3769 / R0486

CAMBRIA

January 10, 2002

Mr. Barney Chan
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

JAN 14 2002

gw
No sampling yet

Re: **Offsite Monitoring Well Installation Report**
Shell-branded Service Station
4255 MacArthur Boulevard
Oakland, California
Incident #98995758
Cambria Project #244-0524

Dear Mr. Chan,

Cambria Environmental Technology, Inc. (Cambria) is submitting this *Offsite Monitoring Well Installation Report* on behalf of Equiva Services LLC. This investigation, proposed in Cambria's *Second Quarter 2001 Monitoring Report*, was conducted in response to the Alameda County Health Care Services Agency letter dated December 7, 2000, requesting the installation of a monitoring well to assess the vertical extent of subsurface hydrocarbons further downgradient of the site. Presented below are summaries of the site background, investigation procedures, investigation results, and conclusions.

SITE BACKGROUND

Site Location: The site is an active Shell service station located at the intersection of MacArthur Boulevard and High Street in a mixed commercial and residential area of Oakland, California. An active Unocal service station and a former Chevron service station are located east of the site. A trailer park and adjacent California Department of Transportation (Caltrans) access to Interstate 580 are located immediately southwest of the site. Topography slopes toward the west, with a 5-feet (ft) elevation difference between grade at the Shell service station and the trailer park property, and an additional 5-ft elevation difference between grade at the trailer park property and the Caltrans property.

June 1985 Subsurface Investigation: In June 1985, Emcon Associates of San Jose, California drilled three soil borings and installed one groundwater monitoring well adjacent to the underground storage tanks (USTs). Up to 15,800 milligrams per kilogram (mg/kg) total petroleum hydrocarbons as gasoline (TPHg) were detected in the shallow soil samples from

Oakland, CA
San Ramon, CA
Sonoma, CA

Cambria Environmental Technology, Inc.

1144 65th Street
Suite B
Oakland, CA 94608
Tel (510) 420-0700
Fax (510) 420-9170

inside the UST area. In July 1992, GeoStrategies, Inc. of Hayward, California performed a site reconnaissance and verified that the original monitoring well had been destroyed during the 1985 UST replacement activities.

December 1985 UST Replacement: In December 1985, the USTs were replaced, and approximately 810 cubic yards of hydrocarbon-bearing soil were transported to a disposal facility. Up to 22,000 mg/kg total volatile hydrocarbons and 500 mg/kg benzene were detected in the soil samples from the excavation.

November 1993 Subsurface Investigation: In November 1993, Weiss Associates of Emeryville, California (WA) drilled soil borings BH-A, BH-B and BH-C which were converted into monitoring wells MW-1, MW-2 and MW-3, respectively. Up to 1,700 mg/kg TPHg and 3.3 mg/kg benzene were detected in soil boring BH-C (MW-3) between 11 ft and 16 ft depth. Up to 66 mg/kg TPHg and 0.07 mg/kg benzene were detected in soil boring BH-B (MW-2) between 9 ft and 14 ft depth.

November 1994 Subsurface Investigation: In November 1994, WA drilled on site soil borings BH-D and BH-E located on the northeastern end of the lot and off site boring BH-F (MW-4) located near the Highway 580 on ramp. Up to 5,900 mg/kg TPHg and 23 mg/kg benzene were detected at 5 ft depth in soil boring BH-E located adjacent to the central eastern pump island. Trace hydrocarbons concentrations were detected in the capillary fringe soil samples collected from each of the borings.

November 1995 Dispenser and Piping Removal and Sampling: In November 1995, WA collected 15 soil samples during dispenser and piping replacement activities. Up to 7,800 mg/kg TPHg were detected in samples collected from beneath the former middle dispenser and 2,800 mg/kg TPHg were detected in the sample collected from beneath the adjacent product piping. Up to 7,300 mg/kg TPHg were detected in the sample collected from beneath the northeast dispenser island. No benzene above 1 mg/kg was detected in any of the 15 samples collected. During the dispenser replacements, horizontal wells HW-1 through HW-4 were installed in the vadose zone about 5 ft below ground surface and adjacent to the former piping and dispensers to facilitate future removal of petroleum hydrocarbons from the impacted soil.

