

C A M B R I A

3646 / 223

August 14, 2002

Barney Chan
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Well Installation Report**
Shell-branded Service Station
540 Hegenberger Road
Oakland, California
Incident #98995752
Cambria Project #244-0414



Dear Mr. Chan:

On behalf of Equilon Enterprises LLC dba Shell Oil Products US, Cambria Environmental Technology, Inc. (Cambria) is submitting this *Well Installation Report*. The well installation was conducted on June 7, 2002, in accordance with recommendations submitted in Cambria's February 27, 2002 *Subsurface Investigation Work Plan* and approved in a April 29, 2002 Alameda County Health Care Services Agency (ACHCSA) letter. The purpose of the investigation was to monitor the effect of remediation downgradient of well MW-1 and to further define the onsite extent of hydrocarbon-impacted soil and groundwater. Presented below are summaries of the site background, investigation procedures, investigation results, and conclusions.

SITE BACKGROUND

Location: This active Shell-branded service station is located on the southeast corner of the intersection at Hegenberger Road and Edes Avenue in Oakland, California (Figure 1). The site is surrounded by commercial property. The service station layout includes a station building, two dispenser islands, and a gasoline underground storage tank (UST) complex (Figure 2).

August 1996 Piping Repair: On August 8, 1996, Cambria collected one soil sample beneath the piping at Dispenser 1 (Figure 2), which was being repaired. In this sample, 3,400 milligrams per kilogram (mg/kg) of total petroleum hydrocarbons as gasoline (TPHg) were detected, 17 mg/kg of benzene were detected, and 720 mg/kg of methyl tertiary butyl ether (MTBE) were reported by EPA Method 8020.

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

1998 Station Upgrade: In January and February 1998, Paradiso Mechanical of San Leandro, California added secondary containment beneath the existing dispensers and submersible turbine pumps. Cambria collected soil samples from beneath the dispensers. The maximum concentrations of hydrocarbons reported in soil were 340 mg/kg TPHg and 3.7 mg/kg benzene beneath the western dispenser-island. During the line tightness test on February 6, 1998, a leak in the piping between the USTs and the western dispenser-island was discovered and repaired on the same day. No separate-phase hydrocarbons were observed during Cambria's February 7, 1998 site visit. Based on Cambria's February 6, 1998 telephone conversation with Barney Chan of the ACHCSA, additional sampling in the area of the repaired piping was not required due to a planned soil and groundwater investigation at the site.



1998 Soil Borings: On March 6, 1998, Cambria advanced five onsite soil borings, SB-1 through SB-5 (Figure 2). Boring depths ranged from 12 to 20 feet below grade (fbg). The maximum TPHg, benzene, and MTBE concentrations in soil were reported at 6 fbg in boring SB-5 at 3,400 mg/kg, 39 mg/kg, and 170 mg/kg, respectively. The maximum TPHg, benzene, and MTBE concentrations in groundwater were also reported in boring SB-5, at 200,000 micrograms per liter ($\mu\text{g/L}$), 11,000 $\mu\text{g/L}$, and 1,300,000 $\mu\text{g/L}$, respectively.

1998 Groundwater Monitoring Well Installation: On July 14 and 15, 1998, Cambria installed three groundwater monitoring wells and advanced one soil boring at the site (Figure 2). MW-1 was installed to 25 fbg in boring SB-A. MW-2 and MW-3 were installed to 20 fbg in borings SB-B and SB-C, respectively. SB-D was advanced to 16 fbg. The maximum concentrations of hydrocarbons reported in soil were 460 mg/kg TPHg, 4.7 mg/kg benzene, and 240 mg/kg MTBE in boring SB-D at a depth of 5.5 fbg. The maximum concentrations of hydrocarbons reported in groundwater were 190 $\mu\text{g/L}$ benzene in well MW-3, and 31,000 $\mu\text{g/L}$ MTBE by EPA Method 8020 in the southwestern tank backfill well. No TPHg was detected in any of the groundwater samples. Groundwater has been monitored onsite since August 1998.

1999-2002 Interim Remediation Efforts: From July 1999 through June 2000, mobile groundwater extraction (GWE) using a vacuum truck was performed at the site to remove dissolved-phase hydrocarbons and MTBE from beneath the site. From June through December 2000, dual-phase vacuum extraction (DVE) was conducted to enhance GWE and to extract vapor-phase hydrocarbon and MTBE from the soil as well. DVE was discontinued after the December 2000 event, and monthly DVE events were resumed in May 2001. Due to low vapor mass-removal rates, DVE was discontinued in October 2001, and monthly GWE was re-initiated. Wells MW-1 and MW-3 and tank backfill well BW-D were used for extraction until April 2002, when extraction from the tank backfill was switched from well BW-D to BW-B due to higher historic MTBE concentrations observed in this well.

Groundwater Depth and Flow Direction: Since groundwater monitoring was initiated in August 1998, depth to groundwater has ranged from 5.3 to 9.6 fbg. Historically, groundwater flow direction has ranged from north to northeast.

