC Liquid limit: Plasticity index:

Notes

Remarks:

Data Sheet No.:

Mechanical Analysis Data

Sieve	Cumul. Wt. retained	Percent finer
Initial		
Dry sample and tare=	195.00	
Tare =	0.00	
Dry sample weight =	195.00	
Tare for cumulative weight retained=	0	
0.75 inches	0.00	100.0
0.375 inches	14.70	92.5
# 4	29.80	84.7
# 10	52.20	73.2
# 20	72.30	62.9
# 40	86.40	55.7
# 60	95.10	51.2
# 100	100.70	48.4
# 200	106.80	45.2

Fractional Components

Gravel/Sand based on #4 sieve
 Sand/Fines based on #200 sieve
 % + 3 in. = 0.0 % GRAVEL = 15.3 % SAND = 39.5
 % FINES = 45.2

D85= 4.84 D60= 0.646 D50= 0.204

GRAIN SIZE DISTRIBUTION TEST DATA

Test No.: 5

Date: 3-4-97
 Project No.: 13-105
 Project: Lynn Worthington

Sample Data

Location of Sample: MW-4-10A 73968
 Sample Description 1: Olive grey clayey
 Sample Description 2: COARSE SAND.
 USCS Class: SC Liquid limit: Plasticity index:

Notes

Remarks:

Data Sheet No.:

Mechanical Analysis Data

Initial
 Dry sample and tare= 255.40
 Tare = 0.00
 Dry sample weight = 255.40
 Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
0.75 inches	0.00	100.0
0.375 inches	3.50	98.6
# 4	18.40	92.8
# 10	56.50	77.9
# 20	107.20	58.0
# 40	136.10	46.7
# 60	149.20	41.6
# 100	156.20	38.8
# 200	162.10	36.5

Fractional Components

Gravel/Sand based on #4 sieve
 Sand/Fines based on #200 sieve
 % + 3 in. = 0.0 % GRAVEL = 7.2 % SAND = 56.3
 % FINES = 36.5

D85= 2.85 D60= 0.932 D50= 0.536

GRAIN SIZE DISTRIBUTION TEST DATA

Test No.: 1

Date: 3-5-97
 Project No.: 13-105
 Project: Lynn Worthington

Sample Data

Location of Sample: MW-4-15A 73970
 Sample Description 1: Brown clayey COARSE
 Sample Description 2: SAND.
 USCS Class: SC Liquid limit: Plasticity index:

Notes

Remarks:

Data Sheet No.:

Mechanical Analysis Data

Initial
 Dry sample and tare= 280.80
 Tare = 0.00
 Dry sample weight = 280.80
 Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
0.75 inches	0.00	100.0
0.375 inches	3.60	98.7
# 4	17.30	93.8
# 10	41.00	85.4
# 20	72.80	74.1
# 40	96.90	65.5
# 60	112.80	59.8
# 100	128.40	54.3
# 200	145.20	48.3

Fractional Components

Gravel/Sand based on #4 sieve
 Sand/Fines based on #200 sieve
 % + 3 in. = 0.0 % GRAVEL = 6.2 % SAND = 45.5
 % FINES = 48.3

D85= 1.93 D60= 0.251 D50= 0.092

McCAMPBELL ANALYTICAL

110 2nd AVENUE, # D7
PACHECO, CA 94553

(510) 798-1620

FAX (510) 798-1622

REPORT TO: *Ed Hamilton*

BILL TO: *McC Campbell*

PROJECT NUMBER: *13-105*

PROJECT NAME: *LYNN WORTHINGTON*

PROJECT LOCATION: *OAKLAND*

CHAIN OF CUSTODY RECORD

TURN AROUND TIME: RUSH 24 HOUR 48 HOUR 5 DAY ROUTE

ANALYSIS REQUEST

OTHER

SAMPLE ID	LOCATION	SAMPLING		CONTAINERS	TYPE CONTAINERS	MATRIX					METHOD PRESERVED					
		DATE	TIME			WATER	SOIL	AIR	SLUDGE	OTHER	HCL	HNO3	ICE	OTHER		
MW-4-5A		2/26/97		1	BT	(X)						(X)				
MW-4-10A		"		1	BT	(X)						(X)				
MW-4-15A		"		1	BT	(X)						(X)				

