

June 1, 1999

Mr. Larry Seto
Alameda County Dept. of Environmental Health
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California 94502

Re: **2nd Quarter 1999 - Remediation System Operation Report**
Former Arco Service Station
706 Harrison Street
Oakland, California
Cambria Project #230-0116



Dear Mr. Seto:

On behalf of Mr. Bo Gin, Cambria Environmental Technology, Inc. (Cambria), is submitting this remediation system operation report for the soil vapor extraction (SVE) and air sparge (AS) system at the site referenced above. As the first system operation report for this project, this report summarizes all operation activities since system startup. Described below are the remediation system design and installation, system operation & monitoring, and system performance.

REMEDICATION SYSTEM DESIGN & INSTALLATION

Installation and Operation of Oxidizer for SVE and AS System: In May 1998, Cambria completed installation and startup of the SVE and AS system at the site. The SVE system consisted of a 250 cubic feet per minute (cfm) catalytic oxidizer manufactured by Stealth Industries for extracting and treating soil vapor from five wells: SVE wells VW-1 and VW-2, and combination SVE/AS wells VW/SP-3, VW/SP-4 and VW/SP-5. The air sparging system consists of a 7.5 hp reciprocating piston air compressor for injecting air into wells VW/SP-3, VW/SP-4 and VW/SP-5. The remediation system layout is shown on Figure 1.

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


**Cambria
Environmental
Technology, Inc.**

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

The system operated from startup on May 6, 1998 until July 15, 1998, when excessive water was drawn from the SVE wells into the system. The system was restarted on July 16, 1998, and operated until September 26, 1998. After system repairs and testing on a number of occasions, Cambria restarted the system on October 5, 1998. On October 12, 1998, Cambria shut down the 250 cfm oxidizer system to select more cost-effective SVE equipment for the decreased hydrocarbon removal rates.

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ENVIRONMENTAL
PROTECTION



Installation of Blower and Carbon System: In December 1998, Cambria coordinated installation of a skid-mounted blower and vapor-phase carbon. The SVE equipment consisted of a 100 cfm positive-displacement blower and two, 200-lb carbon vessels connected in series. Between December 23 and 28, 1998, Cambria performed system startup testing in compliance with requirements of permit number 11615 from the Bay Area Air Quality Management District (BAAQMD). Although vapor analyses did not detect hydrocarbons in the carbon midpoint and effluent, OVA measurements suggested that hydrocarbons may have broken through the carbon vessels. To help satisfy BAAQMD concerns, Cambria replaced the 200-lb canisters with 1,000-lb canisters. The air permit was modified at that time to allow monitoring by a flame ionization detector (FID) in lieu of laboratory analyses of vapor samples. Due to prior water upwelling concerns, Cambria waited until the winter rains to end before successfully restarting the system on May 5, 1999.

SYSTEM OPERATION AND MONITORING

System Operation: As described above, the system operated almost continuously between system startup on May 6, 1998 and October 12, 1998, when the system was shut down to select more cost-effective SVE equipment. After brief SVE testing in late December 1998 and after the winter rains ended, Cambria resumed SVE using a blower and carbon filtration system on May 5, 1999. To date, air sparging has been conducted simultaneously with the SVE system.

System Monitoring: Cambria currently monitors the SVE system on a monthly basis in accordance with the revised BAAQMD air permit. The monitoring involves measuring hydrocarbon concentrations using a FID and recording system operation parameters. During monitoring of the current carbon filtration system, no hydrocarbons have been detected by the FID between the carbon canisters or in the system effluent.

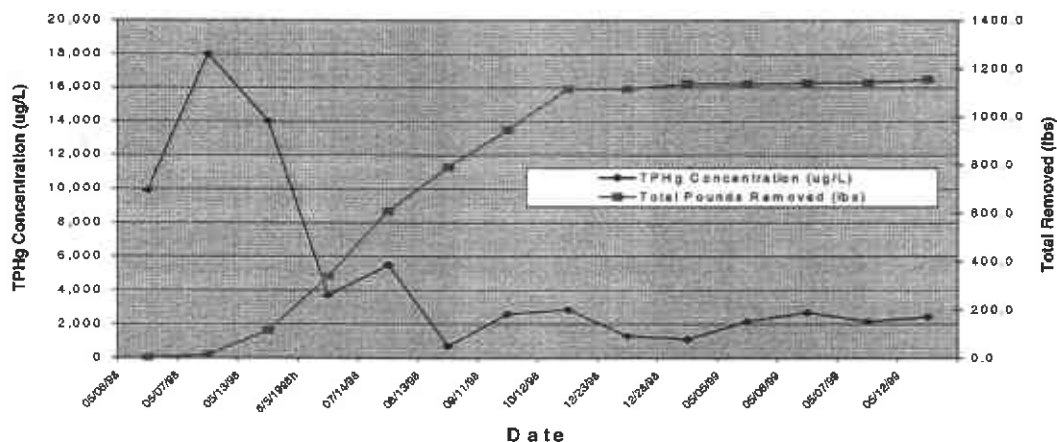
During prior SVE operation using a catalytic oxidizer, Cambria collected vapor samples on a monthly basis. The vapor samples were analyzed for total petroleum hydrocarbons as gasoline (TPHg) by modified EPA Method 8015, and benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8020. The highest TPHg and benzene concentrations were 18,000 micrograms per liter (ug/L) and 480 ug/L, respectively. The analytical results for extracted soil vapor are summarized in Table 1, and the analytical reports are included in Attachment A. Figure A graphs the influent hydrocarbon concentrations in extracted vapor over time.