2000 Site Investigation: On August 25 and September 5, 2000, Cambria drilled three offsite soil borings (SB-E, SB-F, SB-G) and installed one offsite groundwater monitoring well (MW-4). MTBE concentrations in soil samples collected during the investigation ranged from non-detect to 1.83 parts per million (ppm). MTBE concentrations in groundwater samples collected from the borings ranged from 68.3 parts per billion (ppb) (SB-F) to 58,400 ppb (SB-G).



INVESTIGATION PROCEDURES

Cambria advanced one boring which was converted to a groundwater monitoring well. Soil samples were collected for lithologic logging purposes to the total depth of the boring, and selected soil samples were submitted for chemical analyses.

The monitoring well location is shown on Figure 2. Specific procedures for this investigation are summarized below. Analytical results for soil are summarized in Table 1, and certified laboratory reports are presented as Attachment A. The soil boring log and Cambria's standard field procedures for monitoring well installation are presented as Attachments B and C, respectively. A copy of the well permit is included as Attachment D. The Department of Water Resources (DWR) well completion report is included as Attachment E, and the wellhead elevation survey report is presented as Attachment F.

- Drilling Date:** June 7, 2002.
- Drilling Company:** Gregg Drilling of Martinez, California (Gregg)
(C-57 License #485165).
- Personnel Present:** Jason Gerke, Staff Geologist, of Cambria
Jason Neff, of Gregg
Tony Longon, of Gregg
- Permits:** Alameda County Public Works Agency Permit # W02-0573
(Attachment D).
- Drilling Method:** Drill rig equipped with 10-inch diameter hollow stem augers.

To characterize soil cuttings from the borings 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 borings were stockpiled on the site and transported on June 24, 2002 to Forward Landfill in Manteca, California for disposal (Attachment G).



INVESTIGATION RESULTS

MTBE concentrations of 10 mg/kg and 15 mg/kg were detected in soil samples collected from the [redacted] zone. No TPH or BTEX was detected in any soil samples collected during this investigation. Soil analytical results are summarized in Table 1, and the certified laboratory analytical reports are presented in Attachment A.

CONCLUSIONS AND RECOMMENDATIONS

MTBE was detected in soil samples collected from 14 fbg and 19 fbg in the saturated zones of monitoring well MW-5.

Well MW-5 will be developed and added to the groundwater monitoring program for the site beginning in the third quarter 2002. Groundwater samples will be collected from the well on a quarterly basis and analyzed for TPHg, BTEX and MTBE by EPA Method 8260. As recommended in our July 8, 2002 First Quarter 2002 Monitoring Report for the site, an interim remediation work plan will be prepared for the site.

CLOSING

Please call Jacquelyn Jones at (510) 420-3316 if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.



Jacquelyn L. Jones
Project Geologist



Diane M. Lundquist, P.E.
Principal Engineer



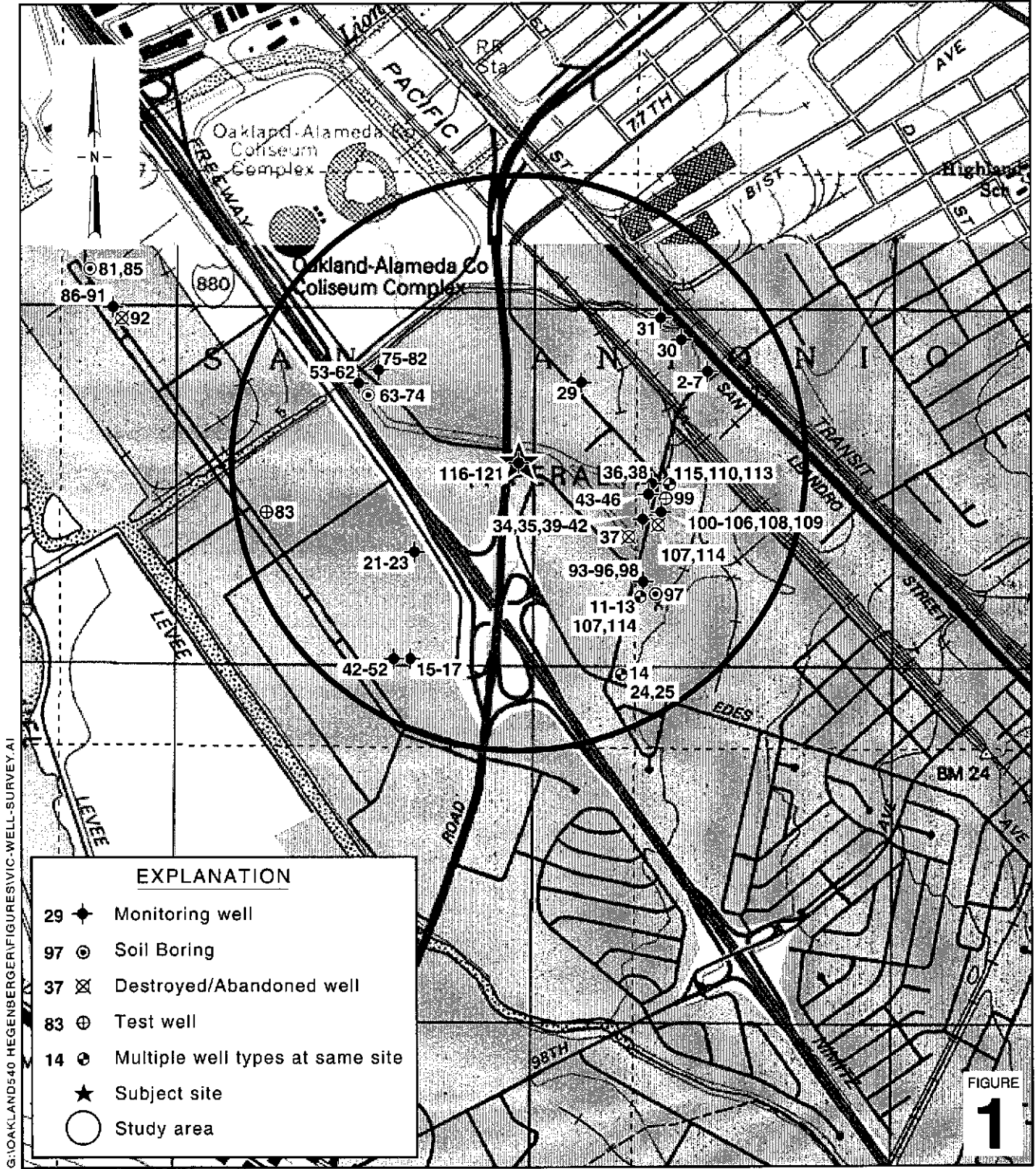
Figures: 1 - Vicinity/Area Well Survey Map
 2 - Monitoring Well Location Map