August 1997 Soil Vapor Extraction (SVE) Test: In August 1997, Cambria performed short-term SVE testing using a VR Systems Model V3 internal combustion engine on horizontal vapor extraction wells HW-1 and HW-2 through HW-4 and monitoring wells MW-2 and MW-3. Cambria measured vapor extraction flow rates, the vacuum applied to the wellheads, and the vacuum influence in nearby wells. Cambria calculated an effective radius of influence of 35 to 50 ft during testing of wells MW-3 and MW-2. The relatively high TPHg removal rates measured in horizontal wells HW-1 and HW-2 through HW-4 were most likely temporary, and

are not believed to be representative of site conditions due to extensive well screen in permeable fill material. The results of the short-term testing indicated that SVE achieves only low hydrocarbon removal rates in wells MW-2 and MW-3, which are more representative of native soil conditions.

February 1998 Subsurface Investigation: In February 1998, Cambria drilled two offsite borings (SB-1 and SB-2) in the trailer park adjacent to the Shell site (Figure 1). No TPHg or benzene was detected in the soil samples collected from the two borings. The highest methyl tert butyl ether (MTBE) concentration detected in soil was 1.4 mg/kg detected in soil boring SB-2 at a depth of 7 feet below grade (fbg). Up to 7,700 micrograms per liter (µg/L) TPHg, 210 µg/L benzene, and 46,000 µg/L MTBE were detected in the grab groundwater sample collected from soil boring SB-2. In sample analysis of soil physical parameters, total organic carbon was detected at 2,140 mg/kg and 7,210 mg/kg at a depth of 5.5 fbg in borings SB-1 and SB-2, and total porosity was measured as 35.2% and 37.4%, respectively. Specific permeability values were 181 millidarcies (md) for SB-1-5.5 and 71 md for SB-2-5.5, but the lab noted that the measured values were an order of magnitude or more too high due to fine fractures developed in the samples upon drying. Permeability measurements confirmed the low permeability of the shallow soils beneath the site.

2001 Sensitive Receptor Survey, Conduit Study and Site Conceptual Model (SCM): Cambria included sensitive receptor survey and conduit study results and an SCM in our *First Quarter 2001 Monitoring Report.* The sensitive receptor survey identified 25 monitoring wells, 4 cathodic protection wells, and 1 domestic well within ½-mile of the site. Given the conduit study results, Cambria concluded that nearby sewer, storm drain, and water lines located between 8-13 fbg could serve as preferential pathways for the migration of petroleum hydrocarbons and MTBE. However, Cambria did not identify any conduits in the nearby downgradient direction.

Groundwater Monitoring: Quarterly groundwater monitoring has been conducted at the site since November 1993.

have been + should continue GWE from tank backfill + specific MWE.

INVESTIGATION PROCEDURES

To install the monitoring well, Cambria advanced one soil boring approximately 200 ft southwest of the site, on the Caltrans right-of-way adjacent to the I-580 on-ramp. Soil samples were collected from the boring at 5-ft intervals for lithologic description. In addition, one soil sample was collected at the approximate capillary fringe directly above the saturated zone and submitted

for chemical analysis. The boring was converted to a 2-inch-diameter groundwater monitoring well.

Specific procedures for this investigation are summarized below. Soil analytical results are summarized in Table 1, and laboratory analytical reports are included as Attachment A. The well permit and boring log are included as Attachments B and C, respectively. Cambria's *Standard Field Procedures for Installation of Monitoring Wells* are included as Attachment D.

Drilling Date: November 12, 2001.

Drilling Company: Gregg Drilling of Martinez, California (C-57 License #485165).

Personnel Present:

Name:	***Title:***	***Company:***
Sue Landsittel	Staff Geologist	Cambria
Bobby Deason	Driller	Gregg Drilling

Permits: Alameda County Public Works Agency Drill Permits #WO1-882; Caltrans Encroachment Permit #0401-6SV-2272 (Attachment B).

Drilling Method: 8-inch hollow-stem auger.

Soil Sampling Method: Soil samples were collected at 5-foot intervals using a split-spoon sampler with brass sample tubes.

