

The Ronal

98 FEB -4 PM 3:58

January 28, 1998

Mr. Larry Seto Senior Hazardous Materials Specialist Alameda County Health Services Agency 1131 Harbor Bay Parkway, Room #250 Alameda, California 94502-6577

Re:

**Investigation Report** 

Former Shell Service Station 2160 Otis Drive Alameda, California WIC #204-0072-0502 Cambria Project #24-627

Dear Mr. Seto:

On behalf of Shell Oil Products Company (Shell), Cambria Environmental Technology, Inc. (Cambria) is submitting the results of the subsurface investigation conducted on December 17, 1997 at the site referenced above. The investigation objective was to evaluate the soil and ground water in the areas noted in an Alameda County Department of Environmental Health (ACDEH) November 13, 1997 letter. The site is subject to a real estate transaction and expedited review of this report and our no further action recommendation is requested. The site background, investigation procedures, investigation results, and no further action request are presented below.

#### **BACKGROUND**

CAMBRIA

ENVIRONMENTAL

TECHNOLOGY, INC.

1144 65TH STREET.

SUITE B

OAKLAND,

OAKLANO

CA 94608

PH: (510) 420-0700

FAX: (510) 420-9170

This former Shell Service Station is located on Otis Drive, between Willow and Park Streets, in Alameda, California. The site is located approximately 3,000 feet east of San Francisco Bay. No further action status was granted by the ACDEH on November 14, 1995 based on the results of more than five years of ground water monitoring. Shell discontinued operation of this service station in September 1997 with the demolition of the station and removal of the underground storage tanks (USTs). Shell is leasing the property and no further action status from your office has been requested prior to returning the site to the property owners.

During the ground water monitoring between 1989 and 1995, the depth to ground water at this site varied between 3 and 5 ft with a flow direction of north-northeast. Ground water samples previously

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collected from former wells MW-1 and MW-2 contained over 6,500 milligrams per liter (mg/L) of total dissolved solids, which exceeds state guidelines for use as a drinking water source.

On August 1, 1997, nine Geoprobe® borings were sampled in order to pre-characterize the soil in the vicinity of the gasoline and waste oil tanks. Cambria's September 5, 1997 correspondence, which was submitted via facsimile to the ACDEH and as an attachment to our October 3, 1997 report, presented the analytic results of this preliminary investigation.

On September 4, 1997, Paradiso Mechanical of San Leandro, California (Paradiso) removed three 10,000-gallon fiberglass gasoline tanks and one 550-gallon fiberglass waste oil tank, as well as associated gasoline product piping, vent piping, and dispensers, using a backhoe. Before removal, the tanks and piping were triple rinsed by Crosby and Overton of Oakland, California, and the rinsate was hauled to the Shell refinery in Martinez, California for recovery. The site is underlain by sandy silt and silty sand of moderate to high estimated permeability to the total explored depth of 20 feet. A 6-inch thick clayey silt interval of low to moderate estimated permeability was typically encountered at approximately 11 feet below ground surface. Approximately 1 ft of ground water entered the gasoline tank excavation, which was approximately 1 ft deep, and the waste oil tank excavation, which was approximately 6 ft deep.

Following UST removal, Cambria collected six soil samples from near the ends of the former gasoline tanks by driving a brass tube into soil collected by the backhoe. One grab water sample was collected from the gasoline tank excavation using a disposable bailer. Cambria collected one soil sample from near the former waste oil tank. One grab water sample was collected from the waste oil tank excavation using a disposable bailer. Cambria collected six soil samples from beneath the former dispensers and product piping and one soil sample from beneath each of two former hoists and the former oil/water separator.

The tank removal and sampling activities were documented in Cambria's October 3, 1997 *Tank Removal and Sampling Report*. Sample locations are shown on Figure 1 and analytic results are summarized on the table below.

	Maximum Soil and Ground Water Analytical Results Summary September 4, 1997 Tank and Dispenser Removal										
Location	Matrix	ТРРН	ТЕРН	ТКРН	Benzene	Toluene	Ethyl- benzene	Xylenes	МТВЕ	Lead	Other Metals
Former Gasoline Tanks	Ground Water, μg/L	8,300	, <b></b>		ND ^	45	ND	1,300	, 8,300	0.018	
	Soil, mg/kg	ND			0.11	ND	0.0081	0.0089	0.49	ND	
Former Dispensers	Soil, mg/kg	270		<del></del>	1.7	9.3	2.4	22	0.32	ND	
Former Waste Oil Tank	Ground Water, μg/L	ND	12,000	150	ND	ND	ND	0;81	8.5	ND	< MCLs
	Soil, mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	Low

#### Notes:

Concentrations listed are the maximum concentrations detected in each location

--- = Not analyzed

ND = Not detected

<MCLs = Less than California primary maximum contaminant levels (22 CCR 64444)

mg/kg = Milligrams per kilogram

 $\mu g/L = Micrograms per liter$ 

TPPH = Total purgeable petroleum hydrocarbons by modified EPA Method 8015

TEPH = Total extractable petroleum hydrocarbons by modified EPA Method 8015

TRPH = Total recoverable petroleum hydrocarbons by Standard Method 5520 E & F

Benzene, toluene, ethylbenzene, xylenes by EPA Method 8020

MTBE = Methyl tert-butyl ether by EPA Method 8020

Lead by EPA Method 6010

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#### INVESTIGATION PROCEDURES

Cambria based the soil boring locations on the comments presented in the November 13, 1997 ACDEH letter. The procedures used for Cambria's December 1997 subsurface investigation were described in the work plan dated November 25, 1997, which was approved in a letter from the ACDEH dated December 10, 1997. The procedures are summarized below. Analytic results for soil and ground water are summarized in Tables 1 and 2, and the analytic reports are presented in Attachment A. Boring logs and Cambria's standard field procedures for Geoprobe® sampling are presented in Attachments B and C, respectively.

#### **Field Activities**

Personnel Present: Paul Waite, Project Manager, and Aubrey Cool, Staff Geologist, of

Cambria.

Permits: Alameda County Public Works Agency Drilling Permit #97WR239, issued

December 15, 1997.

Drilling Company: Vironex of Hayward, California (C-57 License #705927).

Drilling Dates: December 17, 1997.

**Drilling Methods:** Geoprobe (hydraulic push with roto-hammer).

Number of Borings: Seven (G-1 through G-7) (Figure 1).

Boring Locations: Boring G-1 was placed down gradient of the former gasoline tank pit.

boring G-3 was down gradient of the former waste oil tank. Borings G-4 and G-5 were placed in the furthest down gradient corner (the northern corner) of the property. Borings G-1, G-2, G-3, and G-5 were installed to 12 ft depth and soil and grab ground water samples were collected from each boring. Boring G-4 encountered a subsurface obstruction at 4.3 feet;

Boring G-2 was placed down gradient of the former dispenser islands, and

a soil sample was collected but ground water was not encountered. Borings G-6 and G-7 were installed near the former dispenser island where sample

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D-4 was previously collected. These two borings were installed to 8 ft depth for soil sampling only.

**Boring Depths:** 

8 to 12 ft (Attachment B).

Ground Water Depths:

Ground water was encountered in each of the borings, except boring G-4, at approximately 3.5 to 8 ft depth.

Sediment Lithology:

The site subsurface consists of silty sands of moderate to high estimated permeability to approximately 10 ft depth. The silty sands were underlain by an interval of black organic sandy silt with occasional small shell fragments. (Attachment B).

Chemical Analyses:

As proposed in the work plan dated November 25, 1997, soil and grab ground water samples were submitted for the following analyses:

Soil and water samples from borings G-1, G-2, G-4, G-5, G-6, and G-7 were analyzed for:

- TPPH by modified EPA Method 8015; and,
- MTBE, benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8020. MTBE concentrations in water samples were confirmed by EPA Method 8260.

The soil sample from boring SB-3, down gradient of the former waste oil tank location, was also analyzed for TEPH by modified EPA Method 8015 and TRPH by Standard Method 5520 E&F. The grab water sample from boring SB-3 was analyzed for TRPH by Standard Method 5520 E&F; the water sample analysis for TEPH was performed but not completed by the laboratory within the standard holding time.

Backfill Method:

Boring locations were backfilled with cement grout to match the existing grade.