EPA 601/8010	EPA 602/8020	EPA 808/8080	EPA 806/8060 - PCBs Only	EPA 824/8240/8260	EPA 825/8270	CAM - 17 Metals	EPA - Priority Pollutant Metals	LUFT Metals	LEAD (7240/7421/239.2/6010)	ORGANIC LEAD	RCI	<i>Porosity ✓</i>	<i>Bulk Density</i>	<i>Moisture Content</i>	<i>Fraction Organic Carbon</i>	<i>Permeability AND *</i>	<i>Air Filled Voids ✓</i>
												X	X	X	X	X	X

COMMENTS:

351

73966
73968
73970

RELINQUISHED BY: *N. Pica*
RELINQUISHED BY: *M. a. fan*
RELINQUISHED BY:

DATE: *3/4/97*
DATE: *3/10/97*
DATE:

RECEIVED BY: *M. a. fan*
RECEIVED BY: *N. Pica*
RECEIVED BY LABORATORY:

REMARKS:
** Grainsize analysis was performed and permeability cancelled as per your request.*

LEGEND

Analytical Services

3636 N. Laughlin Road, Suite 110 Santa Rosa, California 95403 707.541.2313 707.541.2333 fax

Adam Sevi
Cambria Env. Technology
1144 65th Street
Suite C
Oakland, CA 94608

Date: 04/04/1997
LEGEND Client Acct. No: 98900
LEGEND Job No: 97.00596
Received: 03/22/1997

Client Reference Information

13-105-106/Worthington

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety. Please refer to the enclosed "Key to Result Flags" for definition of terms. Should you have questions regarding procedures or results, please feel free to call me at (707) 541-2313.

Submitted by:

Jennifer L. Roseberry
Quality Assurance Officer

Enclosure(s)

Client Name: Cambria Env. Technology
 Client Acct: 98900
 LEGEND Job No: 97.00596

Date: 04/04/1997
 ELAP Cert: 2193
 Page: 2

Ref: 13-105-106/Worthington

SAMPLE DESCRIPTION: MW-1
 Date Taken: 03/20/1997
 Time Taken:
 LEGEND Sample No: 273847

Parameter	Results	Flags	Reporting		Method	Date	Date	Run Batch No.
			Limit	Units		Extracted	Analyzed	
TPH (Gas/BTEX, Liquid)								
5030/M8015	--						03/25/1997	3816
DILUTION FACTOR*	200						03/25/1997	3816
as Gasoline	33		10	mg/L	5030		03/25/1997	3816
8020 (GC, Liquid)	--						03/25/1997	3816
Benzene	6,100		100	ug/L	8020		03/25/1997	3816
Toluene	560		100	ug/L	8020		03/25/1997	3816
Ethylbenzene	970		100	ug/L	8020		03/25/1997	3816
Xylenes (Total)	2,200		100	ug/L	8020		03/25/1997	3816
MTBE	ND		400	ug/L	8020		03/25/1997	3816
SURROGATE RESULTS	--						03/25/1997	3816
Bromofluorobenzene (SURR)	99			% Rec.	5030		03/25/1997	3816
M8015 (EXT., Liquid)						03/26/1997		
DILUTION FACTOR*	20						04/01/1997	1313
as Diesel	10		1	mg/L	3510		04/01/1997	1313
SURROGATE RESULTS	--						04/01/1997	1313
Ortho-terphenyl (SURR)	132			% Rec.	3510		04/01/1997	1313

NOTE: Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety.

Client Name: Cambria Env. Technology Date: 04/04/1997
 Client Acct: 98900 ELAP Cert: 2193
 LEGEND Job No: 97.00596 Page: 3

Ref: 13-105-106/Worthington

SAMPLE DESCRIPTION: MW-2
 Date Taken: 03/20/1997
 Time Taken:
 LEGEND Sample No: 273848