Sediment Lithology: Soil encountered in the boring consisted of fill to 3 fbg, clayey sandy silt to approximately 13 fbg, clayey silty sand to approximately 18 fbg, and clay to the total explored depth of 20 fbg (Attachment C).

Groundwater Depths: Groundwater was encountered at approximately 8 fbg during drilling activities. Static groundwater depth in the new wells will be measured by Blaine Tech Services (Blaine) of San Jose, California during the next quarterly monitoring event.

Drilling Method: 8-inch hollow-stem auger.

Number of Wells: One, MW-5.

Well Depth: 20 fbg.

Well Materials: MW-5 was constructed using 2-inch diameter Schedule 40 PVC casing with 0.010-inch slotted screen. The filter pack consisted of Monterey 2/12 sand from 20 to 3.5 fbg, the casing was sealed with bentonite from 3.5 to 2 fbg, and Portland Type I neat cement was placed from 2 to 1 fbg. A traffic-rated well box was installed to complete the well to grade (Attachment C).

Well Screen Interval: 5 to 20 fbg (Attachment C).

Well Elevation Survey The top of casing elevations will be surveyed by Virgil Chavez Land Surveying of Vallejo, California. Results of the survey will be included in Cambria's next quarterly monitoring report.

Well Development: Blaine will develop the wells using surge-block agitation and pump evacuation. Wells will be developed at least 72 hours after installation and at least 72 hours prior to sampling. Blaine will sample the new well during the next regularly scheduled groundwater monitoring event.

Chemical Analyses: Selected soil samples collected from the boring were analyzed by a State-certified laboratory for TPHg, benzene, toluene, ethylbenzene, and xylenes (BTEX), and MTBE using EPA Method 8260B.

To characterize stockpiled soil cuttings from the boring for disposal, four brass tubes of soil were collected, then composited and analyzed by the analytical laboratory for TPHg, BTEX, and MTBE by Method 8260B and for total threshold limit concentration lead.

Soil Handling: Soil cuttings produced from the boring were temporarily stored onsite in drums and were transported by Manley Trucking of Sacramento, California for disposal at Forward Landfill in Manteca, California. Soil disposal confirmation will be included in the next quarterly monitoring report.

INVESTIGATION RESULTS

Analytical Results for Soil: No TPHg, BTEX, or MTBE was detected in the soil sample collected during this investigation. Analytical results for the soil samples are summarized in Table 1. The certified laboratory analytical report is included as Attachment A.

CONCLUSIONS

No chemical impact to soil in the vicinity of MW-5 downgradient of the site was detected during this investigation. Though no groundwater samples were collected during this investigation, incorporation of MW-5 into the quarterly sampling regimen will enable further definition of the lateral extent of the dissolved gasoline plume downgradient of the site and provide data for further study of plume attenuation and stability.

CLOSING

Please call Melody Munz at (510) 420-3324 if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.

Sue Landsittel
Staff Geologist

Stephan Bork, C.E.G., C.HG.
Associate Hydrogeologist

Figure: 1- Monitoring Well Location Map

Table: 1 - Soil Analytical Results

Attachments: A - Laboratory Analytical Reports
B - Well Permit
C - Boring Log
D - Standard Field Procedures for Installation of Monitoring Wells