REMEDIATION SYSTEM PERFORMANCE

To assess the performance of the remediation system, Cambria calculates the hydrocarbon removal rates, hydrocarbon emission rates, and TPHg destruction efficiency based on analytical results, field measurements, and system operation parameters. The SVE system performance data is summarized on Table 2. As shown on Figure A and Table 2, the cumulative estimated hydrocarbon removal between system startup and May 12, 1999 is 1,112 pounds. Since system startup, the air sparging system, when operated in conjunction with the SVE system, injects approximately 2 cfm into each well under an approximate pressure of 8 pounds per square inch (psi).



Figure A - Hydrocarbon Concentrations and Removal vs. Time
Former Arco Station, 706 Harrison Street, Oakland, CA



CLOSING

We appreciate the opportunity to help remediate your site. Please call if you have questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.



David Elias

David Elias, RG
Senior Geologist

Bob Clark-Riddell

Robert Clark-Riddell, PE
Principal Engineer

Figures: 1 - Site Plan
 2 - System Layout

Tables: 1 - SVE System Analytical Results
 2 - Soil Vapor Extraction/Air Sparging System Performance Summary

Attachments: A - Analytic Results for Soil Vapor Sampling

cc: Mr. Bo Gin, 288 11th Street, Oakland, California 94712
 Ms. Anna Torres, State UST Cleanup Fund, 2014 T Street, Sacramento, California 94244
 Mr. Robert Cave, BAAQMD, 939 Ellis Street, San Francisco, California 94109

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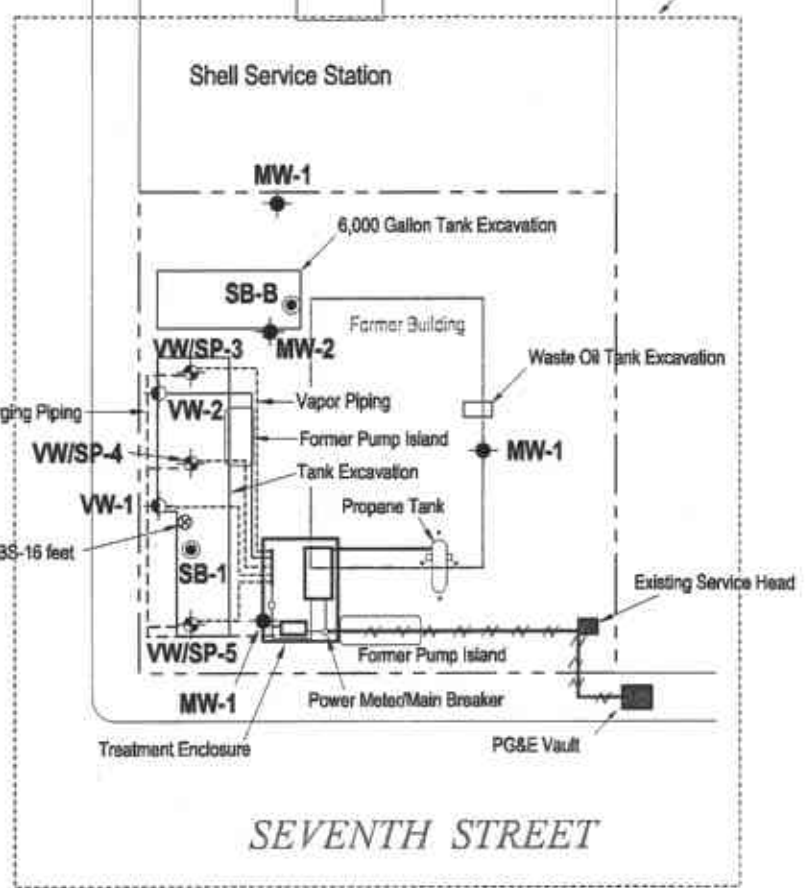


Former Unocal Station

HARRISON STREET

Approximate Location of Shell Fuel Tanks

This area shown on Figure 2



*Piping Locations are Approximate

EXPLANATION

- MW-1 Monitoring well location
- SB-1 Soil boring location
- VW-1 Soil Vapor Extraction well
- VW/SP-5 Combination Soil Vapor Extraction/Air Sparging well