Parameter	Results	Flags	Reporting		Method	Date	Date	Run
			Limit	Units		Extracted	Analyzed	Batch No.
TPH (Gas/BTEX, Liquid)								
5030/M8015	--						03/25/1997	3816
DILUTION FACTOR*	200						03/25/1997	3816
as Gasoline	27		10	mg/L	5030		03/25/1997	3816
8020 (GC, Liquid)								
Benzene	3,700		100	ug/L	8020		03/25/1997	3816
Toluene	2,300		100	ug/L	8020		03/25/1997	3816
Ethylbenzene	580		100	ug/L	8020		03/25/1997	3816
Xylenes (Total)	2,800		100	ug/L	8020		03/25/1997	3816
MTEE	ND		400	ug/L	8020		03/25/1997	3816
SURROGATE RESULTS								
Bromofluorobenzene (SURR)	97			% Rec.	5030		03/25/1997	3816
M8015 (EXT., Liquid)								
DILUTION FACTOR*	10					03/26/1997		
as Diesel	6.1	DL	0.50	mg/L	3510		04/01/1997	1313
SURROGATE RESULTS								
Ortho-terphenyl (SURR)	105			% Rec.	3510		04/01/1997	1313

NOTE: Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety.

Client Name: Cambria Env. Technology
 Client Acct: 98900
 LEGEND Job No: 97.00596

Date: 04/04/1997
 ELAP Cert: 2193
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Ref: 13-105-106/Worthington

SAMPLE DESCRIPTION: MW-3
 Date Taken: 03/20/1997
 Time Taken:
 LEGEND Sample No: 273849

Parameter	Results	Flags	Reporting		Method	Date	Date	Run
			Limit	Units		Extracted	Analyzed	Batch No.
TPH (Gas/BTEX, Liquid)								
5030/MS015	--						03/24/1997	3817
DILUTION FACTOR*	1,000						03/24/1997	3817
as Gasoline	56		50	mg/L	5030		03/24/1997	3817
8020 (GC, Liquid)	--						03/24/1997	3817
Benzene	9,900		500	ug/L	8020		03/24/1997	3817
Toluene	6,900		500	ug/L	8020		03/24/1997	3817
Ethylbenzene	1,300		500	ug/L	8020		03/24/1997	3817
Xylenes (Total)	8,000		500	ug/L	8020		03/24/1997	3817
MIBK	3,500		2000	ug/L	8020		03/24/1997	3817
SURROGATE RESULTS	--						03/24/1997	3817
Bromofluorobenzene (SRR)	102			% Rec.	5030		03/24/1997	3817
MS015 (EXT., Liquid)						03/26/1997		
DILUTION FACTOR*	10						04/01/1997	1313
as Diesel	11	DL	0.50	mg/L	3510		04/01/1997	1313
SURROGATE RESULTS	--						04/01/1997	1313
Ortho-terphenyl (SRR)	110			% Rec.	3510		04/01/1997	1313

NOTE: Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety.

Client Name: Cambria Env. Technology
 Client Acct: 98900
 LEGEND Job No: 97.00596

Date: 04/04/1997
 ELAP Cert: 2193
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Ref: 13-105-106/Worthington

SAMPLE DESCRIPTION: MW-4
 Date Taken: 03/20/1997
 Time Taken:
 LEGEND Sample No: 273850

Parameter	Results	Flags	Reporting		Method	Date	Date	Run
			Limit	Units		Extracted	Analyzed	Batch No.
TPH (Gas/BTEX, Liquid)								
5030/MB015	--						03/24/1997	3817
DILUTION FACTOR*	100						03/24/1997	3817
as Gasoline	47		5.0	mg/L	5030		03/24/1997	3817
8020 (GC, Liquid)								
Benzene	11,000	FI	500	ug/L	8020		03/25/1997	3818
Toluene	4,500	FI	500	ug/L	8020		03/25/1997	3818
Ethylbenzene	1,100		50	ug/L	8020		03/24/1997	3817
Xylenes (Total)	5,200		50	ug/L	8020		03/24/1997	3817
MTBE	3,400		2000	ug/L	8020		03/24/1997	3817
SURROGATE RESULTS								
Bromofluorobenzene (SURR)	98			% Rec.	5030		03/24/1997	3817
MB015 (EXT., Liquid)								
DILUTION FACTOR*	2					03/26/1997		
as Diesel	3.1		0.1	mg/L	3510		04/01/1997	1313
SURROGATE RESULTS								
Ortho-terphenyl (SURR)	106			% Rec.	3510		04/01/1997	1313

NOTE: Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety.

