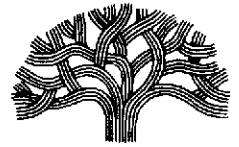




CITY OF OAKLAND



DALZIEL BUILDING • 250 FRANK H. OGAWA PLAZA, SUITE 5301 • OAKLAND, CALIFORNIA 94612-2034

Public Works Agency
Environmental Services

FAX (510) 238-7286
TDD (510) 238-7644

Ro 293

Alameda County
SEP 10 2002
Environmental Health

September 4, 2002

Mr. Barney Chan
Alameda County Environmental Health Services
1131 Harbor Bay Parkway
Alameda, California 94502-6577

**Subject: Dual Phase Extraction Pilot Test and Feasibility Study -
City of Oakland Municipal Service Center
7101 Edgewater Drive Oakland, California**

Dear Mr. Chan:

Enclosed is a copy of the above referenced report prepared by our consultants, Cambria Environmental Consultants for the City of Oakland Municipal Service Center at 7101 Edgewater Drive.

Please call me at 238-6259, if you have any questions or require additional information.

Sincerely,

Joseph A. Cotton, R.G.
Environmental Program Specialist

cc: Diane Heinz, Port of Oakland, 530 Water St., Oakland, CA 94604

CAMBRIA

TPE PILOT TEST AND FEASIBILITY REPORT

City of Oakland, Municipal Services Center
7101 Edgewater Drive
Oakland, California
Cambria Project No. 153-1653

August 28, 2002

Alameda County
SEP 10 2002
Environmental Health

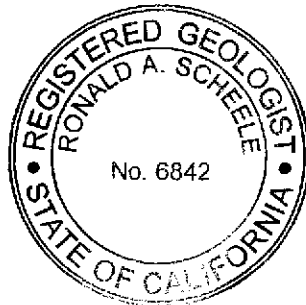


Prepared for:

Mr. Joseph Cotton
City Of Oakland, Public Works Agency
Environmental Services Division
250 Frank H. Ogawa Plaza Suite 5301
Oakland, California 94612-2034

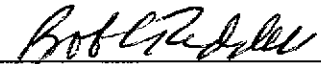
Prepared by:

Cambria Environmental Technology, Inc.
1144 65th Street, Suite B
Oakland, California 94608





Ron Scheele, R.G.
Senior Geologist



Bob Clark-Riddell, P.E.
Principal Engineer

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TPE PILOT TEST AND FEASIBILITY REPORT

City of Oakland, Municipal Services Center
7101 Edgewater Drive
Oakland, California
Cambria Project No. 153-1653

August 28, 2002



INTRODUCTION

Cambria Environmental Technology, Inc. (Cambria) has prepared this *Two Phase Extraction (TPE) Pilot Test and Feasibility Report* for the above-referenced site. The site background, TPE pilot test activities and results, and a feasibility study are presented below.

SITE BACKGROUND

Site Description

The 17-acre site is located in Oakland, California (Figure 1). It consists of a corporation yard of offices, shops, warehouse structures, and a vehicle maintenance and repair facility (Figure 2). Bordering the site to the west and to the north is the Martin Luther King Regional Shoreline Park. Beyond the narrow strip of parkland lies San Leandro Bay to the west and Damon Slough to the north. Area use to the east and south is primarily light industrial and commercial business.

Previous Work

In 1989, an environmental site assessment was performed, and monitoring wells MW-1 through MW-4 were installed. In 1992, an additional investigation was performed and monitoring wells MW-5 through MW-7 were installed. In 1993, thirty-four soil borings were advanced across the site, and groundwater samples were collected. In 1995, three shallow borings were advanced as part of a geotechnical investigation and soil samples were analyzed for petroleum hydrocarbons. In 1996, ten soil borings were advanced and temporary wells were installed outside the western and northern perimeters of the site along San Leandro Bay and Damon Slough. Three of the temporary well locations were converted to monitoring wells: MW-8 through MW-10. From

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September through December 1999, an approximately 2,650 lineal foot fuel transport and dispensing system was removed from the site. In addition, eight underground storage tanks (USTs) and associated piping were removed. In November 1999, MW-3 and MW-4 were destroyed and monitoring wells MW-11 through MW-17 were subsequently installed. In July 2000, 42 direct push soil borings were advanced to assess the extent of contamination. Since installation, monitoring wells have been regularly gauged and sampled. See Baseline's *Site History and Characterization Report* dated January 2001 for further details regarding past site assessment activities.



Site Hydrogeology

The site is underlain by artificial fill that was emplaced during several construction phases since 1945. The fill material varies significantly in character across the site. The fill is underlain by clayey silt deposits, known as Bay Mud and coarse-grained sediments. Based on measured groundwater elevations, groundwater generally appears to flow towards Damon Slough in the northern part of the site, and toward San Leandro Bay in the southern part of the site. The heterogeneity of the artificial fill material and the low permeability of the Bay Mud used as fill at various site locations appear to influence local groundwater flow. In general, the site monitoring wells are screened from 5-13 feet below grade surface (bgs). A groundwater monitoring program has been in place since 1989. Water levels have historically ranged from 5 to 11 feet bgs in the vicinity of the Plumes C and D (Figure 2). Based on past tidal studies, groundwater appears to be tidally influenced in select wells (see Baseline's *Site History and Characterization Report* dated January 2001 for further details).

Contaminant Distribution


Petroleum hydrocarbons have been detected in soil and groundwater at multiple locations across the site. Separate phase hydrocarbons (SPH) have been observed in four areas designated as Plumes A through D. The distribution of a majority of the contamination appears to be related to the former USTs and fuel dispensing systems. The contamination also may have been entrained in the fill material used to reclaim the wetland. The former USTs near TBW-1 and TBW-2, the former USTs east of MW-6, and the recently upgraded active USTs near MW-5 are likely to have been sources of contamination, in addition to the recently removed extensive fuel dispensing system. Low concentrations of petroleum hydrocarbons have been detected in off-site wells MW-8, MW-9, and MW-10 in the past. No petroleum hydrocarbons have ever been detected in off-site wells MW-3 and MW-4, which were recently destroyed.

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TPE PILOT TEST ACTIVITIES

Field activities were performed over a four-week period with TPE pilot testing performed individually on Plumes C and Plume D (Figure 3). The objective of the pilot testing was to maximize SPH removal and determine the feasibility of using TPE to remediate the test areas. The TPE testing activities are described below.