Table: 1 - Soil Analytical Data

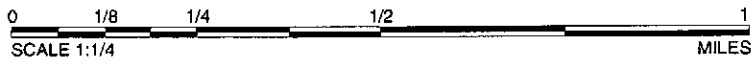
Attachments: A - Laboratory Analytical Reports for Soil Samples
 B - Boring Log and Well Completion Details
 C - Standard Field Procedures for Installation of Monitoring Wells
 D - Well Permit
 E - DWR Well Completion Report
 F - Wellhead Elevation Survey Results
 G - Soil Disposal Confirmation

cc: Karen Petryna, Shell Oil Products US, P.O. Box 7869, Burbank, CA 91510-7869

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Shell-branded Service Station
 540 Hegenberger Road □
 Oakland, California
 Incident #98995752



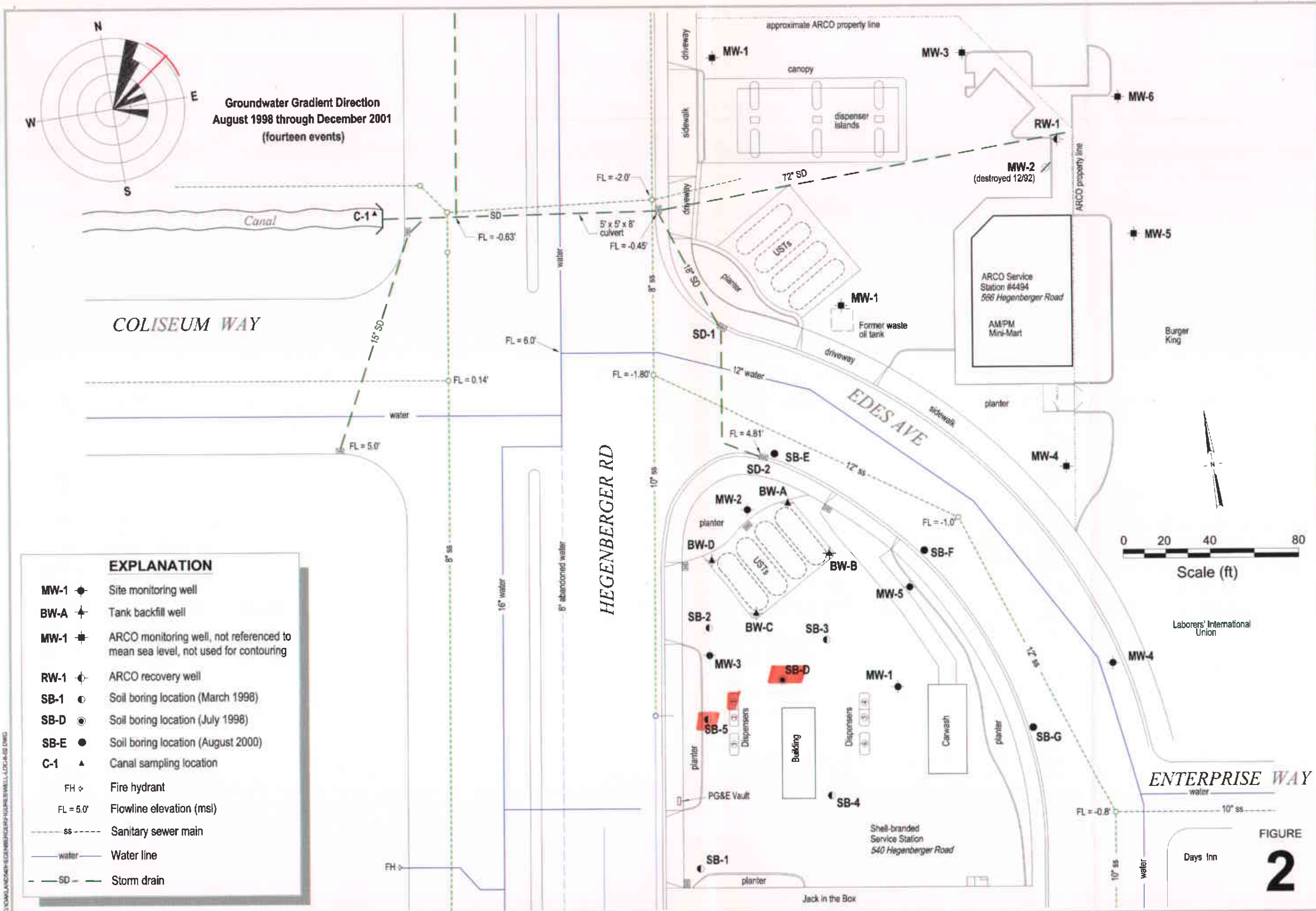
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**Vicinity / Area Well
 Survey Map**