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#### **INVESTIGATION RESULTS**

Hydrocarbon Distribution in Soil: No TPPH was detected in any of the soil samples analyzed. No BTEX compounds were detected in any of the samples except G-6, 3.5', which was collected near the former dispenser islands. In that sample, the benzene concentration was 0.0059 mg/kg, and other compound concentrations were similarly very low. MTBE was only detected in sample G-1, 3.5', down gradient of the former gasoline tank pit, at a concentration of 0.028 mg/kg.

Only sample G-3, 3.5', down gradient of the former waste oil tank, was analyzed for TRPH; the TRPH concentration in that sample was 110 mg/kg. No TEPH was detected in that sample.

Hydrocarbon Distribution in Ground Water: TPPH, BTEX, and MTBE were detected down gradient of the former UST pit and dispensers in the grab ground water samples from borings G-1 and G-3. However, no TPPH, BTEX, or MTBE were detected in the sample from boring G-5, which was at the furthest down gradient corner of the property.

No TPPH, TEPH, BTEX, or MTBE were detected in the sample from boring G-3, down gradient of the former waste oil tank, while TRPH was detected in the sample. Although the TEPH analysis for the water sample was not completed within the standard sample holding time, the absence of detectable TEPH in the water sample and the soil sample from boring G-3 (immediately above the ground water) indicates that TEPH range hydrocarbons are not present in significant concentrations in the ground water near the former waste oil tank.

#### NO FURTHER ACTION REQUEST

Based on the sampling results summarized herein, the remaining hydrocarbons in soil and ground water appear to be limited to the area immediately adjacent to the former tanks and dispensers. Because the tanks and dispensers have been removed, there are no ongoing sources of hydrocarbons in soil at this site. Shallow ground water in the area has a TDS concentration above 3,000 mg/L, which exceeds the state guidelines for use as a drinking water source. The low residual hydrocarbons in soil and ground water will naturally attenuate and should not impede future development of the property or pose a significant risk to future property occupants or the environment. Based on these factors, Cambria, on behalf of Shell, requests issuance of no further action status for the site.

# **CAMBRIA**

#### **CLOSING**

We appreciate your continued assistance with this project. Please call if you have any questions or comments.

Sincerely,

Cambria Environmental Technology, Inc.

Paul Waite

Project Engineer

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

Senior Geologist

cc:

Attachments: A - Analytic Results for Soil and Ground Water

B - Soil Boring Logs

C - Standard Field Procedures for Geoprobe Sampling

A.E. (Alex) Perez, Shell Oil Products Company, P.O. Box 8080, Martinez, California 94553

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Environmental Technology, Inc.

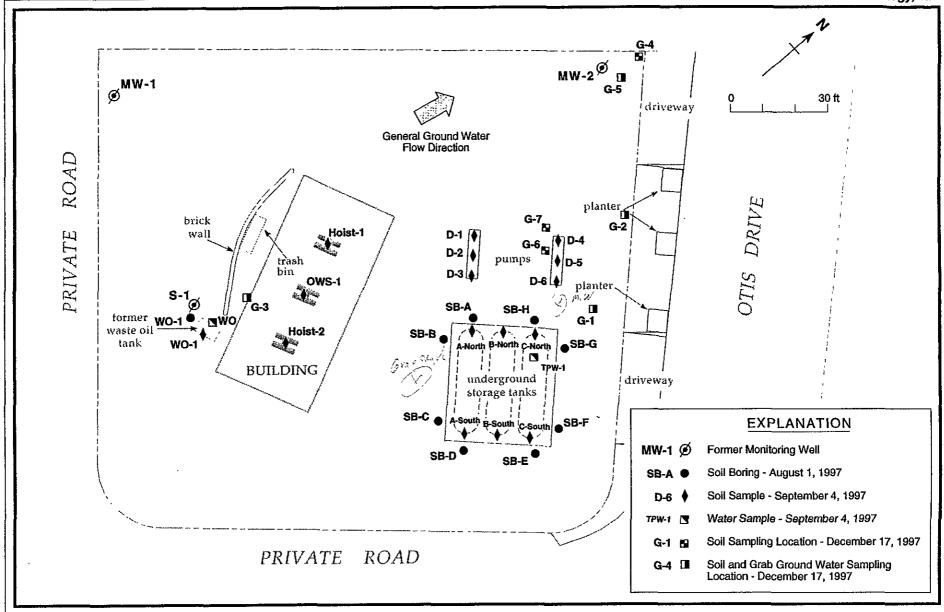


Figure 1. Sample Locations - Shell Service Station WIC #204-0072-0502, 2160 Otis Drive, Alameda, California

Table 1. Soil Analytic Data - Shell Service Station WIC# 204-0072-0502, 2160 Otis Street, Alameda, California

Sample ID, Depth in ft	Sample Location	Date Sampled	TPPH (mg/kg)	TEPH (mg/kg)	TRPH (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	MTBE (mg/kg)
G-1, 3.5	Down gradient of UST pit	12/17/97	<1.0	<u> </u>		<0.0050	<0.0050	<0.0050	<0.0050	0 028
G-2, 3.5	Down gradient of dispensers	12/17/97	<1.0	_		<0.0050	<0.0050	<0.0050	<0.0050	<0.025
G-3, 3.5	Down gradient of waste oil tank	12/17/97	<1.0	<1.0	110	<0.0050	<0.0050	<0.0050	<0.0050	<0.025
G-4, 3.5	North corner	12/17/97	<1.0	<del></del>	_	<0.0050	<0.0050	<0.0050	<0.0050	<0.025
G-5, 3.5	North corner	12/17/97	<1.0		_	<0.0050	<0.0050	<0 0050	<0.0050	<0.025
G-6, 3 5	Dispensers	12/17/97	5.2		_	0.0059	0 041	0 025	0.70	<0.025
G-6, 7.5	Dispensers	12/17/97	<1.0	-	***	<0.0050	<0.0050	<0.0050	<0.0050	<0.025
G-7, 3.5	Dispensers	12/17/97	<1.0	***		<0.0050	<0.0050	<0.0050	<0.0050	<0.025
G-7, 7.5	Dispensers	12/17/97	<1.0	<del>-</del>		<0.0050	<0.0050	<0.0050	<0.0050	<0.025

mg/kg = Milligrams per kilogram

TPPH = Total purgable petroleum hydrocarbons (gasoline) by modified EPA Method 8015

TEPH = Total extractable petroleum hydrocarbons (diesel) by modified EPA Method 8015

TRPH = Total recoverable petroleum hydrocarbons (oil and grease) by Standard Method 5520 E&F

MTBE = Methyl tert-butyl ether by EPA Method 8020

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

UST = Underground storage tank

<n = Below detection limit of n mg/kg

--- = Not analyzed

Table 2. Ground Water Analytic Data - Shell Service Station WIC# 204-0072-0502, 2160 Otis Street, Alameda, California

Sample ID	Sample Location	Date Sampled	945 ТРРН (µg/L)	Diesel TEPH (µg/L)	OH F Gre TRPH (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Eihylbenzene (µg/L.)	Xylenes (µg/L)	MTBE (8020) (μg/L)	MTBE (8260) (μg/L)
G-1	Down gradient of UST pit	12/17/97	2,900	-		240	<25	85	240	890	920
G-2	Down gradient of dispensers	12/17/97	780	-	_	110	3.0	21	5.5	46	57
G-3	Down gradient of waste oil tank	12/17/97	<50	<50 *	5,600	<0.50	<0.50	<0.50	<0.50	<2.5	***
G-5	North corner	12/17/97	<50	_	-	<0.50	<0.50	<0.50	<0.50	<2.5	_

µg/L = Micrograms per liter

TPPH = Total purgable petroleum hydrocarbons (gasoline) by modified EPA Method 8015

TEPH = Total extractable petroleum hydrocarbons (diesel) by modified EPA Method 8015

TRPH = Total recoverable petroleum hydrocarbons (oil and grease) by Standard Method 5520 E&F

MTBE = Methyl tert-butyl ether by EPA Method 8020 and EPA Method 8260

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

UST = Underground storage tank

< n = Below detection limit of n  $\mu$ g/L

Soil sample D-4 taken on 9-497 -> 270 ppm TPPH

1.7 ppm Benzene

9.3 spm toluene
24.0 spm Xykner

L 1.2 ppm MBE

<sup>\* =</sup> TEPH analysis not completed within standard holding time

<sup>--- =</sup> Not analyzed

# Attachment A

Analytic Results for Soil and Ground Water

Redwood City, CA 94063 Walnut Creek, CA 94598

(650) 364-9600 (510) 988-9600 (916) 921-9600

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria 1144 65th St. Suite C Oakland, CA 94608 Attention: Paul Waite