Field Activities



Personnel Present: Rowan Fennell and Sanjiv Gill, Cambria technicians, and Matt Meyers, Cambria environmental scientist, working under the supervision of Ron Scheele, California Registered Geologist.

TPE Contractor: Jeff Sproul of EnviroSupply & Service (EnviroSupply) of Irvine, California.

Notifications: Cambria notified the Bay Area Air Quality Management District of pilot testing activities on Plume C and D test areas in letters dated May 24, and June 5, 2002.

Field Activity Dates: Plume C Petroleum Oil Release-VRA Injection - Fri. May 31, 2002
Groundwater and Pre-test Parameter Monitoring - Mon. June 3, 2002
Plume C TPE Testing - Mon. June 10 through Fri. June 14, 2002
Groundwater and Pre-test Parameter Monitoring - Mon. June, 17, 2002
Plume D TPE Testing - Tues. June 18 through Sat. June 24, 2002
Post-test Groundwater Monitoring - Mon. June 24, 2002

Field Procedures: TPE is the process of applying high vacuum (up to 29 inches of mercury) to a well using a one-inch "stinger" pipe installed through an airtight wellhead seal to simultaneously extract both soil vapors and groundwater. The TPE pilot test was conducted using a liquid-ring pump, moisture knock-out tank, and thermal oxidizer. Extracted vapors were treated using a propane-powered thermal oxidizer. A diesel generator was used to provide electricity and a 499-gallon portable propane tank was used to provide supplemental fuel for the thermal oxidizer. Extracted SPH and groundwater from each plume was temporarily stored in a temporary 21,000-gallon baker tank.

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Groundwater Monitoring: Prior to, during, and after testing, groundwater and SPH levels were measured in all extraction and observation wells (see Table 3). Groundwater levels were also measured twice on June 17, 2002, at low and high tide.

VRA Injection: Prior to testing, a proprietary compound called Petroleum Oil Release-VRA (VRA) was injected into a select well of Plume C. VRA is manufactured by Polychem Corporation of Chestnut Ridge, New York. It is a biodegradable compound with a low viscosity and specific gravity (0.87) which mobilizes trapped SPH by dissolving into the hydrocarbons and shortening their chain lengths, thereby increasing the mobility, volatility, and biodegradability of the parent compounds. VRA was designed specifically to loosen, dilute, and release heavy oils from solid surfaces and is commonly used in the cleanup of oil spills. Alameda County Environmental Health Agency approved VRA injection into site wells.

On May 31, 2002, approximately 50 gallons of VRA was injected in RW-C5 followed by the injection of 30 gallons of tap water. The water slug was used to help force the VRA away from the well and further into the saturated zone. Groundwater and SPH levels were measured prior to and after injection of VRA to determine its impact on the SPH thickness.

Chemical Analysis: To assess hydrocarbon vapor concentration trends and confirm Horiba gas analyzer readings, grab vapor samples were collected from the vaporstream prior to dilution. The samples were collected in Tedlar bags using a vacuum pump and analyzed for TPHg, BTEX and MTBE using EPA Method TO-3 (Table 2 and Appendix A).

Prior to and following completion of the TPE pilot test, well vapor samples were also analyzed for oxygen, and carbon dioxide using a Horiba gas analyzer to determine concentration trends and confirm radius of influence observations from vacuum data.


In addition, a grab water sample from the water storage tank was analyzed to profile the extracted water for future disposal/recycling (Appendix B).

Step Vacuum Tests: Step vacuum tests were conducted on the test wells followed by constant vacuum during the remainder of the pilot test. TPE extraction was performed on each test area (Plume C and Plume D, respectively) for a duration one week with the system operating 24 hours per day. During the day, measurements of vacuum, flow, water level, hydrocarbon concentration, oxygen and carbon dioxide were recorded in the extraction wells and selected observation wells (see Table 1).

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During the beginning of TPE testing, step vacuum tests were conducted on wells RW-C5, RW-C6, RW-D2, RW-D3, and RW-D4 to determine the well response with various TPE stinger depths and applied vacuum levels. The TPE stinger was typically placed near the static water level at approximately 6-8 feet bgs and dropped several feet below the static water level depending upon the sediments and contamination in the area of test well. As the stinger depth was kept constant, the applied vacuum was typically increased in steps of 5 inches of mercury to the maximum achievable by the system (see Table 1).

TPE Pilot Test Results



Petroleum Oil Release-VRA: Following VRA injection into well RW-C5 but prior to TPE testing, the SPH thickness in RW-C5 increased from 0.02 ft to 0.68 ft on June 3 and to 1.64 ft on June 7, 2002 (See Table 3). An increase in the SPH thickness was also observed in nearby well RW-C6, increasing from 0.19 to 0.74 on June 7 and to 1.04 ft on June 10, 2002 (Table 3). A noticeable difference in the appearance of a SPH sample collected from RW-C5 was observed. The SPH showed to have a significantly lower surface tension and a slightly reduced viscosity although the amount of VRA in the SPH sample was not quantified. The increased SPH thickness in the wells along with the reduced surface tension of the SPH suggests that the VRA may enhance SPH mobilization and biodegradation. It is unknown if the fluctuating (tidally influenced) groundwater table affected SPH accumulations in the wells.

Plume C Test Area: During TPE testing, the following observations were noted:

- Well vapor flow rates ranged from 7 to 36 cfm. Well vapor and system flowrates usually decreased as the applied vacuum and stinger depth increased.
- Lower well vapor extraction flowrates corresponded with the higher groundwater extraction rates. Groundwater extraction rates ranged from 2.3 to 8.0 gallons per minute (gpm). These variable rates are likely related to heterogeneous soil conditions.
- The highest hydrocarbon vapor concentration was measured in OB-C1 at 41,000 parts per million by volume (ppmv). Hydrocarbon vapor concentrations were highest at the beginning of the test and decreased significantly during the test.
- Drawdown in water levels was observed up to 0.5 ft in RW-C6 and 0.9 ft in OB-C1 while extracting from RW-C5 was observed. The amount of drawdown related to the TPE activities was difficult to determine due to varying SPH levels, remnant conditions between test wells, and possible tidal affects. Post-test monitoring performed at low and high tides on June 17, 2002, indicated an average change in