Client Name: Cambria Env. Technology
 Client Acct: 98900
 LEGEND Job No: 97.00596

Date: 04/04/1997
 RLAP Cert: 2193
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Ref: 13-105-106/Worthington

CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Parameter	CCV	CCV	CCV	Flags	Units	Date Analyzed	Analyst Initials	Run Batch Number
	Standard % Recovery	Standard Amount Found	Standard Amount Expected					
TPH (Gas/BTEX, Liquid)								
as Gasoline	105.2	0.526	0.50		mg/L	03/24/1997	aal	3816
Benzene	93.6	18.72	20.0		ug/L	03/24/1997	aal	3816
Toluene	88.3	17.66	20.0		ug/L	03/24/1997	aal	3816
Ethylbenzene	92.3	18.46	20.0		ug/L	03/24/1997	aal	3816
Xylenes (Total)	92.1	54.65	60.0		ug/L	03/24/1997	aal	3816
Bromofluorobenzene (SURR)	96.0	96	100	% Rec.		03/24/1997	aal	3816
TPH (Gas/BTEX, Liquid)								
as Gasoline	94.2	0.471	0.50		mg/L	03/24/1997	aal	3817
Benzene	93.5	18.69	20.0		ug/L	03/24/1997	aal	3817
Toluene	92.6	18.51	20.0		ug/L	03/24/1997	aal	3817
Ethylbenzene	93.6	18.71	20.0		ug/L	03/24/1997	aal	3817
Xylenes (Total)	92.1	55.24	60.0		ug/L	03/24/1997	aal	3817
Bromofluorobenzene (SURR)	96.0	96	100	% Rec.		03/24/1997	aal	3817
TPH (Gas/BTEX, Liquid)								
as Gasoline	102.4	0.512	0.50		mg/L	03/25/1997	aal	3818
Benzene	93.1	18.62	20.0		ug/L	03/25/1997	aal	3818
Toluene	88.2	17.64	20.0		ug/L	03/25/1997	aal	3818
Ethylbenzene	91.4	18.28	20.0		ug/L	03/25/1997	aal	3818
Xylenes (Total)	90.8	54.49	60.0		ug/L	03/25/1997	aal	3818
Bromofluorobenzene (SURR)	97.0	97	100	% Rec.		03/25/1997	aal	3818
M8015 (EXT., Liquid)								
as Diesel	92.2	922	1000		mg/L	03/27/1997	aal	1313
Ortho-terphenyl (SURR)	98.0	98	100	% Rec.		03/27/1997	aal	1313
M8015 (EXT., Liquid)								
as Diesel	99.1	991	1000		mg/L	03/28/1997	vah	1313
Ortho-terphenyl (SURR)	102.0	102	100	% Rec.		03/28/1997	vah	1313
M8015 (EXT., Liquid)								
as Diesel	99.3	993	1000		mg/L	03/28/1997	vah	1313
Ortho-terphenyl (SURR)	104.0	104	100	% Rec.		03/28/1997	vah	1313
M8015 (EXT., Liquid)								
as Diesel	92.8	928	1000		mg/L	04/01/1997	gec	1313
Ortho-terphenyl (SURR)	98.0	98	100	% Rec.		04/01/1997	gec	1313

NOTE: Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety.

Client Name: Cambria Env. Technology
 Client Acct: 98900
 LEGEND Job No: 97.00596

Date: 04/04/1997
 ELAP Cert: 2193
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METHOD BLANK REPORT