(1/2-Mile Radius)



Groundwater Gradient Direction
August 1998 through December 2001
(fourteen events)



EXPLANATION	
MW-1	Site monitoring well
BW-A	Tank backfill well
MW-1	ARCO monitoring well, not referenced to mean sea level, not used for contouring
RW-1	ARCO recovery well
SB-1	Soil boring location (March 1998)
SB-D	Soil boring location (July 1998)
SB-E	Soil boring location (August 2000)
C-1	Canal sampling location
FH	Fire hydrant
FL = 5.0'	Flowline elevation (msl)
ss	Sanitary sewer main
water	Water line
SD	Storm drain

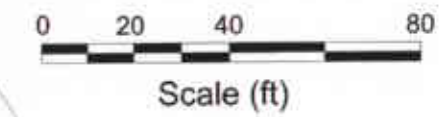


FIGURE
2

Monitoring Well
Location Map



C A M B R I A

Shell-branded Service Station
540 Hegenberger Road
Oakland, California
Incident #98995752

CAMBRIA

Table 1. Soil Analytical Data - Shell-branded Service Station - 540 Hegenberger Road, Oakland, California, Incident # 98995752

Sample ID	Date	Depth (feet below grade)	TPHg	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes
			←----- (ppm) -----→					
MW-5-5.5	June 7, 2002	5.5	<1.0	<0.5	<0.005	<0.005	<0.005	<0.005
MW-5-9.0	June 7, 2002	9.0	<1.0	<0.5	<0.005	<0.005	<0.005	<0.005
MW-5-14.0	June 7, 2002	14.0	<5.0	13	<0.025	<0.025	<0.025	<0.050
MW-5-19.0	June 7, 2002	19.0	<1.0	5.5	<0.005	<0.005	<0.005	<0.010

Notes and Abbreviations:

TPHg = Total petroleum hydrocarbons as gasoline, analyzed by EPA Method 8260B

MTBE = Methyl tert-butyl ether, analyzed by EPA Method 8260B

Benzene, ethylbenzene, toluene, xylenes, analyzed by EPA Method 8260B

ppm = parts per million

<X = Below laboratory detection limit of X

ATTACHMENT A

Laboratory Analytical Reports for Soil Samples



Report Number : 26833

Date : 6/21/2002

Jacquelyn Jones
Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, CA 94608

Subject : 4 Soil Samples
Project Name : 540 Hegenberger Road - OAKLAND
Project Number : 244-0414
P.O. Number : 98905752

Dear Ms. Jones,

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



Report Number : 26833

Date : 6/21/2002

Project Name : 540 Hegenberger Road - OAKLAND

Project Number : 244-0414

Sample : MW-5-5.5

Matrix : Soil

Lab Number : 26833-01

Sample Date :6/7/2002

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 0.005	0.005	mg/Kg	EPA 8260B	6/18/2002
Toluene	< 0.005	0.005	mg/Kg	EPA 8260B	6/18/2002
Ethylbenzene	< 0.005	0.005	mg/Kg	EPA 8260B	6/18/2002
Total Xylenes	< 0.005	0.005	mg/Kg	EPA 8260B	6/18/2002
Methyl-t-butyl ether (MTBE)	< 0.5	0.5	mg/Kg	EPA 8260B	6/18/2002
TPH as Gasoline	< 1.0	1.0	mg/Kg	EPA 8260B	6/18/2002
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	6/18/2002
4-Bromofluorobenzene (Surr)	98.2		% Recovery	EPA 8260B	6/18/2002

Sample : MW-5-9.0

Matrix : Soil

Lab Number : 26833-02

Sample Date :6/7/2002

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 0.005	0.005	mg/Kg	EPA 8260B	6/18/2002
Toluene	< 0.005	0.005	mg/Kg	EPA 8260B	6/18/2002
Ethylbenzene	< 0.005	0.005	mg/Kg	EPA 8260B	6/18/2002
Total Xylenes	< 0.005	0.005	mg/Kg	EPA 8260B	6/18/2002
Methyl-t-butyl ether (MTBE)	< 0.5	0.5	mg/Kg	EPA 8260B	6/18/2002
TPH as Gasoline	< 1.0	1.0	mg/Kg	EPA 8260B	6/18/2002
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	6/18/2002
4-Bromofluorobenzene (Surr)	97.3		% Recovery	EPA 8260B	6/18/2002