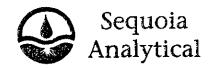
Project:

Shell 2160 Otis, Alameda

Enclosed are the results from samples received at Sequoia Analytical on December 18, 1997. The requested analyses are listed below:

SAMPLE #	SAMPLE	DESCRIPTION	DATE COLLECTED	TEST METHOD
9712C83 -01	SOLID,	G-1, 3.5	12/17/97	TPGBMS Purgeable TPH/BTEX
9712C83 -02	SOLID,	G-2, 3.5	12/17/97	TPGBMS Purgeable TPH/BTEX
9712C83 -03	SOLID,	G-3, 3.5	12/17/97	TRPH (SM 5520 E&F)
9712C83 -03	SOLID,	G-3, 3.5	12/17/97	TPGBMS Purgeable TPH/BTEX
9712C83 -03	SOLID,	G-3, 3.5	12/17/97	TPHD_S Extractable TPH
9712C83 -04	SOLID,	G-4, 3.5	12/17/97	TPGBMS Purgeable TPH/BTEX
9712C83 -05	SOLID,	G-5, 3.5	12/17/97	TPGBMS Purgeable TPH/BTEX
9712C83 -06	SOLID,	G-6, 3.5	12/17/97	TPGBMS Purgeable TPH/BTEX
9712C83 -07	SOLID,	G-6, 7.5	12/17/97	TPGBMS Purgeable TPH/BTEX
9712C83 -08	SOLID,	G-7, 3.5	12/17/97	TPGBMS Purgeable TPH/BTEX
9712C83 -09	SOLID,	G-7, 7.5	12/17/97	TPGBMS Purgeable TPH/BTEX
9712C83 -10	LIQUID,	G-1	12/17/97	TPGBMW Purgeable TPH/BTEX
9712C83 -10	LIQUID,	G-1	12/17/97	MTBEMW Methyl t-Butyl Ethe

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(650) 364-9600 (510) 988-9600 (916) 921-9600

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

SAMPLE #	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
9712C83 -11	LIQUID, G-2	12/17/97	TPGBMW Purgeable TPH/BTEX
9712C83 -11	LIQUID, G-2	12/17/97	MTBEMW Methylit-Butyl Ethe
9712C83 -12	LIQUID, G-3	12/17/97	TPGBMW Purgeable TPH/BTEX
9712C83 -12	LIQUID, G-3	12/17/97	TRPH (SM 5520 B&F)
9712C83 -13	LIQUID, G-5	12/17/97	TPGBMW Purgeable TPH/BTEX

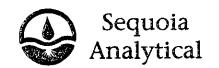
Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

**SEQUOIA ANALYTICAL** 

Project Manager





Redwood City, CA 94063 Walnut Creek, CA 94598

(650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria 1144 65th St. Suite C Oakland, CA 94608

Client Proj. ID: Shell 2160 Otis, Alameda

Sampled: 12/17/97 Received: 12/18/97

Lab Proj. ID: 9712C83

Analyzed: see below

Reported: 01/06/98 Attention: Paul Waite

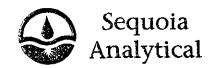
#### LABORATORY ANALYSIS

Analyte	Units	Date Analyzed	Detection Limit	Sample Results
Lab No: 9712C83-03 Sample Desc : <b>SOLID,G-3, 3.5</b>		A A A A A A A A A A A A A A A A A A A		
TRPH (SM 5520 E&F)	mg/Kg	12/26/97	50	110
Lab No: 9712C83-12 Sample Desc : LIQUID,G-3				Action with the second section of the
TRPH (SM 5520 B&F)	mg/L	12/28/97	5.0	5.6

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Richard Herling Project Manager



Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

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1144 65th St. Suite C Oakland, CA 94608

Cambria Client Proj. ID: Shell 2160 Otis, Alameda Sampled: 12/17/97

Sample Descript: G-1, 3.5

Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9712C83-01

Received: 12/17/97 Received: 12/18/97 Extracted: 12/26/97 Analyzed: 12/30/97 Reported: 01/06/98

Attention: Paul Waite QC Batch Number: GC122697BTEXEXA

Instrument ID: GCHP01

## Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	De	tection Limit mg/Kg		Sample Results mg/Kg
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:		1.0 <b>0.025</b> 0.0050 0.0050 0.0050 0.0050		N.D. 0.028 N.D. N.D. N.D. N.D.
Surrogates Trifluorotoluene	70	ntrol Limits %	130	% Recovery 80
4-Bromofluorobenzene	60		140	101

Analytes reported as N.D. were not present above the stated limit of detection.

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Richard Herling Project Manager

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(650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria 1144 65t 1144 65th St. Suite C Oakland, CA 94608

Attention: Paul Waite

Client Proj. ID: Shell 2160 Otis, Alameda

Sample Descript: G-2, 3.5

Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9712C83-02

Sampled: 12/17/97 Received: 12/18/97 Extracted: 12/26/97

Analyzed: 12/30/97 Reported: 01/06/98

QC Batch Number: GC122697BTEXEXA

Instrument ID: GCHP18

# Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:	1.0 0.025 0.0050 0.0050 0.0050 0.0050	N.D. N.D. N.D. N.D. N.D. N.D.
Surrogates Trifluorotoluene 4-Bromofluorobenzene	<b>Control Limits %</b> 70 130 60 140	% Recovery 77 87

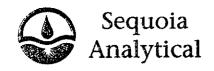
Analytes reported as N.D. were not present above the stated limit of detection.

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Richard Herling Project Manager

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Cambria 1144 65th St. Suite C Oakland, CA 94608

Attention: Paul Waite

Client Proj. ID: Shell 2160 Otis, Alameda

Sample Descript: G-3, 3.5

Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9712C83-03 Sampled: 12/17/97 Received: 12/18/97 Extracted: 12/26/97

Analyzed: 12/30/97 Reported: 01/06/98

QC Batch Number: GC122697BTEXEXA

Instrument ID: GCHP18

# Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:	1.0 0.025 0.0050 0.0050 0.0050 0.0050	N.D. N.D. N.D. N.D. N.D. N.D.
Surrogates Trifluorotoluene 4-Bromofluorobenzene	<b>Control Limits %</b> 70 130 60 140	% Recovery 80 82

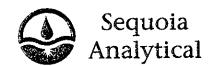
Analytes reported as N.D. were not present above the stated limit of detection.

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ELAP #1210

Richard Herling Project Manager

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Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600

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FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria 1144 65th St. Suite C

Client Proj. ID: Shell 2160 Otis, Alameda

Sampled: 12/17/97 Received: 12/18/97

Oakland, CA 94608

Sample Descript: G-3, 3.5 Matrix: SOLID

Extracted: 12/23/97

Attention: Paul Waite

Analysis Method: EPA 8015 Mod Lab Number: 9712C83-03 Analyzed: 12/29/97 Reported: 01/06/98

QC Batch Number: GC1223970HBPEXB

Instrument ID: GCHP4A

n-Pentacosane (C25)

# **Total Extractable Petroleum Hydrocarbons (TEPH)**

**Analyte Detection Limit** Sample Results mg/Kg mg/Kg **TEPH** as Diesel 1.0 N.D. Chromatogram Pattern: **Control Limits %** % Recovery Surrogates

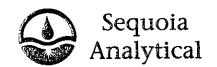
Analytes reported as N.D. were not present above the stated limit of detection.