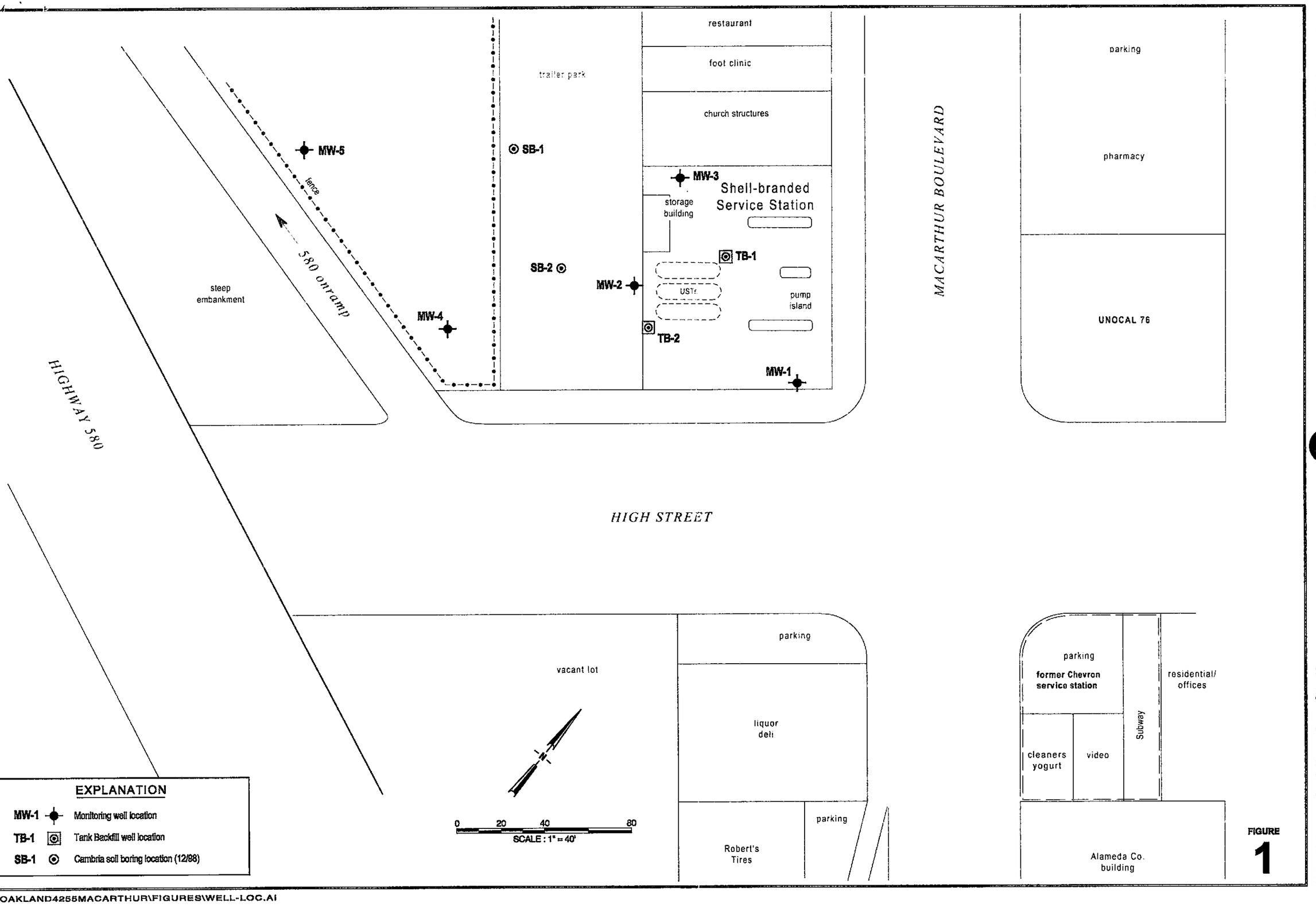
cc: Karen Petryna, Equiva Services LLC, P.O. Box 7869, Burbank, CA 91510-7869

G:\Oakland 4255 MacArthur\2001 MW Installation\4255 MWInstall report 11-01.doc

11/18/01

Monitoring Well Location Map

CAMBRIA



Shell-branded Service Station
4255 MacArthur Boulevard
Oakland, California
Incident #98995758

FIGURE **1**

G:\OAKLAND4255MACARTHUR\FIGURES\WELL-LOC.AI

Table 1. Soil Analytical Results - Shell-branded Service Station, 4255 MacArthur Boulevard, Oakland, California - Incident #98995758

Sample ID	Date	Depth (fbg)	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE
			←			(ppm)		→
MW-5-5.5	11/12/01	5.5	<1.0	<0.005	<0.005	<0.005	<0.005	<0.5

Abbreviations and Notes:

ppm = parts per million (milligrams per kilogram).

TPHg = Total Petroleum Hydrocarbons as gasoline, analyzed by EPA Method 8260B.

Benzene, toluene, ethylbenzene, and xylene analyzed by EPA Method 8260B.

MTBE = Methyl tertiary butyl ether, analyzed by EPA Method 8260B.