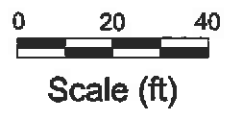


FIGURE 1

H:\EB-3001\B0-01\FIGURES\SITE-PLAN.DWG

Former Arco Station

706 Harrison Street
Oakland, California

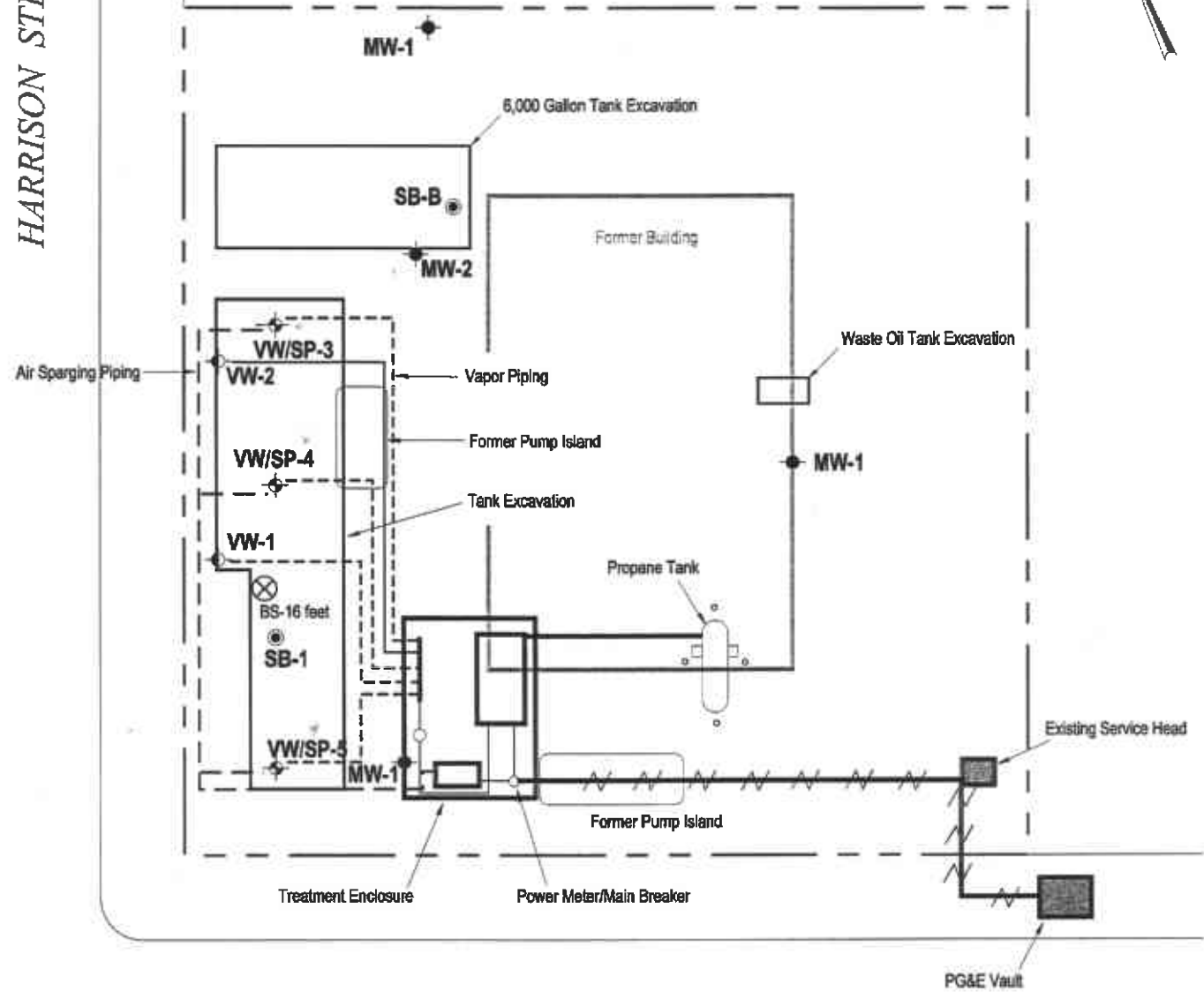
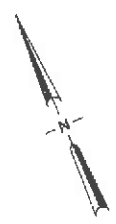


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Site Plan

HARRISON STREET

Shell Service Station



EXPLANATION

- MW-1  Monitoring well location
- SB-1  Soil boring location
- VW-1  Soil Vapor Extraction well
- VW/SP-5  Combination Soil Vapor Extraction/Air Sparging well

SEVENTH STREET

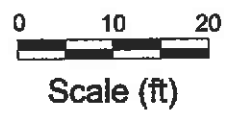


FIGURE
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H:\SB-2004\SB-2004-FIGURES\SYSTEM-LAYOUT.DWG

Former Arco Station

706 Harrison Street
Oakland, California



C A M B R I A

System Layout

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Table 1. SVE System Analytical Results - 706 Harrison Street, Oakland, California