Approved By: Joel Kiff



Report Number : 26833

Date : 6/21/2002

Project Name : 540 Hegenberger Road - OAKLAND

Project Number : 244-0414

Sample : MW-5-14.0

Matrix : Soil

Lab Number : 26833-03

Sample Date :6/7/2002

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 0.025	0.025	mg/Kg	EPA 8260B	6/20/2002
Toluene	< 0.025	0.025	mg/Kg	EPA 8260B	6/20/2002
Ethylbenzene	< 0.025	0.025	mg/Kg	EPA 8260B	6/20/2002
Total Xylenes	< 0.050	0.050	mg/Kg	EPA 8260B	6/20/2002
Methyl-t-butyl ether (MTBE)	13	0.5	mg/Kg	EPA 8260B	6/20/2002
TPH as Gasoline	< 5.0	5.0	mg/Kg	EPA 8260B	6/20/2002
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	6/20/2002
4-Bromofluorobenzene (Surr)	94.2		% Recovery	EPA 8260B	6/20/2002

Sample : MW-5-19.0

Matrix : Soil

Lab Number : 26833-04

Sample Date :6/7/2002

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	< 0.005	0.005	mg/Kg	EPA 8260B	6/19/2002
Toluene	< 0.005	0.005	mg/Kg	EPA 8260B	6/19/2002
Ethylbenzene	< 0.005	0.005	mg/Kg	EPA 8260B	6/19/2002
Total Xylenes	< 0.010	0.010	mg/Kg	EPA 8260B	6/19/2002
Methyl-t-butyl ether (MTBE)	5.5	0.5	mg/Kg	EPA 8260B	6/20/2002
TPH as Gasoline	< 1.0	1.0	mg/Kg	EPA 8260B	6/19/2002
Toluene - d8 (Surr)	95.6		% Recovery	EPA 8260B	6/19/2002
4-Bromofluorobenzene (Surr)	103		% Recovery	EPA 8260B	6/19/2002

Approved By:  Joel Kiff

Report Number : 26833

Date : 6/21/2002

QC Report : Method Blank Data

Project Name : 540 Hegenberger Road - OAKLAND

Project Number : 244-0414

<u>Parameter</u>	<u>Measured Value</u>	<u>Method Reporting Limit</u>	<u>Units</u>	<u>Analysis Method</u>	<u>Date Analyzed</u>
Benzene	< 0.005	0.005	mg/Kg	EPA 8260B	6/20/2002
Toluene	< 0.005	0.005	mg/Kg	EPA 8260B	6/20/2002
Ethylbenzene	< 0.005	0.005	mg/Kg	EPA 8260B	6/20/2002
Total Xylenes	< 0.005	0.005	mg/Kg	EPA 8260B	6/20/2002
Methyl-t-butyl ether (MTBE)	< 0.5	0.5	mg/Kg	EPA 8260B	6/20/2002
TPH as Gasoline	< 1.0	1.0	mg/Kg	EPA 8260B	6/20/2002
Toluene - dB (Sum)	102		%	EPA 8260B	6/20/2002
4-Bromofluorobenzene (Sum)	102		%	EPA 8260B	6/20/2002

<u>Parameter</u>	<u>Measured Value</u>	<u>Method Reporting Limit</u>	<u>Units</u>	<u>Analysis Method</u>	<u>Date Analyzed</u>
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KIFF ANALYTICAL, LLC

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

Approved By: Joel Kiff


QC Report : Matrix Spike/ Matrix Spike Duplicate

Report Number : 26833

Date : 6/21/2002

Project Name : 540 Hegenberger Road -

Project Number : 244-0414

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
Benzene	26851-01	<0.0050	0.0397	0.0393	0.0338	0.0328	mg/Kg	EPA 8260B	6/20/02	85.1	83.5	1.93	70-130	25
Toluene	26851-01	<0.0050	0.0397	0.0393	0.0355	0.0344	mg/Kg	EPA 8260B	6/20/02	89.6	87.6	2.23	70-130	25
Tert-Butanol	26851-01	<0.0050	0.198	0.196	0.156	0.159	mg/Kg	EPA 8260B	6/20/02	78.8	81.1	2.85	70-130	25
Methyl-t-Butyl Ether	26851-01	<0.0050	0.0397	0.0393	0.0341	0.0333	mg/Kg	EPA 8260B	6/20/02	85.9	84.8	1.35	70-130	25

KIFF ANALYTICAL, LLC

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

Approved By:  Joel Kiff

QC Report : Laboratory Control Sample (LCS)