ATTACHMENT A

Laboratory Analytical Reports

KIFF ANALYTICAL LLC

Report Number : 23401
Date : 11/28/2001

Melody Munz
Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, CA 94608

Subject : 1 Soil Sample
Project Name : 4255 MacArthur, Oakland
Project Number : 243-0524
P.O. Number : 99895758

Dear Ms. Munz,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 23401
Date : 11/28/2001

Subject : 1 Soil Sample
Project Name : 4255 MacArthur, Oakland
Project Number : 243-0524
P.O. Number : 99895758

Case Narrative

Matrix Spike recoveries were unusually low for several compounds. This effect was confirmed with a second Matrix Spike/Matrix Spike Duplicate analysis. Reported results for the sample may be biased low.

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 916-297-4800

KIFF ANALYTICAL LLC

Report Number : 23401
Date : 11/28/2001

Project Name : **4255 MacArthur, Oakland**
Project Number : **243-0524**

Sample : **MW-5-5.5** Matrix : Soil Lab Number : 23401-01
Sample Date :11/12/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.005**	0.005	mg/Kg	EPA 8260B	11/19/2001
Toluene	**< 0.005**	0.005	mg/Kg	EPA 8260B	11/19/2001
Ethylbenzene	**< 0.005**	0.005	mg/Kg	EPA 8260B	11/19/2001
Total Xylenes	**< 0.005**	0.005	mg/Kg	EPA 8260B	11/19/2001
Methyl-t-butyl ether (MTBE)	**< 0.5**	0.5	mg/Kg	EPA 8260B	11/19/2001
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	EPA 8260B	11/19/2001
Toluene - d8 (Surr)	98.1		% Recovery	EPA 8260B	11/19/2001
4-Bromofluorobenzene (Surr)	91.5		% Recovery	EPA 8260B	11/19/2001

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

Report Number : 23401

Date : 11/28/2001

Project Name : **4255 MacArthur, Oakland**

Project Number : **243-0524**

23401 Quality Control Data - Method Blank

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.005**	0.005	mg/Kg	EPA 8260B	11/17/2001
Toluene	**< 0.005**	0.005	mg/Kg	EPA 8260B	11/17/2001
Ethylbenzene	**< 0.005**	0.005	mg/Kg	EPA 8260B	11/17/2001
Total Xylenes	**< 0.005**	0.005	mg/Kg	EPA 8260B	11/17/2001
Methyl-t-butyl ether (MTBE)	**< 0.5**	0.5	mg/Kg	EPA 8260B	11/17/2001
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	EPA 8260B	11/17/2001
Toluene - d8 (Surr)	100		% Recovery	EPA 8260B	11/17/2001
4-Bromofluorobenzene (Surr)	99.3		% Recovery	EPA 8260B	11/17/2001

Approved By: Joel Kiff

Report Number : 23401

Date : 11/28/2001

QC Report : Matrix Spike/ Matrix Spike Duplicate

Project Name : **4255 MacArthur, Oakland**

Project Number : **243-0524**

Parameter	Spiked Sample	Sample Value	Spike Level	Spike Dup. Level	Spiked Sample Value	Duplicate Spiked Sample Value	Units	Analysis Method	Date Analyzed	Spiked Sample Percent Recov.	Duplicate Spiked Sample Percent Recov.	Relative Percent Diff.	Spiked Sample Percent Recov. Limit	Relative Percent Diff. Limit
Spike Recovery Data														
Benzene	23401-01	<0.0050	0.0398	0.0387	0.0345	0.0264	mg/Kg	EPA 8260B	11/17/2008	6.7	68.2	23.9	70-130	25
Toluene	23401-01	<0.0050	0.0398	0.0387	0.0310	0.0240	mg/Kg	EPA 8260B	11/17/2007	7.9	62.0	22.7	70-130	25
Tert-Butanol	23401-01	<0.0050	0.199	0.193	0.154	0.147	mg/Kg	EPA 8260B	11/17/2007	7.4	75.8	1.98	70-130	25
Methyl-t-Butyl Ether	23401-01	<0.0050	0.0398	0.0387	0.0330	0.0290	mg/Kg	EPA 8260B	11/17/2008	3.0	75.0	10.2	70-130	25