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ELAP #1210

Richard Herling Project Manager

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(650) 364-9600 (510) 988-9600 (916) 921-9600

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria 1144 65th St. Suite C Oakland, CA 94608

Shell 2160 Otis, Alameda Client Proj. ID:

Sample Descript: G-4, 3.5

Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9712C83-04

Received: 12/18/97 Extracted: 12/26/97 Analyzed: 12/30/97

Sampled: 12/17/97

, Repórted: 01/06/98

QC Batch Number: GC122697BTEXEXA

Instrument ID: GCHP18

Attention: Paul Waite

## Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Li mg/Kg	mit	Sample Results mg/Kg
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:	1.0 0.025 0.0050 0.0050 0.0050	N.D. N.D. N.D. N.D. N.D. N.D.	
Surrogates Triffuorotoluene 4-Bromofluorobenzene	Control Limi 70 60	t <b>s</b> % 130 140	% Recovery 78 84

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL -

ELAP #1210

Richard Herling

Project Manager

Page:



680 Chesapeake Drive 404 N. Wiget Lane

Redwood City, CA 94063 Walnut Creek, CA 94598 819 Striker Avenue, Suite 8 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria Client Proj. ID: Shell 2160 Otis, Alameda Sampled: 12/17/97 1144 65th St. Suite C Sample Descript: G-5, 3.5 Received: 12/18/97 Matrix: SOLID Oakland, CA 94608 Extracted: 12/26/97 Analysis Method: 8015Mod/8020 Analyzed: 12/30/97 Attention: Paul Waite Lab Number: 9712C83-05

QC Batch Number: GC122697BTEXEXA Reported: 01/06/98

Instrument ID: GCHP18

# Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

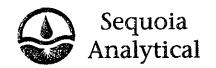
Analyte	Detection mg/K	Sample Results mg/Kg	
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:	1.0 0.02 0.00 0.00 0.00 0.00	050 050 050	N.D. N.D. N.D. N.D. N.D. N.D.
Surrogates Trifluorotoluene 4-Bromofluorobenzene	<b>Control Li</b> 70 60	<b>mits %</b> 130 140	<b>% Recovery</b> 79 83

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Richard Herling Project Manager

Page:



Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834 (650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria	Client Proj. ID: Shell 2160 Otis, Alameda	Sampled: 12/17/97
1144 65th St. Suite C	Sample Descript: G-6, 3.5	Received: 12/18/97
Oakland, CA 94608	Matrix: SOLID	Extracted: 12/26/97
Analysis Method: 8015Mod/8020	Analyzed: 12/30/97	
Attention: Paul Waite	Lab Number: 9712C83-06	Reported: 01/06/98

QC Batch Number: GC122697BTEXEXA

instrument ID: GCHP01

## Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Det	Sample Results mg/Kg	
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:		0.0050 0.0050	5.2 N.D. 0.0059 0.041 0.025 0.70
Weathered Gas	*****************	*******	C6-C12
Surrogates		trol Limits %	% Recovery
Trifluorotoluene	70	130	81
4-Bromofluorobenzene	60	140	104

Analytes reported as N.D. were not present above the stated limit of detection.

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ELAP #1210

Richard Herling Project Manager

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Cambria 1144 65th St. Suite C Oakland, CA 94608

Attention: Paul Waite

Client Proj. ID: Shell 2160 Otis, Alameda

Sample Descript: G-6, 7.5

Matrix: SOLID Analysis Method: 8015Mod/8020 Lab Number: 9712C83-07

Sampled: 12/17/97 Received: 12/18/97 Extracted: 12/26/97 Analyzed: 12/30/97

Reported: 01/06/98

QC Batch Number: GC122697BTEXEXA

Instrument ID: GCHP22

# Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

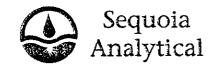
Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:	1.0 0.025 0.0050 0.0050 0.0050 0.0050	N.D. N.D. N.D. N.D. N.D. N.D.
Surrogates Trifluorotoluene 4-Bromofluorobenzene	<b>Control Limits %</b> 70 130 60 140	<b>% Recovery</b> 105 90

Analytes reported as N.D. were not present above the stated limit of detection.

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Richard Herling Project Manager

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Cambria 1144 65th St. Suite C Oakland, CA 94608

Attention: Paul Waite

Shell 2160 Otis, Alameda Client Proj. ID:

Sample Descript: G-7, 3.5 Matrix: SOLID

Analysis Method: 8015Mod/8020 Lab Number: 9712C83-08

Sampled: 12/17/97 Received: 12/18/97 Extracted: 12/26/97

Analyzed: 12/30/97 Reported: 01/06/98

QC Batch Number: GC122697BTEXEXA Instrument ID: GCHP22

# Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:	1.0 0.025 0.0050 0.0050 0.0050 0.0050	N.D. N.D. N.D. N.D. N.D.
Surrogates Trifluorotoluene 4-Bromofluorobenzene	<b>Control Limits %</b> 70 130 60 140	% <b>Recovery</b> 104 93

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Richard Herling Project Manager

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(650) 364-9600 (510) 988-9600 (916) 921-9600

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria 1144 65th St. Suite C Oakland, CA 94608 Attention: Paul Waite

Shell 2160 Otis, Alameda Client Proj. ID: Sample Descript: G-7, 7.5

Matrix: SOLID

Analysis Method: 8015Mod/8020 Lab Number: 9712C83-09

Sampled: 12/17/97 Received: 12/18/97 Extracted: 12/26/97 Analyzed: 12/31/97 Reported: 01/06/98

QC Batch Number: GC122697BTEXEXA

Instrument ID: GCHP01

# Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:	1.0 0.025 0.0050 0.0050 0.0050 0.0050	N.D. N.D. N.D. N.D. N.D. N.D.
Surrogates Trifluorotoluene 4-Bromofluorobenzene	<b>Control Limits %</b> 70 130 60 140	<b>% Recovery</b> 91 98

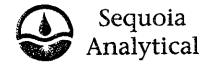
Analytes reported as N.D. were not present above the stated limit of detection.

**SEQUOIA ANALYTICAL** - ELAP #1210

Richard Herling

**Project Manager** 

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Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834 (650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (65,0) 364-9233 FAX (510) 988-9673 FAX (91,6) 921-0100

∥ Cambria ∥ 1144 65th St. Suite C Client Proj. ID: Shell 2160 Otis, Alameda

Sampled: 12/17/97 Received: 12/18/97

Oakland, CA 94608

Sample Descript: G-1 Matrix: LIQUID

Received: 12/18/97

Attention: Paul Waite

Analysis Method: 8015Mod/8020 Lab Number: 9712C83-10

/8020 Analyzed: 12/31/97 Reported: 01/06/98

QC Batch Number: GC123197BTEX18A

Instrument ID: GCHP18

# Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Dete	Sample Results ug/L	
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:		125 25 25 25 25	2900 890 240 N.D. 85 240 C6-C8
Surrogates Triftuorotoluene	<b>Cont</b> 70	trol Limits % 130	% Recovery 92

Analytes reported as N.D. were not present above the stated limit of detection.

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ELAP #1210

Richard Herling Project Manager

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1144 65th St. Suite C Oakland, CA 94608

Attention: Paul Waite

Cambria Client Proj. ID: Shell 2160 Otis, Alameda Sampled: 12/17/97

Sample Descript: G-1 Matrix: LIQUID

Analysis Method: EPA 8260 Lab Number: 9712C83-10

Received: 12/18/97

Analyzed: 01/06/98 Reported: 01/06/98

QC Batch Number: MS010698MTBEF3A

Instrument ID: F3

Methyl t-Butyl Ether (MTBE)

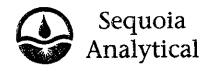
**Analyte Detection Limit** Sample Results ug/L ug/L Methyl t-Butyl Ether 10 920 % Recovery Surrogates Control Limits % 1,2-Dichloroethane-d4 76 114 93

Analytes reported as N.D. were not present above the stated limit of detection.

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Cambria

Client Proj. ID:

Shell 2160 Otis, Alameda

Sampled: 12/17/97

1144 65th St. Suite C Oakland, CA 94608

Sample Descript: G-2 Matrix: LIQUID

Received: 12/18/97

Attention: Paul Waite

Analysis Method: 8015Mod/8020

Analyzed: 12/31/97

Lab Number: 9712C83-11 

Reported: 01/06/98

QC Batch Number: GC123197BTEX18A

Instrument ID: GCHP18

## Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte		ction Limit ug/L	Sample Results ug/L
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:		250 12 2.5 2.5 2.5 2.5 2.5	
Surrogates Trifluorotoluene	Contr 70	rol Limits % 130	% Recovery 103

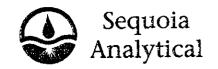
Analytes reported as N.D. were not present above the stated limit of detection.

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ELAP #1210

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Cambria 1144 65th St. Suite C Oakland, CA 94608

Client Proj. ID: Shell 2160 Otis, Alameda Sample Descript: G-2

Sampled: 12/17/97 Received: 12/18/97

Matrix: LIQUID

Analysis Method: EPA 8260 Lab Number: 9712C83-11 Attention: Paul Waite

Analyzed: 01/06/98 Reported: 01/06/98

QC Batch Number: MS010698MTBEF3A

Instrument ID: F3

## Methyl t-Butyl Ether (MTBE)

**Analyte Detection Limit** Sample Results ug/L ug/L Methyl t-Butyl Ether 2.0 57 Surrogates **Control Limits %** % Recovery 1,2-Dichloroethane-d4 76 114 92

Analytes reported as N.D. were not present above the stated limit of detection.