Report Number : 26833

Date : 6/21/2002

Project Name : **540 Hegenberger Road -**

Project Number : **244-0414**

Parameter	Spike Level	Units	Analysis Method	Date Analyzed	LCS Percent Recov.	LCS Percent Recov. Limit
Benzene	0.0397	mg/Kg	EPA 8260B	6/20/02	92.2	70-130
Toluene	0.0397	mg/Kg	EPA 8260B	6/20/02	95.8	70-130
Tert-Butanol	0.198	mg/Kg	EPA 8260B	6/20/02	86.5	70-130
Methyl-t-Butyl Ether	0.0397	mg/Kg	EPA 8260B	6/20/02	93.3	70-130

KIFF ANALYTICAL, LLC

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

Approved By:  _____
Joel Kiff

SHELL Chain Of Custody Record

720 Olive Drive, Suite D
Davis, CA 95616

(530) 297-4800 (530) 297-4803 fax

Shell Project Manager to be Invoiced:

SCIENCE & ENGINEERING
 TECHNICAL SERVICES
 O&M - HOUSTON

Karen Petryna

26833

DATE RECEIVED
9 8 9 0 5 7 5 2

DATE: 6/7/02

PAGE: 1 of 1

SAMPLING COMPANY: Cambria Environmental Technology		LOG CODE: CETO	SITE ADDRESS (Street and City): 540 Hegenberger Road - OAKLAND		GLOBAL ID NO.: T0600102123
ADDRESS: 1144-65TH Street, Oakland, CA 94608		EDD DELIVERABLE TO (Responsible Party or Designee): shelloaklandedf@cambria-env.com		PHONE NO.:	CONSULTANT PROJECT NO.: 244-0414
PROJECT CONTACT (Hardcopy or PDF Report to): Jacquelyn Jones		SAMPLER NAME(S) (Print): Jason K. Gerke			
TELEPHONE: 510-420-3316	FAX: 510-420-8170	EMAIL: jones@cambria-env.com			

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: CHECK BOX IF EDD IS NOT NEEDED

cc lab report to: jgerke@cambria-env.com

Field Sample Identification					REQUESTED ANALYSIS														FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes					
DATE	TIME	MATRIX	NO. OF CONT.	TPH - Gas, Purgeable	BTEX	MTBE (8021B - 5ppb RL)	MTBE (8280B - 0.5ppb RL)	Oxygenates (9) by (8280B)	Ethanol (8280B)	Methanol	EDB & 1,2-DCA (8280B)	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 3416m)	Vapor Fixed Gases (ASTM D1946)		Test for Disposal (4B-)	TPH - Diesel, Extractable (8015m)	MTBE (8280B) Confirmation, See Note	TEMPERATURE ON RECEIPT C°	
MW-5-5.5	6/7/02 9:20	Soil	1	X	X	X																		
MW-5-9.0	↓ 9:23	Soil	1	X	X	X																		01
MW-5-14.0	↓ 9:28	Soil	1	X	X	X																		02
MW-5-19.0	↓ 9:35	Soil	1	X	X	X																		03
																								04

Relinquished by: (Signature) <i>Jason M. G. B.</i>	Received by: (Signature) "Secure Location"	Date: 6/7/02	Time: 1415
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature) <i>Frank Beem KIFF</i>	Date: 06/10/02	Time: 1320