Approved By: Joel Kiff

KIFF ANALYTICAL, LLC

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

Report Number : 23401

Date : 11/28/2001

QC Report : Laboratory Control Sample (LCS)

Project Name : **4255 MacArthur, Oakland**

Project Number : **243-0524**

Parameter	Spike Level	Units	Analysis Method	Date Analyzed	LCS Percent Recov.	LCS Percent Recov. Limit
Benzene	0.0377	mg/Kg	EPA 8260B	11/17/200	101	70-130
Toluene	0.0377	mg/Kg	EPA 8260B	11/17/200	97.5	70-130
Tert-Butanol	0.189	mg/Kg	EPA 8260B	11/17/200	86.1	70-130
Methyl-t-Butyl Ether	0.0377	mg/Kg	EPA 8260B	11/17/200	87.7	70-130

Approved By: Joel Kiff

KIFF ANALYTICAL, LLC

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL

EQUIVA Services LLC Chain Of Custody Record

720 Olive Drive, Suite D
Davis, CA 95616
(530) 297-4800 (530) 297-4803 fax

Equiva Project Manager to be invoiced:
☑ SCIENCE & ENGINEERING ☐ TECHNICAL SERVICES ☐ CRMT HOUSTON
Karen Petryna

23401

INCIDENT NUMBER (S&E ONLY): 9 9 8 9 5 7 5 8
SAP or CRMT NUMBER (TS/CRMT):

DATE: 11/12/01
PAGE: 1 of 1

SAMPLING COMPANY:	LOG CODE:	SITE ADDRESS (Street and City):	GLOBAL ID NO.:
Cambria Environmental Technology, Inc.	CETO	4255 MacArthur Blvd., Oakland	T0600101261

ADDRESS:	EDF DELIVERABLE TO (Responsible Party or Designee):	PHONE NO.:	E-MAIL:	CONSULTANT PROJECT NO.:
1144 65th St., Suite B, Oakland, CA 94608	Melody Munz	(510) 420-3324	slandsittel@cambria-env.com	243-0524

PROJECT CONTACT (Hardcopy or PDF Report to):	TELEPHONE:	FAX:	E-MAIL:	SAMPLER NAME(S) (Print):
Melody Munz	510.420.0700	510.420.9170	mmunz@cambria-env.com	Sue Landsittel

LAB USE ONLY

TURNAROUND TIME (BUSINESS DAYS):
☑ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY: _____

GC/MS MTBE CONFIRMATION: HIGHEST _____ HIGHEST per BORING _____ ALL _____

SPECIAL INSTRUCTIONS OR NOTES: TEMPERATURE ON RECEIPT C°

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Gas, Purgeable	BTEX	MTBE (8021B - 5ppb RL)	MTBE (8260B - 0.5ppb RL)	Oxygenates (5) by (8260B)	Ethanol (8260B)	Methanol	EDB & 1,2-DCA (8260B)	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3415m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (48-_____)		TPH - Diesel, Extractable (8015m)		MTBE (8260B) Confirmation, See Note	UST REPORTING REQUIRED
	MW-5-5.5	11/12	9:39	Soil	1	X	X	X																		-01

FIELD NOTES:
Container/Preservative or PID Readings or Laboratory Notes

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Sue Landsittel		11/12/01	15:20
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
	John Cassell Kiff Analytical	111501	1320

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/15/00 Revision

C&Q Graphic (714) 898-9702

ATTACHMENT B

Well Permit

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
951 TURNER COURT, SUITE 300, HAYWARD, CA 94545-2651
PHONE (510) 670-5248 MARLON MAGALLANES/CINDY HUTCHINSON
FAX (510) 670-5262

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 4255 MACARTHUR OAKLAND, CA → SHELL SERVICE STATION → EAST OF STATION OFF OF THE SHOULDER OF HIGHWAY 580 ON RAMP - See Sitemap

CLIENT
Name EQUIVA SERVICES LLC
Address P.O. BOX 7869 Phone
City BURBANK, CA Zip 91510

APPLICANT
Name CAMBRIA ENVIRONMENTAL TECHNOLOGY Fax 510-420-9170
Address 1144 65th Street, Suite B Phone 510 420-3339
City Oakland, CA Zip 94608