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Redwood City, CA 94063 Walnut Creek, CA 94598 (650) 364-9600 (510) 988-9600 (916) 921-9600

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Cambria 1144 65th St. Suite C Oakland, CA 94608

Attention: Paul Waite

Shell 2160 Otis, Alameda Client Proj. ID:

Sample Descript: G-3 Matrix: LIQUID

Analysis Method: 8015Mod/8020 Lab Number: 9712C83-12

Sampled: 12/17/97 Received: 12/18/97

Analyzed: 12/31/97 Reported: 01/06/98

QC Batch Number: GC123197BTEX18A

Instrument ID: GCHP18

# Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

Analyte	Detection Limit ug/L	Sample Results ug/L	
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:	50 2.5 0.50 0.50 0.50 0.50	N.D. N.D. N.D. N.D. N.D. N.D.	
Surrogates Trifluorotoluene	Control Limits % 130	% Recovery 89	

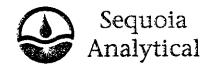
Analytes reported as N.D. were not present above the stated limit of detection.

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(650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Sampled: 12/17/97

Received: 12/18/97

Cambria 1144 65th St. Suite C Oakland, CA 94608

Attention: Paul Waite

Client Proj. ID: Shell 2160 Otis, Alameda

Sample Descript: G-5

Matrix: LIQUID Analysis Method: 8015Mod/8020

Analyzed: 12/31/97 Lab Number: 9712C83-13 Reported: 01/06/98

QC Batch Number: GC123197BTEX03A

Instrument ID: GCHP3

# Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX and MTBE

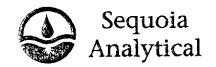
Analyte	Detection Limit ug/L	Sample Results ug/L
TPPH as Gas Methyl t-Butyl Ether Benzene Toluene Ethyl Benzene Xylenes (Total) Chromatogram Pattern:	50 2.5 0.50 0.50 0.50 0.50	N.D. N.D. N.D. N.D. N.D. N.D.
Surrogates Trifluorotoluene	Control Limits % 130	% Recovery 88

Analytes reported as N.D. were not present above the stated limit of detection.

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Richard Herling Project Manager

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Cambria Environmental Tech.

Client Project ID:

Shell 2160 Otis, Alameda

Matrix:

Solid

1144 65th St., Ste. C Oakland, CA 94608 Attention: Paul Waite

Work Order #:

9712C83

01-09

Reported: Tomografia de la composição de como como de como como de como

Jan 9, 1998

#### QUALITY CONTROL DATA REPORT

Analyte:	Benzene	Toluene	Ethyl	Xylenes	Gas
_			Benzene		
QC Batch#:	GC122697BTEXEXA	GC122697BTEXEXA	GC122697BTEXEXA	GC122697BTEXEXA	GC122697BTEXEXA
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015M
Prep. Method:	EPA 5030				
Analyst:	J. Minkel				
MS/MSD#:	9712C8301	9712C8301	9712C8301	9712C8301	9712C8301
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.
Prepared Date:	12/26/97	12/26/97	12/26/97	12/26/97	12/26/97
Analyzed Date:	12/26/97	12/26/97	12/26/97	12/26/97	12/26/97
nstrument I.D.#:	GCHP22	GCHP22	GCHP22	GCHP22	GCHP22
Conc. Spiked:	0.20 mg/Kg	0.20 mg/Kg	0.20 mg/Kg	0.60 mg/Kg	1.2 mg/Kg
Result:	0.18	0.17	0.17	0.49	1.0
MS % Recovery:	90	85	85	82	83
Dup. Result:	0.17	0.17	0.17	0.46	1.0
MSD % Recov.:	85	85	85	77	83
RPD:	5.7	0.0	0.0	6.3	0.0
RPD Limit:	0-25	0-25	0-25	0-25	0-25

LCS #:	BLK122697	BLK122697	BLK122697	BLK122697	BLK122697
Prepared Date:	12/26/97	12/26/97	12/26/97	12/26/97	12/26/97
Analyzed Date:	12/26/97	12/26/97	12/26/97	12/26/97	12/26/97
nstrument I.D.#:	GCHP22	GCHP22	GCHP22	GCHP22	GCHP22
Conc. Spiked:	0.20 mg/Kg	0.20 mg/Kg	0.20 mg/Kg	0.60 mg/Kg	1.2 mg/Kg
LCS Result:	0.20	0.20	0.19	0.56	1.2
LCS % Recov.:	100	100	95	93	100
MS/MSD	60-140	60-140	60-140	60-140	60-140
LCS Control Limits	70-130	70-130	70-130	70-130	70-130

SEQUOIA ANALYTICAL

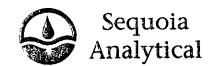
Richard Herling Project Manager Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

\*\* MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

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Cambria Environmental Tech. Client Project ID: Cambria Environmental Tech.

Shell 2160 Otis, Alameda

1144 65th St., Ste. C Oakland, CA 94608 Matrix:

Solid

Attention: Paul Waite

Work Order #:

9712C83 10-12

Reported:

Jan 9, 1998

#### **QUALITY CONTROL DATA REPORT**

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Analyte:	Benzene	Toluene	Ethyl	Xylenes	Gas
			Benzene		
QC Batch#:	GC123197BTEX18A	GC123197BTEX18A	GC123197BTEX18A	GC123197BTEX18A	GC123197BTEX18A
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015M
Prep. Method:	EPA 5030	EPA 5030	EPA 5030	EPA 5030	EPA 5030
Analyst:	R. Geckler	R. Geckler	R. Geckler	R. Geckler	R. Geckler
MS/MSD #:	9712D1506	9712D1506	9712D1506	9712D1506	9712D1506
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.
Prepared Date:	12/31/97	12/31/97	12/31/97	12/31/97	12/31/97
Analyzed Date:	12/31/97	12/31/97	12/31/97	12/31/97	12/31/97
nstrument I.D.#:	GCHP18	GCHP18	GCHP18	GCHP18	GCHP18
Conc. Spiked:	10 μg/L	10 μg/L	10 μg/L	30 μ <b>g</b> /L	60 μg/L
Result:	8.6	8.7	8.6	27	67
MS % Recovery:	86	87	86	90	112
Dup. Result:	9.0	9.2	9.0	28	69
MSD % Recov.:	90	92	90	93	115
RPD:	4.5	5.6	4.5	3.6	2.9
RPD Limit:	0-25	0-25	0-25	0-25	0-25

LCS #:	BLK123197	BLK123197	BLK123197	BLK123197	BLK12319
Prepared Date:	12/31/97	12/31/97	12/31/97	12/31/97	12/31/97
Analyzed Date:	12/31/97	12/31/97	12/31/97	12/31/97	12/31/97
nstrument I.D.#:	GCHP18	GCHP18	GCHP18	GCHP18	GCHP18
Conc. Spiked:	10 μg/L	10 μg/L	10 μg/L	30 μg/L	60 μg/L
LCS Result:	10	10	10	30	77
LCS % Recov.:	100	100	100	100	128
MS/MSD	60-140	60-140	60-140	60-140	60-140
LCS Control Limits	70-130	70-130	70-130	70-130	70-130

**SEQUOIA ANALYTICAL** 

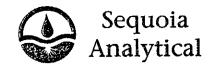
Richard Herling **Project Manager**  Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

\*\* MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

9712C83.CCC <2>





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(650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria Environmental Tech.