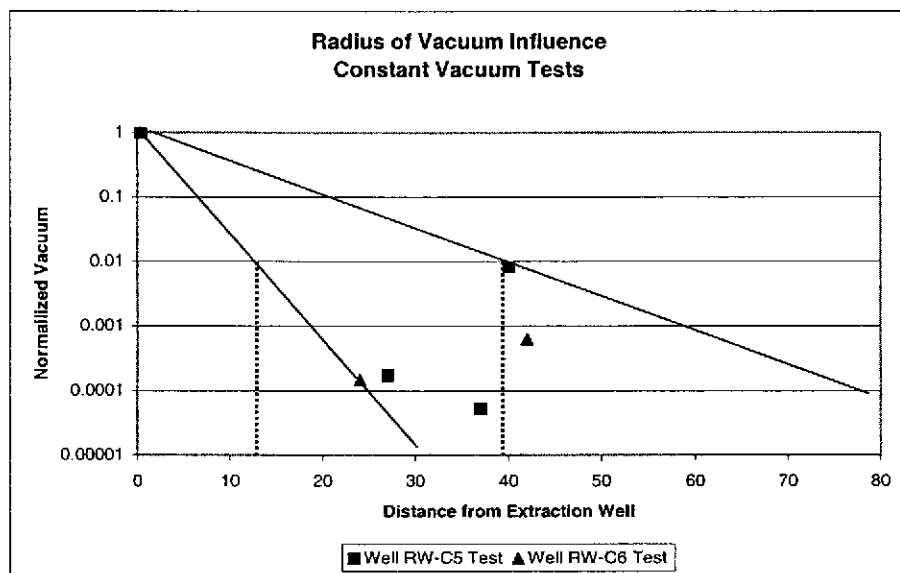
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water levels of 0.06 ft within a 12-hour period (Table 3).

- Vacuum influence in observation wells ranged from 0 to 2.85 inches of H₂O. Vacuum levels did not always increase with proximity from the extraction well. For example, wells RW-C3, located 40 feet away from extraction well RW-C5, had 2.35 inches of H₂O of vacuum while RW-C6 located 15 feet exhibited an anomalous positive pressure. These variable and anomalous readings are likely related to the heterogeneities of the underlying soils and tidal influences. These conditions require significant consideration prior to implementation of a remediation system.
- After TPE testing, the SPH thickness had decreased in wells RW-C6, OB-C1, increased in wells RW-C5, and appeared in RW-C2, RW-C3, RW-C7, and TBW-1 (see Table 3).



Radius of Vacuum Influence: The effective radius of vacuum influence was estimated according to *A Summary of Nationwide Vapor Extraction System Performance Study* (T.E. Buscheck, T. R. Peargin, November 1991). This approach involves normalizing the vacuum data by dividing the vacuum observed in monitoring points by the vacuum applied to the extraction wellhead. The log of the normalized vacuum data is then plotted against the distance to the observation wells. The effective radius of influence is frequently considered to be the distance corresponding to 1% (0.01) of the normalized vacuum. As shown on the graph below, the estimated effective radius of vacuum influence ranged from 13 to 39 feet at the completion of the constant vacuum tests on wells RW-C5 and RW-C6.



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Vapor Analytical Data: Vapor samples were collected from wells RW-C1, OB-C1, and RW-C3 near the end of the constant vacuum tests. Analytical results exhibit a decreasing concentration trend during each test similar to the readings collected using the Horiba gas analyzer (see Table 1).

Vapor measurements collected from the test wells had pre-test levels of oxygen ranging from 5.5 to 20.6%, (atmospheric level is ~20.9%), and levels of carbon dioxide ranging from 0 to 17%, (atmospheric level is ~0.03%) (see Table 1). Wells RW-C3 and OB-C1 had depleted levels of oxygen, and wells RW-C6 and OB-C1 had enriched levels of carbon dioxide, which is often indicative of the presence of aerobic, hydrocarbon-degrading microbes within the soil. At the end of each test, significant increases in oxygen were measured in wells OB-C1 and RW-C3, which is indicative of subsurface air movement and introduction of air at atmospheric levels.

Estimated Hydrocarbon Removal Rates: During the TPE testing of Plume C, vapor-phase mass removal rates from the test wells ranged from low (2.2 lbs/day) to moderate levels (22 lbs/day). Approximately 297 gallons or 45 pounds of vapor-phase hydrocarbons were removed from test wells in Plume C (see equations below)

HC vapor removal rate (lbs/day) = flowrate (scfm) x well conc. (ppmv) x conv. factor (3.2E-4)

HC volume in vapor (gal) = HC vapor removal rate (lbs/day) x # of days / 6.6 lbs of HC/gal

A water sample collected from the Plume C storage tank had TPHg and TPHd concentrations of 7,700 and 3,300 parts per billion (ppb), respectively (Table 2 and Appendix B). Approximately 16,000 gallons of hydrocarbon-impacted groundwater was extracted during the five days of testing. Approximately 0.23 gallons of dissolved-phase hydrocarbons and 200 gallons of separate-phase hydrocarbons were removed from the subsurface (see equations below).

HC volume in gw (gal) = TPHg+TPHd conc. (ug/L) x gw volume (gal) x conv. factor (8.346E-9)
/ 6.6 lbs of HC/gal

SPH volume (gal) = SPH volume (cubic ft) x 7.48 gal/cubic ft

PLUME D Test Area: During TPE testing, the following observations and findings were noted from wells related to Plume D:

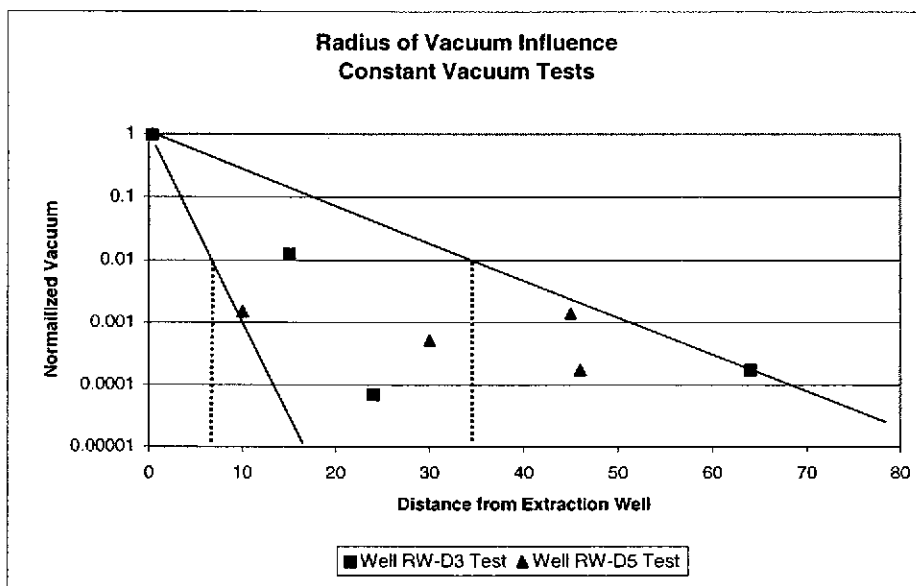
- Well vapor flow rates ranged from 5 to 32 cfm. Well vapor and system flowrates usually decreased as the applied vacuum and stinger depth increased.

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- Lower well vapor extraction flowrates corresponded with the higher groundwater extraction rates. Groundwater extraction rates ranged from 0.7 to 4.1 gpm.
- The highest hydrocarbon vapor concentration was measured in RW-D4 at 46,280 ppmv. Hydrocarbon vapor concentrations were highest at the beginning of the test and decreased significantly by the end of the test.
- Significant drawdown in water levels was observed up to 2.6 ft in RW-D1, 2.7 ft in RW-D3, and 0.8 ft in RW-D4 while extracting from RW-D2. The amount of drawdown related to the TPE activities was difficult to determine due to varying SPH levels, remnant conditions between test wells, and tidal influences.
- Vacuum influence in observation wells ranged from 0 to 3.6 inches of H₂O. Vacuum levels did not always respond as expected, with positive pressure often being observed in observations near to the extraction well. The relatively close proximity of the wells to the San Leandro Bay and changing tides may be a possible cause for the anomalous positive pressure readings.
- After TPE testing, SPH thickness had decreased in all test wells: RW-D2, RW-D3, RW-D4, and TBW-5 (see Table 3).

Radius of Vacuum Influence: The effective radius of vacuum influence was estimated as previously described for Plume C. As shown on the graph below, the estimated effective radius of vacuum influence ranged from 7 to 34 feet at the end of the constant vacuum tests on wells RW-D3 and RW-D5.



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Vapor Analytical Data: Vapor samples were collected from wells RW-D2, RW-D3, RW-D4, RW-D5 near the end of the constant vacuum tests. Sample analytical results exhibit a decreasing concentration trend during each test similar to the readings collected using the Horiba gas analyzer (see Table 1).

Vapor measurements collected from the test wells had pre-test levels of oxygen ranging from 0.82 to 18.94%, (atmospheric level is ~20.9%), and levels of carbon dioxide ranging from 0 to 15.16%, (atmospheric level is ~0.03%) (see Table 1). Wells RW-D2, RW-D3, RW-D4, and TBW-5 had depleted levels of oxygen, and wells RW-D3, RW-D4, and TBW-5 had enriched levels of carbon dioxide, which is often indicative of the presence of aerobic, hydrocarbon-degrading, microbes within the soil. Significant increases in oxygen were measured in wells RW-D2, RW-D3, and RW-D5 at the end of each test, which is indicative of subsurface air movement and introduction of air at atmospheric levels.

Estimated Hydrocarbon Removal Rates: During the TPE testing of Plume D, vapor-phase mass removal rates from the test wells ranged from low (1.2 lbs/day) to high levels (135 lbs/day). Approximately 245 pounds or 1,617 gallons of vapor-phase hydrocarbons were removed from test wells in Plume D (see equations below).

$$\begin{aligned} \text{HC vapor removal rate (lbs/day)} &= \text{flowrate (sfcm)} \times \text{well conc. (ppmv)} \times \text{conv. factor (3.2E-4)} \\ \text{HC volume in vapor (gal)} &= \text{HC vapor removal rate (lbs/day)} \times \text{\# of days} / 6.6 \text{ lbs of HC/gal} \end{aligned}$$

A water sample collected from the Plume C storage tank had TPHg and TPHd concentrations of 48,000 and 10,000 parts per billion (ppb), respectively (Table 2 and Appendix B). Approximately 17,000 gallons of hydrocarbon-impacted groundwater was extracted during the five days of testing. Approximately 1.2 gallons of dissolved-phase hydrocarbons and 143 gallons of separate-phase hydrocarbons were removed from the subsurface (Table 4).

$$\begin{aligned} \text{HC volume in gw (gal)} &= \text{TPHg+TPHd conc. (ug/L)} \times \text{gw volume (gal)} \times \text{conv. factor (8.346E-9)} \\ &\quad / 6.6 \text{ lbs of HC/gal} \end{aligned}$$

$$\text{SPH volume (gal)} = \text{SPH volume (cubic ft)} \times 7.48 \text{ gal/cubic ft}$$

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could be reduced by sharing remedial systems between plumes. If the cleanup of both plumes were to be combined, cost savings from operation and maintenance would be realized though system installation and construction costs would also be substantially higher. The estimated costs shown below are based, in part, on our past experience working with all four technologies.

Table B – Duration and Cost Estimates

Potentially Applicable Technology	Permits and Approvals	Installation/ Construction	Operations And Maintenance (Annual)	Quarterly Monitoring (Annual)	Estimated Duration (Years)	Estimated First Year Cost	Estimated Life Cycle Cost
TFP	\$5,000 (water discharge fees)	\$45,000 (trenching/ install piping, and purchase and install 4 pumps and equipment/ gw treatment system)	\$90,000 (three site visits/mo, rental diesel generator usage costs \$38k/yr, consumables)	NA	2 total (SPH removal only)	\$137,000	\$227,000
DPE	\$10,000 (air, water discharge permitting and fees, and building permit)	\$120,000 (convert groundwater wells for DPE, trenching/ install piping, purchase 4 pumps, and install DPE equipment/ gw treatment system)	\$155,000 (three site visits/mo, rental cat-ox, rental diesel generator usage costs \$44k/yr, consumables)	NA	1.5 total (SPH removal only)	\$285,000	\$440,000
TPE	\$10,000 (air, water discharge permitting and fees, and building permit)	\$110,000 (convert groundwater wells for TPE, trenching/ install piping, and TPE equipment/ gw treatment system)	\$160,000 (three site visits/mo, rental liquid ring/cat-ox, rental diesel generator usage costs \$44k/yr, consumables)	NA	1.5 total (SPH removal only)	\$280,000	\$440,000
Vac-Ops	\$2,000 (water discharge permit and fees)	\$20,000 (build stingers and install gw treatment system)	\$35,000 (weekly 8 hr events, subcontract vacuum truck)	NA	3 total (SPH removal only)	\$57,000	\$127,000