ATTACHMENT B

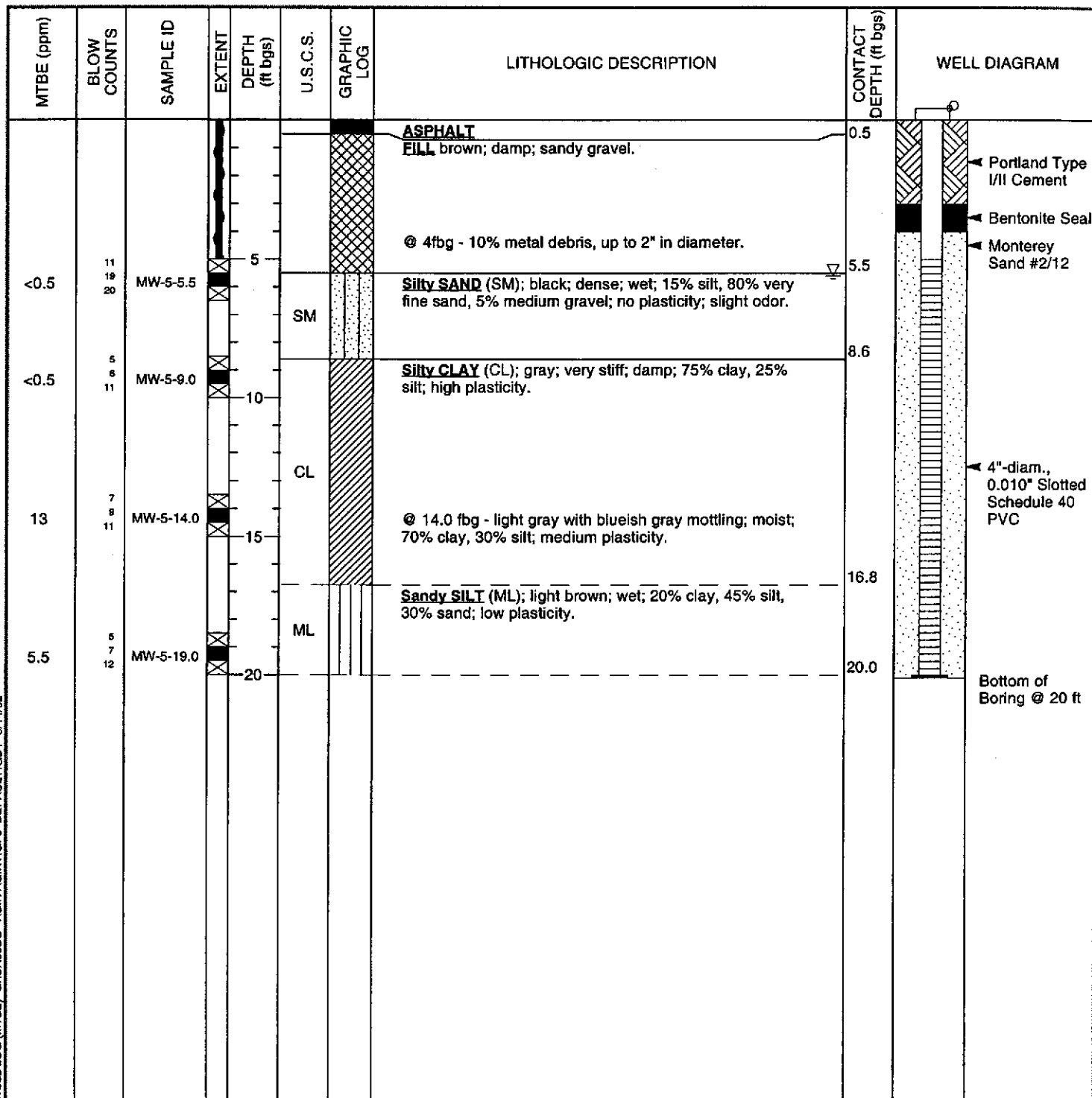
Boring Log and Well Completion Details



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

BORING/WELL LOG

CLIENT NAME	Shell Oil Products US	BORING/WELL NAME	MW-5
JOB/SITE NAME	oak1540	DRILLING STARTED	07-Jun-02
LOCATION	540 Hegenberger Road, Oakland	DRILLING COMPLETED	07-Jun-02
PROJECT NUMBER	244-0414	WELL DEVELOPMENT DATE (YIELD)	NA
DRILLER	Gregg Drilling	GROUND SURFACE ELEVATION	10.47 ft above msl
DRILLING METHOD	Hollow-stem auger	TOP OF CASING ELEVATION	10.03 ft above msl
BORING DIAMETER	10"	SCREENED INTERVAL	5 to 20 ft bgs
LOGGED BY	J. Gerke	DEPTH TO WATER (First Encountered)	5.6 ft (07-Jun-02)
REVIEWED BY	M. Derby, PE# 55475	DEPTH TO WATER (Static)	NA
REMARKS	Hand Augered to 5'.		



WELL LOG (MTBE) G:\0495DB-1\GINT\GINT.GPJ DEFAULT.GDT 8/14/02

ATTACHMENT C

Standard Field Procedures for Installation of Monitoring Wells

CAMBRIA

STANDARD FIELD PROCEDURES FOR MONITORING WELL INSTALLATION

This document presents standard field methods for drilling and sampling soil borings and 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.

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 groundwater depth to select soil samples for analysis.

CAMBRIA

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 groundwater 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 4C, 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

Groundwater monitoring wells are installed 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 feet 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.

CAMBRIA

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 4C, 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.

Waste Handling and Disposal

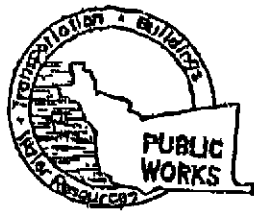
Soil cuttings from drilling activities are usually stockpiled onsite and covered by plastic sheeting. At least three individual soil samples are collected from the stockpiles and composited at the analytic laboratory. The composite sample is analyzed for the same constituents analyzed in the borehole samples in addition to any analytes required by the receiving disposal facility. Soil cuttings are transported by licensed waste haulers and disposed in secure, licensed facilities based on the composite analytic results.

Groundwater removed during development and sampling is typically stored onsite in sealed 55-gallon drums. Each drum is labeled with the drum number, date of generation, suspected contents, generator identification and consultant contact. Upon receipt of analytic results, the water is either pumped out using a vacuum truck for transport to a licensed waste treatment/disposal facility or the individual drums are picked up and transported to the waste facility where the drum contents are removed and appropriately disposed.