Client Project ID:

Shell 2160 Otis, Alameda

Matrix:

Solid

41144 65th St., Ste. C Oakland, CA 94608

Attention: Paul Waite

Work Order #:

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Reported:

Jan 9, 1998

#### QUALITY CONTROL DATA REPORT

Analyte:	Benzene	Toluene	Ethyl	Xylenes	Gas
			Benzene		
QC Batch#:	GC123197BTEX03A	GC123197BTEX03A	GC123197BTEX03A	GC123197BTEX03A	GC123197BTEX03A
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015M
Prep. Method:	EPA 5030				
Analyst:	A. Miraftab				
MS/MSD #:	9712D1506	9712D1506	9712D1506	9712D1506	9712D1506
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	N.D.
Prepared Date:	12/31/97	12/31/97	12/31/97	12/31/97	12/31/97
Analyzed Date:	12/31/97	12/31/97	12/31/97	12/31/97	12/31/97
nstrument I.D.#:	GCHP3	GCHP3	GCHP3	GCHP3	GCHP3
Conc. Spiked:	10 μg/L	10 μg/L	10 μg/L	30 μg/L	60 μg/L
Result:	10	11	11	34	69
MS % Recovery:	100	110	110	113	115
Dup. Result:	9.8	10	10	31	64
MSD % Recov.:	98	100	100	103	107
RPD:	2.0	9.5	9.5	9.2	7.5
RPD Limit:	0-25	0-25	0-25	0-25	0-25

BLK123197	BLK123197	BLK123197	BLK123197	BLK12319
12/31/97	12/31/97	12/31/97	12/31/97	12/31/97
12/31/97	12/31/97	12/31/97	12/31/97	12/31/97
GCHP3	GCHP3	GCHP3	GCHP3	GCHP3
10 μg/L	10 μg/L	10 μg/L	30 μg/L	60 μg/L
9.7	10	10	31	64
97	100	100	103	107
60-140	60-140	60-140	60-140	60-140
70-130	70-130	70-130	70-130	70-130
	12/31/97 12/31/97 GCHP3 10 µg/L 9.7 97	12/31/97 12/31/97 12/31/97 12/31/97 GCHP3 GCHP3 10 μg/L 10 μg/L 9.7 10 97 100	12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 GCHP3 GCHP3 GCHP3 10 μg/L 10 μg/L 10 μg/L  9.7 10 10 97 100 100	12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 12/31/97 GCHP3 GCHP3 GCHP3 GCHP3 10 μg/L 10 μg/L 30 μg/L  9.7 10 10 31 97 100 100 103

**SEQUOIA ANALYTICAL** 

Richard Herling Project Manager Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

\*\* MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

9712C83.CCC <3>





Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria Environmental Tech.

Client Project ID: Shell 2160 Otis, Alameda

1144 65th St., Ste. C Oakland, CA 94608

Solid

Attention: Paul Waite

Work Order #:

Matrix:

03

Reported:

Jan 9, 1998

#### QUALITY CONTROL DATA REPORT

9712C83

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Analyte: Total Recoverable

Petroleum Hydrocarbons

QC Batch#: IN122397552000A

Analy. Method:

SM 5520EF

Prep. Method:

Analyst:

P. Cheung

MS/MSD #:

9712C8303

Sample Conc.:

**Prepared Date:** 

N.D.

12/23/97

**Analyzed Date:** 

12/23/97

Instrument I.D.#:

MANUAL

Conc. Spiked:

150 mg/Kg

Result:

160

MS % Recovery:

106

Dup. Result:

MSD % Recov.:

141 96

RPD:

13

**RPD Limit:** 

0-30

LCS #:

LCS122397

**Prepared Date:** 

12/23/97

**Analyzed Date:** 

12/23/97

Instrument I.D.#:

MANUAL

Conc. Spiked:

150 mg/Kg

LCS Result:

142

LCS % Recov.:

98

MS/MSD

60-140

LCS

70-130

Control Limits

SEQUOIA ANALYTICAL

Please Note:

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Richard Herlin**g** Project Manager

\*\* MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

9712C83.CCC <4>



Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834 (650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (550) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria Environmental Tech.

Tech. Client Project ID:

Work Order #:

Shell 2160 Otis, Alameda

1144 65th St., Ste. C Oakland, CA 94608 Matrix: Solid

Attention: Paul Waite

9712C83 03

Reported:

Jan 9, 1998®

#### **QUALITY CONTROL DATA REPORT**

Analyte:

Diesel

QC Batch#: GC1223970HBPEXB Analy. Method: EPA 8015M Prep. Method: EPA 3550/DHS

Analyst: G. Fish
MS/MSD #: 9712C8301
Sample Conc.: N.D.
Prepared Date: 12/23/97
Analyzed Date: 12.29/97
Instrument I.D.#: GCHP4A
Conc. Spiked: 25 mg/Kg

Result: 25 MS % Recovery: 100

Dup. Result: 36 MSD % Recov.: 144

> RPD: 36 RPD Limit: 0-50

> > LCS #: BLK122397

Prepared Date: 12/23/97
Analyzed Date: 12.29/97
Instrument I.D.#: GCHP4A
Conc. Spiked: 25 mg/Kg

LCS Result: 22 LCS % Recov.: 98

MS/MSD 50-150 LCS 60-140

Control Limits

SEQUOIA ANALYTICAL

Please Note:

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Richard Herling Project Manager

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9712C83.CCC <5>



Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria Environmental Tech.

1144 65th St., Ste. C Oakland, CA 94608

Client Project ID:

Shell 2160 Otis, Alameda

Matrix:

Liquid

Attention: Paul Waite

Work Order #:

9712C83 10, 11

Reported: 

Jan 9, 1998

#### **QUALITY CONTROL DATA REPORT**

Analyte:

MTBE

QC Batch#: MS010698MTBEF3A Analy. Method:

**EPA 8260** 

Prep. Method:

Analyst:

L.Duong

MS/MSD #: Sample Conc.:

980101802 N.D.

**Prepared Date: Analyzed Date:** 

1/6/98 1/6/98

Instrument I.D.#: Conc. Spiked:

F3 50 μg/L

Result:

49

MS % Recovery:

98

Dup. Result:

47

MSD % Recov.:

94

RPD:

4.2

**RPD Limit:** 

0-25

LCS #:

LCS010698

**Prepared Date:** 

1/6/98

**Analyzed Date:** 

1/6/98

Instrument I.D.#:

F3

Conc. Spiked:

 $50 \mu g/L$ 

LCS Result: LCS % Recov.:

48 96

MS/MSD

60-140

LCS

70-130

Control Limits

SEQUOIA ANALYTICAL

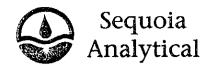
Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

Richard Herling Project Manager

\*\* MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

9712C83.CCC <6>



680 Chesapeake Drive 404 N. Wiget Lane 819 Striker Avenue, Suite 8

Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria Environmental Tech.

Client Project ID:

Work Order #:

Matrix:

Shell 2160 Otis, Alameda Liquid

1144 65th St., Ste. C Oakland, CA 94608

Attention: Paul Waite

12

Reported:

Jan 9, 1998

## QUALITY CONTROL DATA REPORT

9712C83

Analyte: Total Recoverable

Petroleum Hydrocarbons

and the state of t

QC Batch#: IN121997552000A

Analy. Method:

SM 5520BF

Prep. Method:

Analyst:

P. Cheung

**Prepared Date:** 

12/19/97

**Analyzed Date:** 

12/21/97

Instrument I.D.#:

MANUAL

Conc. Spiked:

10 mg/L

Result:

9.4

BS % Recovery:

94

Dup. Result:

8.8

BSD % Recov.:

88

RPD:

6.6

**RPD Limit:** 

0-30

LCS #:

LCS122697

**Prepared Date:** 

12/26/97

**Analyzed Date:** Instrument I.D.#: 12/28/97

MANUAL

Conc. Spiked:

10 mg/L

LCS Result: LCS % Recov.:

10 100

60-140

MS/MSD LCS

70-130

**Control Limits** 

**SEQUOIA ANALYTICAL** 

Richard Herling Project Manager Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

\*\* MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

9712C83,CCC <7>



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Cambria

1144 65th St. Suite C Oakland, CA 94608

680 Chesapeake Drive 404 N. Wiget Lane 819 Striker Avenue, Suite 8

Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Client Proj. ID: Shell 2160 Otis, Alameda Received: 12/18/97

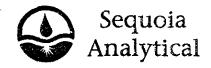
Lab Proj. ID: 9712C83 Reported: 01/06/98 Attention: Paul Waite

## LABORATORY NARRATIVE

In order to properly interpret this report, it must be reproduced in its entirety. This report contains a total of \_\_\_\_\_\_ pages including the laboratory narrative, sample results, quality control, and related documents as required (cover page, COC, raw data, etc.).