Sample ID (Location)	Date Sampled	TPH-G	(Concentrations in µg/L)				MTBE
			B	T	E	X	
Sys-Inf (Influent)	5/6/98	9,900	480	370	44	160	<700
Sys-Eff (Effluent)	5/6/98	<50	<0.5	<0.5	<0.5	<0.5	<5.0
Sys-Inf (Influent)	5/7/98	18,000	190	320	44	120	---
INFL (Influent)	5/13/98	14,000	390	530	54	170	<1,200
EFFL (Effluent)	5/13/98	<50	<0.5	<0.5	<0.5	<0.5	<5.0
SYS-INF (Influent)	6/5/98	3,700	130	140	20	95	---
SYS-EFF (Effluent)	6/5/98	<50	<0.5	<0.5	<0.5	<0.5	---
Well Gas (Influent)	7/14/98	5,500	110	190	21	180	<70
SYS-EFF (Effluent)	7/14/98	<50	<0.5	<0.5	<0.5	<0.5	<5.0
Well Gas (Influent)	8/13/98	690	6.2	15	1.5	42	---
SYS-EFF (Effluent)	8/13/98	<50	<0.5	<0.5	<0.5	2.7	---
Well Gas (Influent)	9/11/98	2,600	15	40	7.6	87	---
Sys-Eff (Effluent)	9/11/98	<50	<0.5	<0.5	<0.5	<0.5	---
IN (Influent)	12/23/98	1,300	2.1	5.6	2.3	9.5	<5.0
BE (Mid-Carbon)	12/23/98	<50	<0.5	<0.5	<0.5	<0.5	<5.0
EF (Effluent)	12/23/98	<50	<0.5	<0.5	<0.5	<0.5	<5.0
IN (Influent)	12/28/98	1,100	8.3	29	6.1	49	---
BE (Mid Carbon)	12/28/98	<50	<0.5	<0.5	<0.5	<0.5	---
EF (Effluent)	12/28/98	<50	<0.5	<0.5	<0.5	<0.5	---

Abbreviations:

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

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

B, T, E, X=Benzene, toluene, ethylbenzene, and xylenes by EPA Method 8020

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MTBE= Methyl tert-butyl ether by EPA Method 8020. Result in parentheses indicates MTBE by EPA Method 8260

ft= Feet, µg/L=Micrograms per liter

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Table 2. Soil Vapor Extraction System Performance Summary - 706 Harrison Street, Oakland, California

Date	Interval Days of Operation	Total Well Flow Rate (cfm)	System Flow Rate (cfm)	System Vacuum (" H ₂ O)	Total Well Influent Hydrocarbon Concentrations ^a			Effluent Hydrocarbon Concentrations		Hydrocarbon Removal Rate ^b		Hydrocarbon Emission Rates ^b		Destruct. Efficiency (%)	Total TPHg Removal ^c (lbs)
					OVA ^d (ppmv)	TPHg (ug/L)	Benz (ug/L)	TPHg (ug/L)	Benz (ug/L)	TPHg (lbs/day)	Benz (lbs/day)	TPHg (lbs/day)	Benz (lbs/day)		
05/06/98	0	10	124	100	2,080	9,900	480	< 50	< 0.5	9.3	0.45	< 0.56	< 0.0056	> 94	0
05/07/98	1	11	188	98	>1,800	18,000	190	NA	NA	17.7	0.19	NA	NA	NA	9.3
05/13/98	6	13	155	83	NA	14,000	390	< 50	< 0.5	15.9	0.44	< 0.70	< 0.0070	> 96	115
05/19/98	6	16	110	103	1,843	4,970	NA	NA	NA	7.2	NA	NA	NA	NA	210
06/05/98 ^e	23	11	122	86	130	3,700	130	< 50	< 0.5	3.6	0.13	< 0.55	< 0.0055	> 85	375
07/14/98	39	21	98	100	NA	5,500	130	< 50	< 0.5	10.2	0.24	< 0.44	< 0.0044	> 96	515
08/13/98	30	29	98	95	NA	690	6.2	< 50	< 0.5	1.8	0.02	< 0.44	< 0.0044	> 76	823
09/11/98	29	38	33	86	NA	2,600	15	< 50	< 0.5	8.9	0.05	< 0.15	< 0.0015	> 98	875
10/12/98	22	26	31	86	1,060 ^f	2,860	NA	NA	NA	6.8	NA	NA	NA	NA	1,071
12/23/98	0	38	38	110	1,300	1,300	2.1	< 50	< 0.5	4.4	0.01	< 0.17	< 0.0017	> 96	1,071
12/28/98	5	36	36	100	292	1,100	8.3	< 50	< 0.5	3.6	0.03	< 0.16	< 0.0016	> 95	1,093
05/05/99	0	15	48	50	800	2,160	NA	< 50	< 0.5	2.9	NA	< 0.22	< 0.0022	> 93	1,093
05/06/99	1	12	47	57	1,000	2,700	NA	< 50	< 0.5	2.8	NA	< 0.21	< 0.0021	> 93	1,096
05/07/99	1	14	45	65	800	2,160	NA	< 50	< 0.5	2.6	NA	< 0.20	< 0.0020	> 92	1,098
05/12/99	5	13	46	50	900	2,430	NA	< 50	< 0.5	2.7	NA	< 0.21	< 0.0021	> 92	1,112

Notes and Abbreviations:

TPHg = Total petroleum hydrocarbons as gasoline

Benz = Benzene

ppmv = Parts per million by volume

ug/L = micrograms per liter

NA = Not analyzed

^aHydrocarbon concentrations based on Organic Vapor Analyzer (OVA), TPHg and benzene (Benz) by Modified EPA Methods 8015 and 8020.