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	☐	General	☐
Water Supply	☐	Contamination	☐
Monitoring	☑	Well Destruction	☐

PROPOSED WATER SUPPLY WELL USE

New Domestic	☐	Replacement Domestic	☐
Municipal	☐	Irrigation	☐
Industrial	☐	Other Monitoring	☐

DRILLING METHOD:

Mud Rotary	☐	Air Rotary	☐	Auger	☑
Cable	☐	Other	☐		

DRILLER'S LICENSE NO. C57 485165

WELL PROJECTS
Drill Hole Diameter 10 in. Maximum Depth 25 ft.
Casing Diameter 4 in. Number 1 well (MW-5)
Surface Seal Depth 10 ft.

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

ESTIMATED STARTING DATE Sept 27, 2001
ESTIMATED COMPLETION DATE Sept 27, 2001

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

APPLICANT'S SIGNATURE [signature] DATE 9/14/01

FOR OFFICE USE
PERMIT NUMBER WO1-882
WELL NUMBER _____
APN _____

PERMIT CONDITIONS
Circled Permit Requirements Apply

A. GENERAL
1. A permit application should be submitted so as to arrive at the ACPWA office five days prior to proposed starting date.
2. Submit to ACPWA 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 SUPPLY WELLS
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.

C. GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

D. 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.

E. CATHODIC
Fill hole above anode zone with concrete placed by tremie.

F. WELL DESTRUCTION
See attached.

G. SPECIAL CONDITIONS

APPROVED [signature] DATE 9-20-01

ATTACHMENT C

Boring Log

Cambria Environmental Technology, Inc.
1144 - 65th St.
Oakland, CA 94608
Telephone: (510) 420-0700
Fax: (510) 420-9170

BORING/WELL LOG

CLIENT NAME	Equiva Services LLC	**BORING/WELL NAME**	MW-5
JOB/SITE NAME	Shell-branded service station	**DRILLING STARTED**	12-Nov-01
LOCATION	4255 MacArthur Boulevard	**DRILLING COMPLETED**	12-Nov-01
PROJECT NUMBER	243-0524	**WELL DEVELOPMENT DATE (YIELD)**	NA
DRILLER	Gregg Drilling	**GROUND SURFACE ELEVATION**	Not Surveyed
DRILLING METHOD	Hollow-stem auger	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	8"	**SCREENED INTERVAL**	5 to 20 ft bgs
LOGGED BY	S. Landsittel	**DEPTH TO WATER (First Encountered)**	8.0 ft (12-Nov-01) ▽
REVIEWED BY	S. Bork, RG# 5620	**DEPTH TO WATER (Static)**	NA ▼

REMARKS Hand-augered to 5' bgs. Located on Caltrans right-of-way adjacent to I-580 onramp approx. 100' from High St.

TPHg (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (ft bgs)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (ft bgs)	WELL DIAGRAM
				0			**FILL**; dark brown; damp; 25% clay, 30% silt, 5% sand, 50% gravel; low plasticity; contains organics.		Portland Type I/II Cement
								3.0	Bentonite Seal
							Clayey Sandy SILT (ML); dark brown; moist; 20% clay, 50% silt, 25% fine sand, 5% gravel; medium plasticity.		Monterey Sand #2/12
		MW-5-5.5		5					
					ML		▽		
				10			@ 10' bgs - 15% clay, 55% silt, 20% fine sand, 10% fine gravel.		
								13.0	2"-diameter, 0.010" Slotted Schedule 40 PVC
				15	SM		**Clayey Silty SAND** (SM); brown; moist; 15% clay, 25% silt, 50% fine sand, 10% fine gravel; low plasticity.		
								18.0	
					CL		**CLAY** (CL); light brown; moist; 80% clay, 12% silt, 5% fine sand, 3% fine gravel; high plasticity.		
				20				20.0	Bottom of Boring @ 20 ft

WELL LOG (SHELL) G:\OA53EC-114255.GPJ DEFAULT.GDT 1/8/02

ATTACHMENT D

Standard Field Procedures for Installation of Monitoring Wells

CAMBRIA

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.

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.

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.

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