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RECOMMENDATIONS

Based on our detailed evaluation presented above, vacuum truck operations is the most cost-effective approach to address removal of SPH at the site. To summarize, we recommend this approach for the following reasons:

- Vac-Ops utilizes downwell stingers, the same favorable extraction process as TPE,
- No system operation and maintenance is needed,
- No on site power is required,
- No capital costs for equipment and minimal equipment installation costs are required,
- Vac-Ops is timely and can be implemented as needed depending upon seasonal variations in SPH levels,
- Vac-Ops has the flexibility to extract from various wells from different plumes based on varying extraction schedules,
- The use of downhole pumps is avoided thereby eliminating costly pump maintenance related to the "sticky" nature of the SPH,
- Vac-Ops requires minimal space allowing more space for truck parking and related City of Oakland activities,
- Remediation costs are substantially less than other alternatives through reduced disposal costs, elimination of a diesel generator and supplemental fuel, and reduced O&M efforts.

In the short term, we recommend that a Vac-Ops approach be implemented immediately to maximize SPH removal during the fall months. Extracted SPH and groundwater can either be immediately hauled away for disposal or temporarily stored in the 21,000-gallon storage tanks, and subsequently treated and batch discharged into a sanitary sewer or storm drain depending upon treatment facilities and discharge permit conditions. After evaluating the outcome of these short-term activities, further consideration can be given to installation of a permanent TPE next year, if needed. In an effort to decrease the duration of Vac-Ops activities and in turn reduce lifecycle costs, we recommend that additional VRA injections be considered with the SPH cleanup efforts, when SPH levels and removal rates have stabilized, so that VRA's affect on SPH mobilization can be quantified.

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ATTACHMENTS

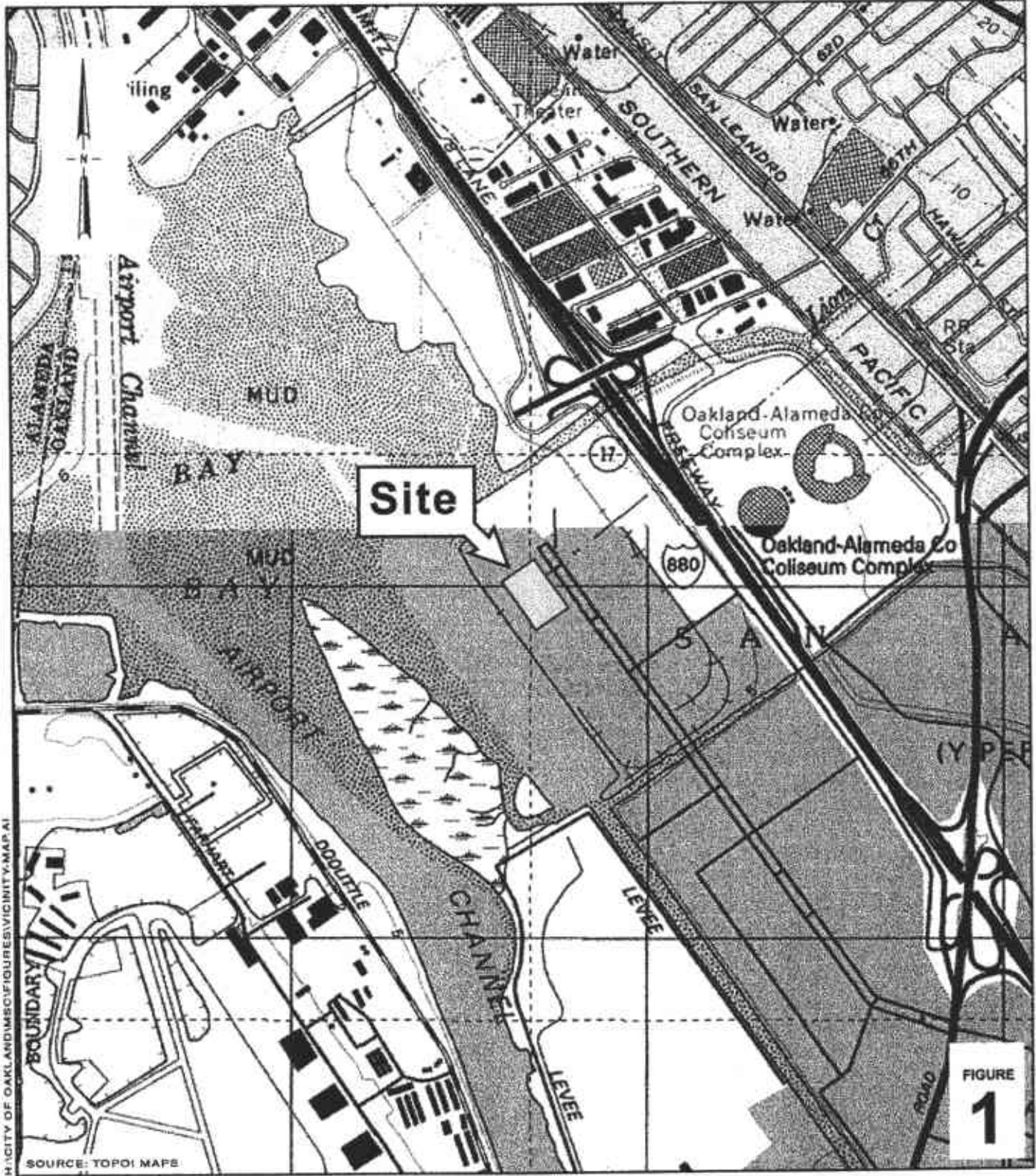
Figure 1 – Vicinity Map
Figure 2 – Site Map
Figure 3 – Plume C and Plume D Test Areas