^bHydrocarbon removal calculation: Pounds per day removed = Concentration (ug/L) x flowrate (scfm) x 1440 min/day x 28.3 l/scf x 2.2 lbs/kg * 1/1,000,000,000 kg/ug *

^cTotal TPHg Removal = The previous removal rates times the interval days of operation plus the previous total removal amount.

^dGastech LEL meter, photoionization detector, or flame ionization detector used to measure field hydrocarbon concentrations.

^eThe OVA readings from the October 5, 1998 monitoring event were used to calculate the amount of hydrocarbons removed.

^fSystem flow rate average of 6/5/98 and 9/11/98 flow rates.

^aTotal well flow rate average of 7/14/98 and 9/11/98 flow rates.

^bInfluent and effluent samples switched.

^cTPHg concentration estimated from OVA measurement.

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ATTACHMENT A

Analytic Results for Soil Vapor Sampling



McCAMPBELL ANALYTICAL INC.

110 Second Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
<http://www.mccampbell.com> E-mail: main@mccampbell.com

Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-0116; Bo Gin	Date Sampled: 12/28/98
		Date Received: 12/28/98
	Client Contact: David Elias	Date Extracted: 12/28/98
	Client P.O:	Date Analyzed: 12/28/98

01/05/99

Dear David:

Enclosed are:

- 1). the results of 3 samples from your #230-0116; Bo Gin project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Edward Hamilton, Lab Director



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Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & BTEX*

EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g) ⁺	MTBE	Benzene	Toluene	Ethylben- zene	Xylenes	% Recovery Surrogate
01003	IN	Air	1100,a	---	8.3	29	6.1	49	111
01004	BE	Air	ND	---	ND	ND	ND	ND	109
01005	EF	Air	ND	---	ND	ND	ND	ND	108
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit	W	50 ug/L	5.0	0.5	0.5	0.5	0.5	0.5	
	S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	0.005	

* water and vapor samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP and SPLP extracts in ug/L

^a cluttered chromatogram; sample peak coelutes with surrogate peak

^{*}The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (?); f) one to a few isolated peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) no recognizable pattern.

QC REPORT FOR HYDROCARBON ANALYSES

Date: 12/28/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		
	Sample (#98923)	MS	MSD		MS	MSD	RPD
TPH (gas)	0.0	112.0	116.7	100.0	112.0	116.7	4.1
Benzene	0.0	10.6	8.9	10.0	106.0	89.0	17.4
Toluene	0.0	11.3	9.3	10.0	113.0	93.0	19.4
Ethyl Benzene	0.0	11.2	9.1	10.0	112.0	91.0	20.7
Xylenes	0.0	33.5	28.4	30.0	111.7	94.7	16.5
TPH(diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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

CAMBRIA ENVIRONMENTAL TECHNOLOGY, INC.

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

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Cambria Manager: <u>David Elias</u> Cambria Sampler: <u>Owen Ratchye</u> Client: <u>Bo Gin</u> Site Address: <u>706 Harrison</u> Project Number: <u>230-0116</u>					ANALYSES										LAB: <u>McC Campbell</u> 				
					T	B													
					P	T													
					H	E													
					g	X													
SAMPLE ID	DATE	TIME	MATRIX	# OF SAMPLES															
IN	12/28/98	1:30 pm	Vapor	1 bag	X	X													
BE	12/28/98	1:45 pm	Vapor	1 bag	X	X													
EF	12/28/98	2:00 pm	Vapor	1 bag	X	X													
					VOAS O&G METALS OTHER:														
					ICE/GOOD CONDITION/HEADSPACE ABSENT ✓				PRESERVATION APPROPRIATE CONTAINERS ✓										
Relinquished by: <u>Owen Ratchye</u> Received by: <u>David Mora</u> Time/Date: <u>12/28/98 3 pm</u>					Relinquished by: <u>David Mora</u> Received by: <u>Judi Rin</u> Time/Date: <u>12/28/98 1625</u>					Relinquished by: _____ Received by: _____ Time/Date: _____					Relinquished by: _____ Received by: _____ Time/Date: _____				



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	Client Contact: David Elias	Date Extracted: 12/23/98
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12/31/98

Dear David:

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- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
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All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Edward Hamilton, Lab Director



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Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & BTEX*

EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g) [†]	MTBE	Benzene	Toluene	Ethylben- zene	Xylenes	% Recovery Surrogate
00854	IN	Air	1300,c,j	ND<50	2.1	5.6	2.3	9.5	— [‡]
00855	BE	Air	ND	ND	ND	ND	ND	ND	92
00856	EF	Air	ND	ND	ND	ND	ND	ND	92
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit	Air	50 ug/L	5.0	0.5	0.5	0.5	0.5	0.5	
	S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	0.005	

* water and vapor samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP and SPLP extracts in ug/L