**SEQUOIA ANALYTICAL** 

Richard Herling Project Manager



680 Chesapeake Drive 404 N. Wiget Lane 819 Striker Avenue, Suite 8 Sacramento, CA 95834

Redwood City, CA 94063 Walnut Creek, CA 94598

(650) 364-9600 (510) 988-9600 (916) 921-9600

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria 1144 65th St. Suite C Oakiand, CA 94608 Attention: Paul Waite

Project:

Shell 2160 Otis, Alameda

Enclosed are the results from samples received at Sequoia Analytical on December 18, 1997. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE COLLECTED	TEST METHOD
9801D60 -01	LIQUID, G-3	12/17/97	TPHD_W Extractable TPH

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

**SEQUOIA ANALYTICAL** 

**Project Manager** 





680 Chesapeake Drive 404 N. Wiget Lane

Redwood City, CA 94063 Walnut Creek, CA 94598 819 Striker Avenue, Suite 8 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600

150

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

Cambria 1144 65th St. Suite C Oakland, CA 94608

Client Proj. ID: Shell 2160 Otis, Alameda

Sample Descript: G-3 Matrix: LIQUID

Analysis Method: EPA 8015 Mod ention: Paul Waite Lab Number: 9801D60-01 Re

Sampled: 12/17/97 Received: 12/18/97 Extracted: 01/26/98

Analyzed: 01/27/98 Reported: 01/27/98

QC Batch Number: GC012698OHBPEXA

Instrument ID: GCHP4B

n-Pentacosane (C25)

Attention: Paul Waite

## Total Extractable Petroleum Hydrocarbons (TEPH)

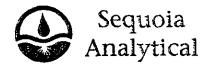
Analyte **Detection Limit** Sample Results ug/L ug/L 50 TEPH as Diesel N.D. Chromatogram Pattern: **Control Limits %** Surrogates % Recovery

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL - ELAP #1210

Richard Herling Project Manager

Page:



680 Chesapeake Drive 404 N. Wiget Lane 819 Striker Avenue, Suite 8 Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600

FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

y englig again ya wakana ang samagara ng sama Cambria Environmental Tech.

1144 65th St., Ste. C

Client Project ID:

Shell 2160 Otis, Alameda

Matrix:

Liquid

Oakland, CA 94608 Attention: Paul Waite

Work Order #:

9801D60 01 les a successión de la complexación 
Reported:

Jan 27, 1998

## QUALITY CONTROL DATA REPORT

Analyte:

Diesel

QC Batch#: GC0126980HBPEXA Analy. Method:

**EPA 8015M** 

Prep. Method:

EPA 3510

Analyst:

D. Lockhart

MS/MSD #:

BLK012698

Sample Conc.:

N.D.

**Prepared Date: Analyzed Date:**  1/26/98 1/27/98

Instrument I.D.#:

Conc. Spiked:

GCHP4A  $1000 \mu g/L$ 

Result:

690

MS % Recovery:

69

Dup. Result:

850

MSD % Recov.:

85

RPD:

21

RPD Limit:

0-50

LCS #:

**Prepared Date:** 

**Analyzed Date:** 

Instrument I.D.#:

Conc. Spiked:

LCS Result: LCS % Recov.:

MS/MSD

50-150

LCS

60-140

Control Limits

**SEQUOIA ANALYTICAL** 

Please Note:

The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

\*\* MS=Matrix Spike, MSD=MS Duplicate, RPD=Relative % Difference

9801D60.CCC <1>



SHELI RETAIL I	, OII	, CO	MP/	NGIN	/ IEERII	NG - '	WES	iT		•	СН		OF at No		UST	10	1 Yo	REC	ORD		: 12/17/97 = L/ ol 4
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Shell Engineer:  Consultant Name &	)	<b>~</b>		71011 <b>0</b>	NO.:	227						12	p		17	12	(B	2	SNe investigation	(441)	48 hours []
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Consultant Contact:			i i	hone ax #:	No.: 5	100	ធ	Ç	`	\$240)		Ke	520			;			Sall/Ali Rain, or Sys.	] 4452	By 12/29/4) HOTE: Holly tab us
Paul 1/91	it S			ax I:	420-	1170	Ŋ	Die	_	A dia		8015	5	- {	.	ļ				] 4453	NOTE: Notify tables spon as Possible of 24/44 his. TAL
///AMUMBINIET				17-1-	3 F		8	Mod	8020/602	n		TPH SX	)				.Ö.		Other		43,30 (10), (20),
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Printed Name: Pa	Dale Dale	Studge	solt .	Walet	Αh	No. of	西岩	电影	西区田	Volcatio	Test for Disp	Combination	E		Asbestos	Container	Preparation Use	Сэтроя	MATERIAL DESCRIPTION		SAMPLE CONDITION/ COMMENTS
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680 Chesapeake Drive 404 N. Wiget Lane 819 Striker Avenue, Suite 8

Redwood City, CA 94063 Walnut Creek, CA 94598 Sacramento, CA 95834

(650) 364-9600 (510) 988-9600 (916) 921-9600 FAX (650) 364-9233 FAX (510) 988-9673 FAX (916) 921-0100

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Client Proj. ID: Shell 2160 Otis, Alameda Cambria

Received: 12/18/97

1144 65th St. Suite C Oakland, CA 94608 Attention: Paul Waite

Lab Proj. ID: 9801D60

Reported: 01/27/98

#### LABORATORY NARRATIVE

In order to properly interpret this report, it must be reproduced in its entirety. Thi report contains a total of \_\_\_\_\_ pages including the laboratory narrative, sample results, quality control, and related documents as required (cover page, COC, raw data, etc.).

Please Note: This sample was extracted and analyzed outside of hold time. For this reason, the result should be concidered an estimate.

**SEQUOIA ANALYTICAL** 

Richard Herling **Project Manager** 

# Attachment B

Soil Boring Logs

Clier	nt: Shell Oil	Pro		ORING LOG	Lassei	216	Boring O Otis Drive, A		G-1
L	ect No: 24-62		Juuota (	Phase Task 111		e Elev. <b>N</b>		nameu	Page 1 of 1
Depth (feet)	Blow Count	Sample	Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth (feet)	Additional Comments
0	Ground Surfac	æ		Silty SAND; (SM); brown; loose; damp; 20% silt, 80% fine to medium sand; no plasticity; high estimated				0	
-		and the same and t		sand; no plasticity; high estimated permeability.  green to black; moist.				-	
5				wet; fine sand; low plasticity.				5	Water level @ 4 feet
10		X						- 10	
_		•		black; damp; 15% silt, 85% fine to medium sand with shells.					Bottom of boring @ 12 feet
Lo	riller Vironex ogged By Pau ater-Bearing Zor	ıl V	Vaite NA	Drilling Started 12/17  Drilling Completed 12  Grout Type Portlan	<u>/17/97</u>		Notes: See	site r	nap

`	01 -11 03	<b>.</b>		RING LOG				Boring		G-2
Clier	nt: Shell Oil oct No: 24-62		oducts	Company Phase	Task 111		on <b>216</b> ce Elev. <b>N</b>	O Otis Drive, Α Δ ft	Mamed	la Page 1 of 1
Depth (feet)		Sample	Interval		Lithologic Pescription	TPHg (mdd)		Boring Completion Graphics	Depth (feet)	<u> </u>
0	Ground Surfac	Э		Silty SAND: (S	SM); brown; loose;				0	
		The second secon			SM); brown; loose; lt, 80% medium sand; nigh estimated					
5				green; wet; 30	0% silt, 70% fine sand;				5	Water level @ 5 feet
10				silty SAND; (S loose; wet; 30 low plasicity; permeability.	reen to brown; soft; ilt, 5% fine sand; low to city; moderate meability. SM); green to brown; 0% silt, 70% fine sand; high estimated 20% silt, 80% fine to with shells.				10	
								VAVIVATTA		Bottom of boring @ 12 feet
<u></u>	iller <b>Vironex</b>	_		<del>***</del>	Drilling Started 12/1	1/07		Notes: See	elta -	man
			Maita				<del></del> ,	Notes: See	, one t	1144
H	gged By <u>Pau</u>				Drilling Completed 12	-			<del> </del>	
W	ater-Bearing Zor	nes	NA		Grout Type Portlan	<u>d Type</u>	1/11			