Table 1 – Two Phase Extraction Test Summary
Table 2 – Laboratory Analytical Results
Table 3 – Groundwater Monitoring Data
Table 4 – Hydrocarbon Removal Data



Appendix A – TPE Pilot Test Vapor Analytical Data
Appendix B – Baker Tank Water Analytical Data

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H:\CITY OF OAKLAND\MS\FIGURE\VICINITY.MAP.A1

FIGURE 1

0 1/8 1/4 1/2 1
SCALE : 1" = 1/4 MILE

Municipal Service Center
7101 Edgewater Drive
Oakland, California



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Vicinity Map

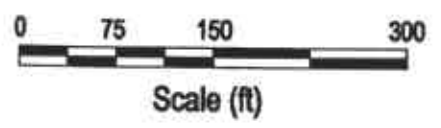
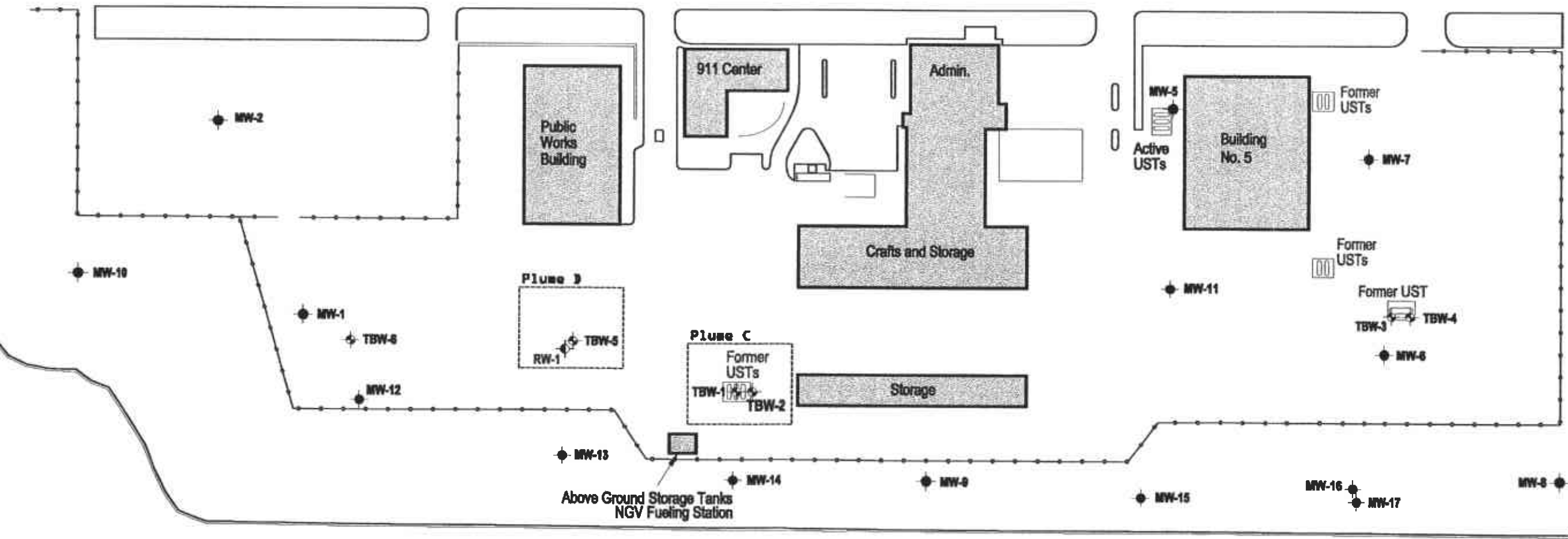
EXPLANATION	
MW-1	Monitoring well location
RW-1	Remediation well location
TBW-1	Tank Backfill Well
MW-3	Abandoned Well
—•—•—•—	Fence



DAMON SLOUGH

EDGEWATER DRIVE

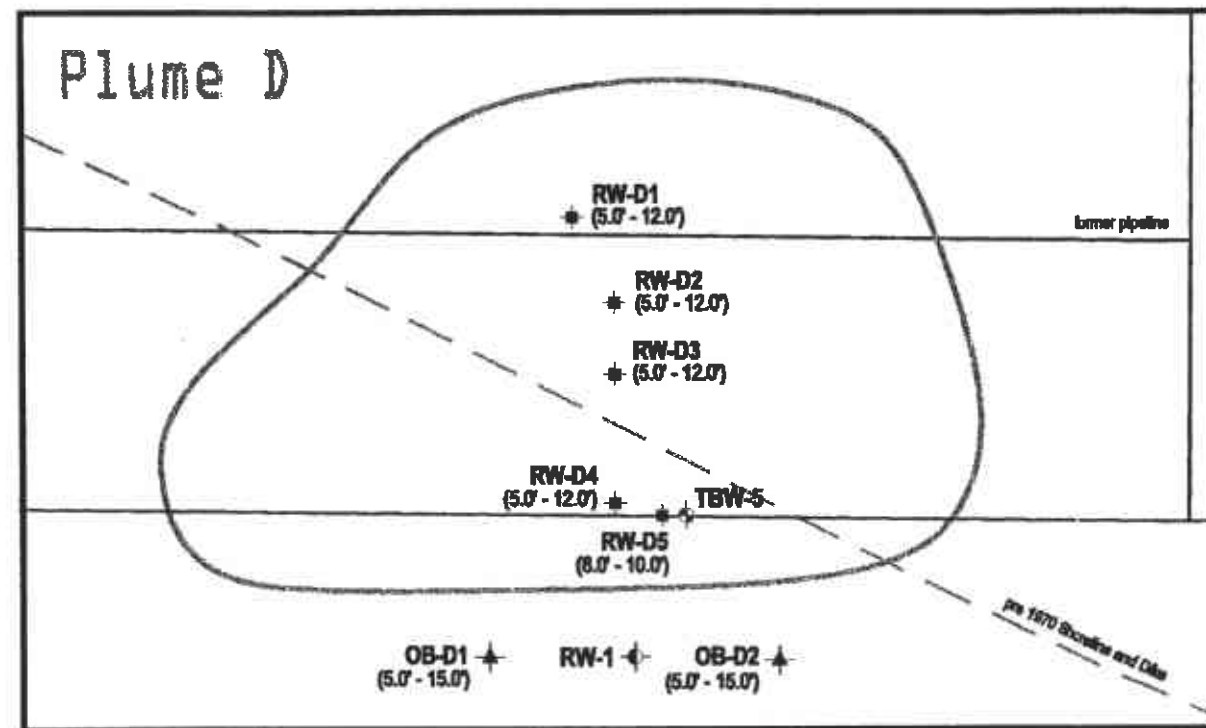
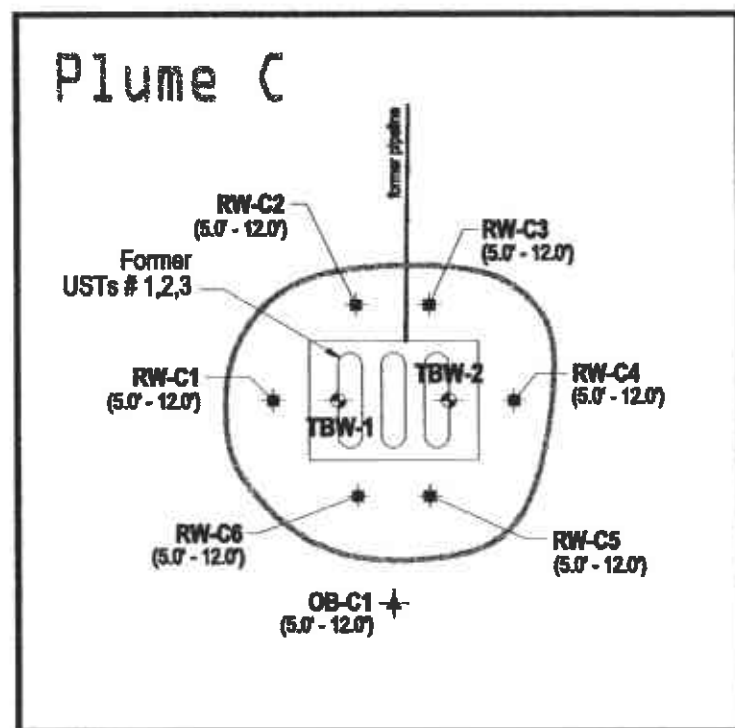
SAN LEANDRO BAY