[†] cluttered chromatogram; sample peak coelutes with surrogate peak

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QC REPORT FOR HYDROCARBON ANALYSES

Date: 12/23/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		
	Sample (#00511)	MS	MSD		MS	MSD	RPD
TPH (gas)	0.0	89.9	86.9	100.0	89.9	86.9	3.5
Benzene	0.0	9.3	9.0	10.0	93.0	90.0	3.3
Toluene	0.0	9.6	9.4	10.0	96.0	94.0	2.1
Ethyl Benzene	0.0	9.9	9.5	10.0	99.0	95.0	4.1
Xylenes	0.0	29.6	28.6	30.0	98.7	95.3	3.4
TPH (diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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

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Cambria Manager: <u>David Elias</u> Cambria Sampler: <u>Owen Ratchye</u> Client: <u>Bo Gin</u> Site Address: <u>706 Harrison</u> Project Number: <u>230-0116</u>					ANALYSES										LAB: <u>McC Campbell</u> <div style="font-size: 2em; font-weight: bold; text-align: center;"> NEEDS RESULTS TUES. 29th 3:00 PM </div>				
T	B																		
P	T																		
H	E																		
g	X																		
SAMPLE ID	DATE	TIME	MATRIX	# OF SAMPLES															
IN	12/23/98	1 pm	Vapor	1 bag	X	X											00854		
BE	12/23/98	1:15 pm	Vapor	1 bag	X	X											00855		
EF	12/23/98	1:30 pm	Vapor	1 bag	X	X											00856		
ICERT GOOD INVOICE <input checked="" type="checkbox"/> HEAD STRIKE <input checked="" type="checkbox"/>					PRESERVATION APPROPRIATE CONTAINERS <input checked="" type="checkbox"/>					VOCs <input checked="" type="checkbox"/> ORG <input checked="" type="checkbox"/> METALS <input checked="" type="checkbox"/> OTHER <input checked="" type="checkbox"/>									
Relinquished by: <u>David Mora</u>					Relinquished by: <u>DAVID MORA</u>					Relinquished by: _____					Relinquished by: _____				
Received by: <u>David Mora</u>					Received by: <u>Anna A Butler</u>					Received by: _____					Received by: _____				
Time/Date: _____					Time/Date: <u>2:30 12/23/98</u>					Time/Date: _____					Time/Date: _____				



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<http://www.mccampbell.com> E-mail: main@mccampbell.com

Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-0116-105; Bo Gin	Date Sampled: 09/11/98
		Date Received: 09/11/98
	Client Contact: Owen Ratchye	Date Extracted: 09/11/98
	Client P.O:	Date Analyzed: 09/11/98

09/18/98

Dear Owen:

Enclosed are:

- 1). the results of 2 samples from your #230-0116-105; Bo Gin project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Edward Hamilton, Lab Director



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Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-0116-105; Bo Gin	Date Sampled: 09/11/98
	Client Contact: Owen Ratchye	Date Received: 09/11/98
	Client P.O:	Date Extracted: 09/11/98
		Date Analyzed: 09/11/98

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & BTEX*

EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g) ⁺	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	% Recovery Surrogate
94846	Well Gas	Air	2600,c,a	--	15	40	7.6	87	104
94847	Sys-Eff	Air	ND	--	ND	ND	ND	ND	103
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit	W		50 ug/L	5.0	0.5	0.5	0.5	0.5	
	S		1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	

* water and vapor samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP and SPLP extracts in ug/L

* cluttered chromatogram; sample peak coelutes with surrogate peak

*The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (?); f) one to a few isolated peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) no recognizable pattern.

QC REPORT FOR HYDROCARBON ANALYSES

Date: 09/10/98-09/11/98 Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		RPD
	Sample (#94114)	MS	MSD		MS	MSD	
TPH (gas)	0.0	96.3	94.9	100.0	96.3	94.9	1.4
Benzene	0.0	9.1	9.1	10.0	91.0	91.0	0.0
Toluene	0.0	9.4	9.4	10.0	94.0	94.0	0.0
Ethyl Benzene	0.0	9.7	9.6	10.0	97.0	96.0	1.0
Xylenes	0.0	29.2	29.0	30.0	97.3	96.7	0.7
TPH(diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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



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Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-116-105; Bo Gin	Date Sampled: 08/13/98
		Date Received: 08/14/98
	Client Contact: Owen Ratchye	Date Extracted: 08/14/98
	Client P.O:	Date Analyzed: 08/14/98

08/21/98

Dear Owen:

Enclosed are:

- 1). the results of 2 samples from your #230-116-105; Bo Gin project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.