Parameter	Method	Reporting	Flags	Units	Date	Analyst	Run
	Blank						
	Amount	Limit			Analyzed	Initials	Number
	Found						
TPH (Gas/BTEX, Liquid)							
as Gasoline	ND	0.050		mg/L	03/24/1997	aal	3816
Benzene	ND	0.50		ug/L	03/24/1997	aal	3816
Toluene	ND	0.50		ug/L	03/24/1997	aal	3816
Ethylbenzene	ND	0.50		ug/L	03/24/1997	aal	3816
Xylenes (Total)	ND	0.50		ug/L	03/24/1997	aal	3816
MTBE	ND	2.0		ug/L	03/24/1997	aal	3816
Bromofluorobenzene (SURR)	101		% Rec.		03/24/1997	aal	3816
TPH (Gas/BTEX, Liquid)							
as Gasoline	ND	0.050		mg/L	03/24/1997	aal	3817
Benzene	ND	0.50		ug/L	03/24/1997	aal	3817
Toluene	ND	0.50		ug/L	03/24/1997	aal	3817
Ethylbenzene	ND	0.50		ug/L	03/24/1997	aal	3817
Xylenes (Total)	ND	0.50		ug/L	03/24/1997	aal	3817
MTBE	ND	2.0		ug/L	03/24/1997	aal	3817
Bromofluorobenzene (SURR)	102		% Rec.		03/24/1997	aal	3817
TPH (Gas/BTEX, Liquid)							
as Gasoline	ND	0.050		mg/L	03/25/1997	aal	3818
Benzene	ND	0.50		ug/L	03/25/1997	aal	3818
Toluene	ND	0.50		ug/L	03/25/1997	aal	3818
Ethylbenzene	ND	0.50		ug/L	03/25/1997	aal	3818
Xylenes (Total)	ND	0.50		ug/L	03/25/1997	aal	3818
MTBE	ND	2.0		ug/L	03/25/1997	aal	3818
Bromofluorobenzene (SURR)	100		% Rec.		03/25/1997	aal	3818
M8015 (EXT., Liquid)							
as Diesel	ND	0.050		mg/L	03/27/1997	aal	1313
Ortho-terphenyl (SURR)	96		% Rec.		03/27/1997	aal	1313

NOTE: Results apply only to the samples analyzed. Reproduction of this report is permitted only in its entirety.

4097

COMPANY: CAMBRIDGE ENVIRONMENTAL
 1144 65TH ST. SUITE B
 OAKLAND, CA 94608

CHAIN OF CUSTODY RECORD
 TURN AROUND TIME: RUSH 24 HOUR 48 HOUR 5 DAY

REPORT TO: Adam Sevi BILL TO: 13-105-106
 PHONE NO.: 510-420-0700 FAX NO.: 510-420-9170
 PROJECT NO.: 13-105-106 PROJECT NAME: WORTHINGTON
 PROJECT LOCATION: 3055 35TH ST & OAKLAND, CA

ANALYSIS REQUEST OTHER

SAMPLE ID	LOCATION	SAMPLING		# CONTAINERS	TYPE CONTAINERS	MATRIX					METHOD PRESERVED		BTEX & TPH on Gasoline (802/8020 & 9015)	TPH on Diesel (8015)	Total Petroleum Oil & Grease (5520 EAF/5520 BAF)	Total Petroleum Hydrocarbons (418.1)	EPA 801/8010	BTEX & MTBE	EPA 608/8080	EPA 608/8080 - PCBs Only	EPA 624/8240/8260	EPA 625/8270	CAM - 17 Metals	EPA - Priority Pollutant Metals	LUFT Metals	LEAD (7240/7421/239.2/6010)	ORGANIC LEAD	RCI	COMMENTS					
		DATE	TIME			WATER	SOIL	AIR	SLUDGE	OTHER	HCL	HNO3																		ICE	OTHER			
MW-1		3/20		3	VoA	X							X																					
MW-1				1	LR	X							X																					
MW-2				3	VoA	X							X																					
MW-2				1	LR	X							X																					
MW-3				3	VoA	X							X																					
MW-3				1	LR	X							X																					
MW-4				3	VoA	X							X																					
MW-4				1	LR	X							X																					

CUSTODY SEALED
 Date 3/21/97 Time 1800 Initials JS
 SEAL INTACT?
 Yes No Initials JLS

RELINQUISHED BY: *Colin Liu* DATE: 3/21/97 TIME: 11:00
 RECEIVED BY: *Steven Rapp*
 RELINQUISHED BY: *Steven Rapp* DATE: 3/21/97 TIME: 1800
 RECEIVED BY: *[Signature]* 0930
 RECEIVED BY LABORATORY: 032297