Municipal Service Center
 7101 Edgewater Drive
 Oakland, California

FIGURE
2

CITY OF OAKLAND WATER PLANNING



EXPLANATION	
RW-A1 *	Proposed Test/Observation well location
OB-A1 †	Proposed Observation well location
(4.0' - 14.0')	Estimated screen interval
MW-1 ●	Monitoring well location
RW-1 †	Remediation well location
TBW-1 †	Tank Backfill Well
— — —	Fence
— — —	Former underground piping
— — —	Area of free product on groundwater

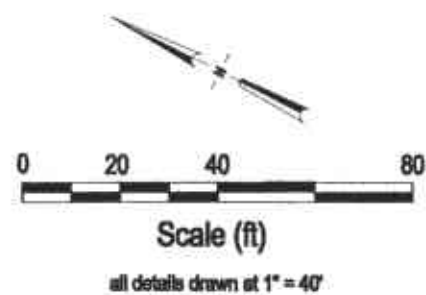


FIGURE
3

Table 1. Two Phase Extraction Test Summary

City Of Oakland, Municipal Services Center
7101 Edgewater Drive, Oakland, California

Date and Time	Well Flowrate (cfm)	System Flowrate (cfm)	Stinger Depth (feet bgs)	Applied Vacuum (in. of Hg)	Well HC	Well CO ₂	Well O ₂	Depth to SPH (feet bgs)	Depth to Water (feet bgs)	SPH Thickness (feet)	Vapor Removal Rate (lbs/day)	GW Extraction Rate (gpm)	Vacuum Readings										
					Conc. Lab	Conc. Horiba	Conc. Horiba						Conc. Horiba	RW-C1	RW-C2	RW-C3	RW-C4	RW-C5	RW-C6	RW-C7	OB-C1	TBW-1	
					(ppmv)	(ppmv)	(%)						(%)	(in. of water)	(in. of water)	(in. of water)	(in. of water)	(in. of water)	(in. of water)	(in. of water)	(in. of water)		
PLUME C TEST AREA																							
Well RW-C5 Test																							
6/7/02 7:45	-	-	-	-	-	4700*	0.84*	19.36*	6.96*	6.28*	0.68*	-	-	-	-	-	-	-	-	-			
6/10/02 8:30	-	-	-	-	-	-	-	-	6.16	7.80	1.64	-	-	-	-	-	-	-	-	-			
6/10/02 12:00	-26	80	7.5	12	-	-	-	-	-	-	-	-	-	0.01	-	0.41	0	-	0	0	0	0.02	
6/10/02 13:10	-31	95	8.0	12.0	-	-	-	-	-	-	-	-	-	0.01	-	>1.0	0	-	0	0	0	0.03	
6/10/02 15:10	-33	102	8.0	18	-	-	-	-	-	-	-	3.1	-	0.015	-	2.35	+	-	+	+	+	+	0.05
system off overnight-repairs needed																							
6/11/02 13:20	-	-	-	-	-	-	-	-	8.82	6.84	0.02	-	-	0	-	0	0	-	0	0	0	0	0
6/11/02 13:50	-32	97	8.0	18	-	1,140	1.32	20.60	-	-	-	-	-	0.01	-	0.40	+	-	+	+	+	+	0
6/11/02 15:10	-18	54	9.0	21	1,300	3,550	1.60	19.71	-	-	-	2.2	-	0.01	-	1.75	+	-	+	+	+	+	0.10
Well RW-C6 Test																							
6/7/02 7:45	-	-	-	-	-	33,000*	17.22*	18.00*	5.83*	6.02*	0.19*	-	-	-	-	-	-	-	-	-	-	-	-
6/10/02 8:30	-	-	-	-	-	-	-	-	5.75	6.49	0.74	-	-	-	-	-	-	-	-	-	-	-	-
6/11/02 15:35	-23	71	8.5	18	-	7,500	0.62	20.28	6.53	7.05	0.52	22.0	-	0.005	-	2.80	+	0.08	-	+	+	0	0
6/11/02 16:20	-26	80	12.0	21	-	-	-	-	-	-	-	-	-	0	-	2.85	0.01	0.11	-	+	+	0	0
6/12/02 8:50	-16	49	12.0	21	-	-	-	-	-	-	-	-	8.0	-	-	-	-	-	-	-	-	-	-
6/12/02 10:00	-16	48	11.0	21	-	-	-	-	-	-	-	-	-	0.01	-	0.23	0	0.90	-	0	0	0.05	0
6/12/02 11:00	-15	47	11.0	21	-	-	-	-	-	-	-	-	-	0	-	0.24	0.01	0.90	-	0	0	0.05	0
6/12/02 12:35	-7	20	11.0	25	-	-	-	-	-	-	-	-	-	0	-	0.18	0	0	-	0	0	0	0
6/12/02 13:00	-7	20	11.0	25	-	21,000	3.60	15.55	7.90	8.05	0.15	7.7	-	0	-	0.21	0.01	0.01	-	0	0	0.05	0
Well OB-C1 Test																							
6/12/02 14:30	-	-	-	-	-	41,000*	8.66*	5.54*	6.43*	6.71*	0.29*	-	-	-	-	-	-	-	-	-	-	-	-
6/12/02 18:30	-22	68	9	20	-	-	-	-	7.22	7.75	0.53	-	-	0	-	0	0	0	0	0	0	-	0