110 2nd Avenue South, #D7, Pacheco, CA 94553
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QC REPORT FOR HYDROCARBON ANALYSES

Date: 08/14/98-08/15/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		RPD
	Sample (#93422)	MS	MSD		MS	MSD	
TPH (gas)	0.0	93.8	90.9	100.0	93.8	90.9	3.1
Benzene	0.0	9.6	9.8	10.0	96.0	98.0	2.1
Toluene	0.0	9.9	10.0	10.0	99.0	100.0	1.0
Ethyl Benzene	0.0	10.1	10.1	10.0	101.0	101.0	0.0
Xylenes	0.0	30.3	30.3	30.0	101.0	101.0	0.0
TPH (diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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



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Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-0116-105; Bo Gin	Date Sampled: 07/14/98
		Date Received: 07/15/98
	Client Contact: Owen Ratchye	Date Extracted: 07/15/98
	Client P.O:	Date Analyzed: 07/15/98

07/22/98

Dear Owen :

Enclosed are:

- 1). the results of 2 samples from your #230-0116-105; Bo Gin project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Edward Hamilton, Lab Director

QC REPORT FOR HYDROCARBON ANALYSES

Date: 07/15/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		RPD
	Sample (#92016)	MS	MSD		MS	MSD	
TPH (gas)	0.0	100.9	98.4	100.0	100.9	98.4	2.5
Benzene	0.0	9.7	9.7	10.0	97.0	97.0	0.0
Toluene	0.0	9.9	9.9	10.0	99.0	99.0	0.0
Ethyl Benzene	0.0	10.1	10.1	10.0	101.0	101.0	0.0
Xylenes	0.0	31.1	30.7	30.0	103.7	102.3	1.3
TPH(diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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



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Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-0116; Bo Gin	Date Sampled: 06/05/98
		Date Received: 06/05/98
	Client Contact: Owen Ratchye	Date Extracted: 06/05/98
	Client P.O:	Date Analyzed: 06/05/98

06/12/98

Dear Owen:

Enclosed are:

- 1). the results of 2 samples from your #230-0116 project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Edward Hamilton, Lab Director



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Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-0116; Bo Gin	Date Sampled: 06/05/98
	Client Contact: Owen Ratchye	Date Received: 06/05/98
	Client P.O:	Date Extracted: 06/05/98
		Date Analyzed: 06/05/98

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & BTEX*

EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g) ⁺	MTBE	Benzene	Toluene	Ethylben- zene	Xylenes	% Recovery Surrogate
90147	SYS-INF	Air	ND	---	ND	ND	ND	ND	103
90148	SYS-EFF	Air	3700,a	---	130	140	20	95	113
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		Air	50 ug/L	5.0	0.5	0.5	0.5	0.5	
		S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	

* water and vapor samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP and SPLP extracts in ug/L

* cluttered chromatogram; sample peak coelutes with surrogate peak

*The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (?); f) one to a few isolated peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) no recognizable pattern.

QC REPORT FOR HYDROCARBON ANALYSES

Date: 06/05/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		
	Sample (#89965)	MS	MSD		MS	MSD	RPD
TPH (gas)	0.0	94.4	87.8	100.0	94.4	87.8	7.2
Benzene	0.0	10.5	9.2	10.0	105.0	92.0	13.2
Toluene	0.0	10.4	9.5	10.0	104.0	95.0	9.0
Ethyl Benzene	0.0	10.6	9.7	10.0	106.0	97.0	8.9
Xylenes	0.0	31.9	28.2	30.0	106.3	94.0	12.3
TPH(diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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



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Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-0116; Bo Gin	Date Sampled: 05/13/98
		Date Received: 05/13/98
	Client Contact: Owen Ratchye	Date Extracted: 05/13/98
	Client P.O:	Date Analyzed: 05/13/98

05/20/98

Dear Owen:

Enclosed are:

- 1). the results of 2 samples from your #230-0116; Bo Gin project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits. If you have any questions please contact me. McCampbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Yours truly,

Edward Hamilton, Lab Director

QC REPORT FOR HYDROCARBON ANALYSES

Date: 05/13/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		RPD
	Sample (#88980)	MS	MSD		MS	MSD	
TPH (gas)	0.0	94.1	89.6	100.0	94.1	89.6	5.0
Benzene	0.0	10.7	10.4	10.0	107.0	104.0	2.8
Toluene	0.0	11.0	10.6	10.0	110.0	106.0	3.7
Ethyl Benzene	0.0	11.2	10.8	10.0	112.0	108.0	3.6
Xylenes	0.0	33.7	32.5	30.0	112.3	108.3	3.6
TPH (diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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

QC REPORT FOR HYDROCARBON ANALYSES

Date: 05/14/98-05/15/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		RPD
	Sample (#88980)	MS	MSD		MS	MSD	
TPH (gas)	0.0	96.4	98.2	100.0	96.4	98.2	1.8
Benzene	0.0	10.2	10.1	10.0	102.0	101.0	1.0
Toluene	0.0	10.3	10.2	10.0	103.0	102.0	1.0
Ethyl Benzene	0.0	10.6	10.3	10.0	106.0	103.0	2.9
Xylenes	0.0	32.0	31.4	30.0	106.7	104.7	1.9
TPH (diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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