•				ORING LOG			Boring	ID	G-3
	nt: Shell Oil		oducts				O Otis Drive, A	lamed	
Proje	ot No: 24-62	7		Phase Task 111	Surfac	e Elev. N	A ft,		Page 1 of 1
争争	Blow	e e	Interval	Lithologic	후	Graphic Log	Boring	들돐	
Depth (feet)	Count	E	ter	Description	TPHg (ppm)	irap Lo	Boring Completion Graphics	Depth (feet)	Additional Comments
	OGUIR	S	<u> </u>			0			
0	Ground Surface	æ	 		<u>.</u>	!		0	
				SAND; (SP); light brown; loose; damp; 5% silt, 95% fine to medium sand; no plasticity; high estimated permeability.					
_		}	}	sand; no plasticity; high estimated permeability.				-	
-								-	
} -				]				-	
								ļ.	
	]	ļ			ļ				
								-	
٠				-				-	
		_		Sitty SAND: (SM): light brown: loose:	ļ			-	
١.				Silty SAND; (SM); light brown; loose; wet; 20% silt, 80% fine to medium sand; no plasticity; high estimated permeability.	ì			-	
5				permeability.				5_	
	1								Water level @ 5 feet
-				]				<u></u>	
-	)			dark brown; damp.				-	
-	-				ļ			-	
								-	
			1					_	
_		H						Ĺ	
-			<b>-</b>	light brown; wet.	1			<u> </u>	
-								-	,
•	( 				1			}	
10					İ			10	
	[								
	1							-	
-	ĺ		}	black; damp; sand with shells.				}	
	·			_				}	
١.		M			1				
:									Bottom of boring @ 12 feet
-	]				]				
	iller <b>Vironex</b>			Drilling Started 12/17	/97		Notes: see	site n	nap
			•			<del></del>	110163	- QILO I	
Lo	gged By <u>Pau</u>	ı V	<u>Vaite</u>	Drilling Completed 12	17/97	<u></u>			
W	ater-Bearing Zor	108	NA	Grout Type Portland	d Type	1/11			

BORING LOG				Boring		G-4
Client: Shell Oil Products Company Project No: 24-627 Phase	Task <b>111</b>		on <b>216</b> 0 e Elev. <b>N</b>	0 Otis Drive, A  A ft,	lamed	la Page 1 of 1
set) wold set)	Lithologic Description	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth (feet)	
n Ground Surface	Description  Drown; loose; damp;  6 fine to medium sand; high estimated	TT (p)	Gra	Graphics	9D 0	Comments  Bottom of boring @ 4.3 feet
Driller Vironex  Logged By Paul Waite  Water-Bearing Zones NA	Drilling Started 12/17  Drilling Completed 12/  Grout Type Portland	17/97	1/11	Notes: See	site r	nap

`				BORING L				ī			Boring	ID	G-5	
1	nt: Shell Oil		odi	_	•						is Drive, A	lamed		
	ect No: 24-62	7	<u> </u>		ase	Та	esk 111		e Elev. N		<del></del>		Page	1 of 1
Depth (feet)	Blow	algu	Interval		L	ithologic		TPHg (ppm)	Graphic Log	Co.	Boring mpletion raphics	Depth (feet)	Add	ditional
De F	Count	Sar	ᆵ		D	escription		ᆙᄚ	l ga	Ğ	raphics	_9 <del>,</del>	Con	nments
0	Ground Surfac	æ		<u>SAND</u> 10% s	(SP); br	own; loose; c fine to medic igh estimated	lamp; ım sand;					0		
5				no pla	sticity; h	igh estimated						5		
5	-	X		Sitty S 20% s plastic	AND; (S ilt, 80% ity; high	M); green; loc fine sand; lo estimated pe	se; wet; w rmeabilty.						Water lev	vel @ 5 feet
10			1000	brown plastic	; fine to ity.	medium sand	l; no					10		
				black;	damp.								Bottom of feet	of boring @ 12
Г	riller <u>Virone</u> x					Drilling Starte	ed 12/1	7/97		N	Notes: See	site r	nap	
11	ogged By Pau		Va	ite		Drilling Comp			·	_   _				
	/ater-Bearing Zor					Grout Type								
L*`	TOTAL DEGLING EU	3				J. J.J. 1990				<u>—</u>				<del></del>

•				RING LOG				Boring	ID	G-6
	:: Shell Oil l		oducts (					Otis Drive, A	lamed	The second secon
Projec	t No: 24-62	_		Phase	Task 11	1 Surfac	e Elev. N	A ft,		Page 1 of 1
Depth (feet)	Blow Count	ample	Interval	j	Lithologic escription	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth (feet)	Additional Comments
		-				_				
0	Ground Surfac	e		SAND; (SP); b 10% silt, 90% no plasticity; h permeability.	rown; loose; damp; 5 fine to medium sand; nigh estimated				0	
15		X		green; wet.					5	Water level @ 5 feet
		X		Silty SAND: (S 25% silt, 75% plasticity; high	SM); brown; loose; wet 6 fine sand; low n estimated permeabilty	· ·			-	Bottom of boring @ 8
10									10	
					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				-	·
Dril	ler <u>Vironex</u>				Drilling Started 12/1	17/97		Notes: see	site n	nap
Loa	iged By Pau	V	Vaite		Drilling Completed 1	2/17/97		_		
<b>1</b> 1	ter-Bearing Zon				Grout Type Portla		1/11			

, BORING LOG							Boring ID G-7					
Client: Shell Oil Products Company							Location 2160 Otis Drive, Alameda					
Project No: 24-627 Phase			Task 1	11	Surfac	e Elev. <b>N</b>	A ft,		Page 1 of 1			
Depth (feet)	Blow Count	Sample	Interval	ļ	Lithologic Description		TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth (feet)	Additional Comments	
0	Ground Surfac	æ		SAND; (SP); b	rown; loose; damp;					0		
-				10% silt, 90% no plasticity; h permeability.	rown; loose; damp; 6 fine to medium sand high estimated	d;				-		
- 5 - -				Sitty SAND: (S 20% silt, 80% plasticity; high permeability.	SM); brown; loose; w 6 fine sand; low n estimated	et;				5		
-									**************************************	-	Water løvel @ 8 feet Bottom of boring @ 8 feet	
10										10		
						i					,	
Driller Vironex Drilling Started 12/17/5							97		Notes: See	site n	nap	
Logged By Paul Waite Drilling Completed 12/17/97												
w	ater-Bearing Zor	ies	NA		Grout Type Port	Grout Type Portland Type I/II						

# **Attachment C**

Standard Field Procedures for Geoprobe Sampling

#### STANDARD FIELD PROCEDURES FOR GEOPROBE® SAMPLING

This document describes Cambria Environmental Technology's standard field methods for Geoprobe® soil and ground water sampling. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

## **Objectives**

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor odor or staining, estimate ground water depth and quality and to submit samples for chemical analysis.

## Soil Classification/Logging

All soil samples are classified according to the Unified Soil Classification System by a trained geologist or engineer working under the supervision of a California Registered Geologist (RG) or a Certified Engineering Geologist (CEG). The following soil properties are noted for each soil sample:

- Principal and secondary grain size category (i.e., sand, silt, clay or gravel)
- Approximate percentage of each grain size category,
- Color
- · Approximate water or separate-phase hydrocarbon saturation percentage,
- Observed odor and/or discoloration,
- Other significant observations (i.e., cementation, presence of marker horizons, mineralogy), and
- Estimated permeability.

### Soil Sampling

Geoprobe® soil samples are collected from borings driven using hydraulic push technologies. A minimum of one and one half ft of the soil column is collected for every five ft of drilled depth. Additional soil samples can be collected near the water table and at lithologic changes. Samples are collected using samplers lined with polyethylene or brass tubes driven into undisturbed sediments at the bottom of the borehole. The ground surface immediately adjacent to the boring is used as a datum to measure sample depth. The horizontal location of each boring is measured in the field relative to a permanent on-site reference using a measuring wheel or tape measure.

Drilling and sampling equipment is steam-cleaned or washed 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 Storage, Handling and Transport

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

After a soil sample has been collected, soil from the remaining tubing is placed inside a sealed plastic bag and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable GasTech® or photoionization detector measures volatile hydrocarbon vapor concentrations in the bag's headspace, extracting the vapor through a slit in the plastic bag. The measurements are used along with the field observations, odors, stratigraphy and ground water depth to select soil samples for analysis.

## **Grab Ground Water Sampling**

Ground water samples are collected from the open borehole using bailers, advancing disposable Tygon® tubing into the borehole and extracting ground water using a diaphragm pump, or using a hydro-punch style sampler with a bailer or tubing. 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.

## **Duplicates and Blanks**

Blind duplicate water samples are usually collected only for monitoring well sampling programs, at a rate of one blind sample for every 10 wells sampled. Laboratory-supplied trip blanks accompany samples collected for all sampling programs to check for cross-contamination caused by sample handling and transport. These trip blanks are analyzed if the internal laboratory quality assurance/quality control (QA/QC) blanks contain the suspected field contaminants. An equipment blank may also 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.

G:\TEMPLATE\SOPS\GEOPROBE.WPD