F:\TEMPLATE\SOPs\GW Installation2.doc

ATTACHMENT D

Well Permit



ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
 399 ELMHURST ST. HAYWARD CA. 94544-1395
 PHONE (510) 670-6554- 6633
 FAX (510) 782-1939

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 540 HESENERGER
RD. OAKLAND

CLIENT
 Name SMELL OIL PRODUCTS US
 Address P.O. BOX 1800 Phone 559. 643. 9306
 City BUBBANE Zip 91510

APPLICANT
 Name CAMBIA ENVIRONMENTAL (SHANNON)
TECHNOLOGY (SHANNON) COUCH
 Address 1144 16TH STREET, SUITE B Fax 510.420.9170
 City OAKLAND Phone 510.420.3399
 Zip 94608

TYPE OF PROJECT
 Well Construction
 Cathodic Protection
 Water Supply
 Monitoring
 Geotechnical Investigation
 General
 Contamination
 Well Destruction

PROPOSED WATER SUPPLY WELL USE
 New Domestic
 Municipal
 Industrial
 Replacement Domestic
 Irrigation
 Other Monitoring

DRILLING METHOD:
 Mud Rotary
 Cable
 Air Rotary
 Other
 Auger

DRILLER'S NAME GREGG DRILLING
 DRILLER'S LICENSE NO. C57425165

WELL PROJECTS
 Drill Hole Diameter 10 in. Maximum Depth 25 ft.
 Casing Diameter 4 in. Owner's Well Number MW-5
 Surface Seal Depth 9 ft.

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

ESTIMATED STARTING DATE 6/7/02
 ESTIMATED COMPLETION DATE 6/10/02

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.
 APPLICANT'S SIGNATURE Shannon Couch DATE 5/31/02
 PLEASE PRINT NAME SHANNON COUCH

FOR OFFICE USE

PERMIT NUMBER W02-0573
 WELL NUMBER _____
 APN _____

PERMIT CONDITIONS
 Cited 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 original Department of Water Resources-Well Completion Report.
 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 by tremie with cement grout or cement grout/sand mixture. Upper two-three feet replaced in kind or with compacted cuttings.

- E. CATHODIC**
 Fill hole annulo zone with concrete placed by tremie.

- F. WELL DESTRUCTION**
 Send a map of work site. A separate permit is required for wells deeper than 45 feet.

- G. SPECIAL CONDITIONS**

NOTE: One application must be submitted for each well or well destruction. Multiple borings on one application are acceptable for geotechnical and contamination investigations.

APPROVED [Signature] DATE 5/31-02

ATTACHMENT E

DWR Well Completion Report

CONFIDENTIAL

STATE OF CALIFORNIA DWR
WELL COMPLETION REPORT
(WELL LOGS)

REMOVED

ATTACHMENT F

Wellhead Elevation Survey Results

Virgil Chavez Land Surveying

312 Georgia Street, Suite 225
Vallejo, California 94590-5907
(707) 553-2476 • Fax (707) 553-8698

July 9, 2002
Project No.: 2110-31

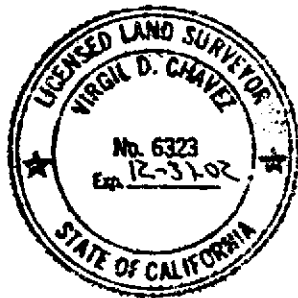
Jason Gerke
Cambria Environmental
1144 – 65th Street, Suite B
Oakland, CA 94608

Subject: Monitoring Well Survey
Shell Service Station
540 Hegenberger Road
Oakland, CA

Dear Jason:

This is to confirm that we have proceeded at your request to survey the new ground water monitoring well located at the above referenced location. The survey was completed on June 19, 2002. The benchmark for this survey was a PK nail and shiner in the median island on Hegenberger opposite the site. The latitude, longitude and coordinates are for top of casings and are based on the Calif. State Coordinate System, Zone III (NAD83). Benchmark Elevation 10.76 feet (NGVD 29).

<u>Latitude</u>	<u>Longitude</u>	<u>Northing</u>	<u>Easting</u>	<u>Elev.</u>	<u>Desc.</u>
37.7443915	-122.1954603	2097952.30	6071467.22	10.47	RIM MW-5
				10.03	TOC MW-5



Sincerely,

Virgil D. Chavez

 Virgil D. Chavez, PLS 6323

ATTACHMENT G

Soil Disposal Confirmation



Hazardous Waste Hauler (Registration #2843)

8896 Elder Creek Rd. • Sacramento, CA 95828 • FAX (916) 381-1573

Disposal Confirmation

Request for Transportation Received: 06/19/02

Consultant Information

Company: Cambria
 Contact: Gerke, Jason
 Phone: 510-420-3320
 Fax: 510-420-9170

Site Information

Station #: _____
 Street Address: 540 Hegenberger Rd.
 City, State, ZIP: Oakland, CA 94621

Customer: Shell Oil Company RESA-0023-LDC
 RIPR #: 12826
 SAP # / Location: 135694
 Incident #: 98995752
 Location / WIC #: 2045508-5900
 Environmental Engineer: Petryna, Karen E.
 Fax: _____

Material Description: Soil stockpile
 Estimated Quantity: 3.5 Yards
 Service Requested Date: 06/28/02

Disposal Facility: Forward Landfill
 Contact: Joe Griffith
 Phone: 800-204-4242
 Approval #: 2084
 Date of Disposal: 06/24/02
 Actual Tonnage: .98 Tons

Transporter: Manley & Sons Trucking, Inc.
 Contact: Glenell Forbes
 Phone: 916 381-6864
 Fax: 916 381-1573
 Invoice: 50220B
 Date of Invoice: 06/27/02

Fax To: Consultant Cc: Tim Dazey Shell