McCAMPBELL ANALYTICAL 11192 XC 276
 110 2nd AVENUE, # D7
 PACHECO, CA 94553 FAX (510) 798-1822

CHAIN OF CUSTODY RECORD

TURN AROUND TIME: RUSH 24 HOUR 48 HOUR 5 DAY

REPORT TO: Cambria BILL TO: Cambria
 COMPANY: Cambria - Oakland
 PM: OWEN RATOLLYE
 TELE: (510) 420-3316 FAX #: (510) 420-9170
 PROJECT NUMBER: 130-0116 PROJECT NAME: Bo Qin
 PROJECT LOCATION: Bo Qin SAMPLER SIGNATURE: *[Signature]*

ANALYSIS REQUEST OTHER

TEX 3 TPH as Gasoline (602/8020 & 8025) (MIB)	THP as Diesel (8015)	Total Petroleum DI & Grease (5520 EIF/5520 REF)	Total Petroleum Hydrocarbons (418J)	EPA 601/8010	EPA 602/8020	EPA 608/8080	EPA 608/8080 - PCBs Only	EPA 624/8240/8260	EPA 625/8270	CAN - 37 Metals	EPA - Priority Pollutant Metals	LEAD (7240/7421/2392/6010)	ORGANIC LEAD	PCB
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89189
 89190
 COMMENTS

SAMPLE ID	LOCATION	SAMPLING		# CONTAINERS	TYPE CONTAINERS	MATRIX					METHOD PRESERVED			
		DATE	TIME			WATER	SOIL	AIR	SLUDGE	OTHER	HCL	NO ₂	OTHER	
INFL	-	5/13/99	1105	1	Nylon			✓				✓	✓	
EFFL	-	"	1115	1	Nylon			✓				✓	✓	

ICE/GOOD CONDITION HEAD SPACE ARSENIC PRESERVATION APPROPRIATE CONTAINERS VOAS O&G/METALS/OTHER

RELINQUISHED BY: *[Signature]* DATE: 5/13/99 TIME: 2:10
 RECEIVED BY: *[Signature]*
 RELINQUISHED BY: *[Signature]* DATE: 5/13 TIME: 2:30 pm
 RECEIVED BY: *[Signature]*
 RELINQUISHED BY: DATE: TIME: RECEIVED BY LABORATORY:

REMARKS:
 NOTE THAT SAMPLES MUST BE ANALYZED AT LEAST 72 HRS. AFTER SAMPLING.



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Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-0116-103	Date Sampled: 05/07/98
		Date Received: 05/08/98
	Client Contact: Owen Ratchye	Date Extracted: 05/08/98
	Client P.O:	Date Analyzed: 05/08/98

05/15/98

Dear Owen:

Enclosed are:

- 1). the results of 1 samples from your #230-0116-103 project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits.

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

Yours truly,

Edward Hamilton, Lab Director

QC REPORT FOR HYDROCARBON ANALYSES

Date: 05/08/98-05/11/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		
	Sample (#88780)	MS	MSD		MS	MSD	RPD
TPH (gas)	0.0	95.6	96.7	100.0	95.6	96.7	1.1
Benzene	0.0	10.5	10.5	10.0	105.0	105.0	0.0
Toluene	0.0	10.8	10.8	10.0	108.0	108.0	0.0
Ethyl Benzene	0.0	10.9	10.8	10.0	109.0	108.0	0.9
Xylenes	0.0	32.7	32.8	30.0	109.0	109.3	0.3
TPH (diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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



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<http://www.mccampbell.com> E-mail: main@mccampbell.com

Cambria Environmental Technology 1144 65 th Street, Suite C Oakland, CA 94608	Client Project ID: #230-0116-103	Date Sampled: 05/06/98
		Date Received: 05/07/98
	Client Contact: Owen Ratchye	Date Extracted: 05/07/98
	Client P.O:	Date Analyzed: 05/07/98

05/14/98

Dear Owen:

Enclosed are:

- 1). the results of 2 samples from your #230-0116-103 project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits.

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

Yours truly,

Edward Hamilton, Lab Director

QC REPORT FOR HYDROCARBON ANALYSES

Date: 05/07/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		
	Sample (#88780)	MS	MSD		MS	MSD	RPD
TPH (gas)	0.0	91.6	95.8	100.0	91.6	95.8	4.5
Benzene	0.0	10.1	10.9	10.0	101.0	109.0	7.6
Toluene	0.0	10.3	11.1	10.0	103.0	111.0	7.5
Ethyl Benzene	0.0	10.5	11.1	10.0	105.0	111.0	5.6
Xylenes	0.0	31.3	33.2	30.0	104.3	110.7	5.9
TPH(diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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

QC REPORT FOR HYDROCARBON ANALYSES

Date: 05/08/98

Matrix: AIR

Analyte	Concentration (mg/L)			Amount Spiked	% Recovery		RPD
	Sample (#88780)	MS	MSD		MS	MSD	
TPH (gas)	0.0	95.6	96.7	100.0	95.6	96.7	1.1
Benzene	0.0	10.5	10.5	10.0	105.0	105.0	0.0
Toluene	0.0	10.8	10.8	10.0	108.0	108.0	0.0
Ethyl Benzene	0.0	10.9	10.8	10.0	109.0	108.0	0.9
Xylenes	0.0	32.7	32.8	30.0	109.0	109.3	0.3
TPH(diesel)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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