REMARKS: Cooler Temp 1.5°C

KEY TO RESULT FLAGS

- * : RPD between sample duplicates exceeds 30%.
- *M : RPD between sample duplicates or MS/MSD exceeds 20%.
- + : Correlation coefficient for the Method of Standard Additions is less than 0.995.
- < : Sample result is less than reported value.
- B-I : Value is between Method Detection Limit and Reporting Limit.
- B-0 : Analyte found in blank and sample.
- C : The result confirmed by secondary column or GC/MS analysis.
- CNA : Cr+6 not analyzed; Total Chromium concentration below Cr+6 regulatory level.
- COMP : Sample composited by equal volume prior to analysis.
- CV : Parameter cannot be analyzed for in a preserved sample.
- CWT : Due to the sample matrix, constant weight could not be achieved.
- D- : The result has an atypical pattern for Diesel analysis.
- D1 : The result for Diesel is an unknown hydrocarbon which consists of a single peak.
- DB : ND for hydrocarbons, non-discrete baseline rise detected.
- DH : The result appears to be a heavier hydrocarbon than Diesel.
- DL : The result appears to be a lighter hydrocarbon than Diesel.
- DR : Elevated Reporting Limit due to Matrix.
- DS : Surrogate diluted out of range.
- DX : The result for Diesel is an unknown hydrocarbon which consists of several peaks.
- FA : Compound quantitated at a 2X dilution factor.
- FB : Compound quantitated at a 5X dilution factor.
- FC : Compound quantitated at a 10X dilution factor.
- FD : Compound quantitated at a 20X dilution factor.
- FE : Compound quantitated at a 50X dilution factor.
- FF : Compound quantitated at a 100X dilution factor.
- FG : Compound quantitated at a 200X dilution factor.
- FH : Compound quantitated at a 500X dilution factor.
- FI : Compound quantitated at a 1000X dilution factor.
- FJ : Compound quantitated at a greater than 1000x dilution factor.
- FK : Compound quantitated at a 25X dilution factor.
- FL : Compound quantitated at a 250X dilution factor.
- G- : The result has an atypical pattern for Gasoline.
- G1 : The result for Gasoline is an unknown hydrocarbon which consists of a single peak.
- GH : The result appears to be a heavier hydrocarbon than Gasoline.
- GL : The result appears to be a lighter hydrocarbon than Gasoline.
- GX : The result for Gasoline is an unknown hydrocarbon which consists of several peaks.
- HT : Analysis performed outside of the method specified holding time.
- HTC : Confirmation analyzed outside of the method specified holding time.
- HTP : Prep procedure performed outside of the method specified holding time.
- HTR : Received after holding time expired, analyzed ASAP after receipt.
- HX : Peaks detected within the quantitation range do not match standard used.
- J : Value is estimated.
- MI : Matrix Interference Suspected.
- MSA : Value determined by Method of Standard Additions.
- MSA* : Value obtained by Method of Standard Additions; Correlation coefficient is <0.995.
- NI1 : Sample spikes outside of QC limits; matrix interference suspected.
- NI2 : Sample concentration is greater than 4X the spiked value; the spiked value is considered insignificant.
- NI3 : Matrix Spike values exceed established QC limits, post digestion spike is in control.
- NI4 : MS/MSD outside of control limits, serial dilution within control.
- P : There is >40% difference between primary and confirmation analysis.
- P7 : pH of sample > 2; sample analyzed past 7 days.
- RSC : Refer to subcontract laboratory report for QC data.
- S2 : Matrix interference confirmed by repeat analysis.
- SCN : Thiocyanate not analyzed separately; total value is below the Reporting Limit for Free Cyanide.
- TND : Conc. of the total analyte ND; therefore this analyte is ND also.
- UMDL : Undetected at the Method Detection Limit.
- UTD : Unable to perform requested analysis.

FORM. FLAGS

Rev. 01/24/97

Attachment D

Standard Field Procedures for Monitoring Well Installation

STANDARD FIELD PROCEDURES FOR 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) or a Certified Engineering Geologist (CEG).

Soil Boring and Sampling

Soil borings are typically drilled using hollow-stem augers or 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 photoionization detector (PID) measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. PID measurements are used along with the field observations, odors, stratigraphy and ground water depth to select soil samples for analysis.