6/12/02 20:30	-19	58	7.75	21	-	-	-	-	-	-	-	-	-	0	-	0	0	0	0	0	0	-	0
6/13/02 6:30	-18	55	7.75	21	-	-	-	-	-	9.86	-	-	2.3	0	-	0	0	0	0	0	0.05	-	0
6/13/02 8:49	-	-	-	-	11,000	-950	6.01	10.51	-	-	-	18.9	-	0	-	0	0	0	0	0	0.05	-	0
Well RW-C2 Test																							
6/13/02 7:45	-19	58	8.5	21	-	2760*	?	20.44*	-	6.13*	-	-	-	0	-	0	0	0	0	0	0	0.05	0
6/13/02 8:10	-19	59	8.5	21	-	-	-	-	8.09	8.14	0.05	-	-	0	-	0.09	0	0	0	0	0	0.05	0
6/13/02 10:00	-19	57	9.0	21	-	-	-	-	-	-	-	-	-	0	-	0.09	0	-	0.04	0	-	-	0
6/13/02 14:10	-14	44	11.0	22	-	-	-	-	-	-	-	-	-	0	-	0.1	0.04	-	0.02	0	-	-	0.02
6/13/02 15:05	-14	44	11.0	22	-	-	-	-	-	-	-	-	-	0	-	0.07	0.04	-	0.02	0.02	-	-	0.02
6/13/02 19:30	-	-	-	-	-	-	-	-	8.31	8.32	0.01	-	2.4	-	-	-	-	-	-	-	-	-	-
Well RW-C3 Test																							
6/13/02 15:20	-14	44	11.0	22	-	35,000*	?	9.26*	-	6.25*	-	-	-	0	0.04	-	0.04	-	0.02	0.02	-	-	0
6/13/02 15:40	-14	44	11.0	22	-	-	-	-	-	-	-	-	-	0	0.04	-	0.04	-	0.02	0.02	-	-	0
6/13/02 19:30	-20	61	11.0	21	12,000	10,000	0.10	14.6	-	-	-	22.9	2.3	0	0.04	-	0.04	0	0	0.01	-	-	0
6/13/02 20:45	-	-	9.0	21	-	-	-	-	-	-	-	-	-	0	0	-	0.03	-	0.06	0.02	-	-	0.02
system left running overnight on RW-C5																							
6/14/02 9:45	-	-	9.0	21	-	-	-	-	-	-	-	-	-	0	0.01	-	0.055	-	0.06	0.05	-	-	0.04
6/14/02 10:15	36	110	9.0	21	-	7,780	0.80	20.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
switch btw wells with SPH, shut down TPE test on Fri. on 6/14/02 @ 4 PM																							

Table 1. Two Phase Extraction Test Summary

City Of Oakland, Municipal Services Center
7101 Edgewater Drive, Oakland, California

Date and Time	Well Flowrate	System Flowrate	Stinger Depth	Applied Vacuum	Well HC Conc.	Well HC Conc.	Well CO ₂ Conc.	Well O ₂ Conc.	Depth to SPH	Depth to Water	SPH Thickness	HC Removal Rate	GW Extraction Rate	RW-D1	RW-D2	RW-D3	RW-D4	RW-D5	OB-D1	TBW-5	RW-1
	(cfm)	(cfm)	(feet bgs)	(in. of Hg)	Lab (ppmv)	Horiba (ppmv)	Horiba (%)	Horiba (%)	(feet bgs)	(feet bgs)	(feet)	(lbs/day)	(gpm)	(in. of water)	(in. of water)	(in. of water)	(in. of water)	(in. of water)	(in. of water)	(in. of water)	(in. of water)
PLUME D TEST AREA																					
Well RW-D2 Test																					
6/18/02 12:00	-	>300	6.0	7.5	-	55,000 ^a	? ^a	6.00 ^a	6.06 ^a	7.76 ^a	1.70 ^a	-	-	+	-	+	0.91	+	0.41	0	0.95
6/18/02 12:15	5	205	6.0	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6/18/02 12:30	26	126	6.0	20	-	-	-	-	-	-	-	-	1.0	+	-	+	+	+	+	0	0.36
6/18/02 13:10	32	124	9.0	20	40,000	32,500	?	16.54	-	-	-	135.6	3.3	0.52	-	+	+	+	+	0	0.30
6/19/02 9:00	22	125	9.0	20	13,000	34,000	?	16.34	-	-	-	30.3	4.1	0.20	-	+	+	+	+	0.05	0
6/20/02 10:50	-	-	-	-	-	-	-	-	8.60	8.90	0.30	-	-	-	-	-	-	-	-	-	-
Well RW-D3 Test																					
6/19/02 9:50	-	>300	6.0	10	-	41,020 ^a	15.16 ^a	4.55 ^a	5.88 ^a	7.51 ^a	1.63 ^a	-	-	-	-	-	-	-	-	-	-
6/19/02 10:20	-	>300	6.0	10	-	-	-	-	-	-	-	-	0.7	0.36	+	-	+	+	0.03	0	0.04
6/19/02 10:27	-5	190	6.0	15	36,000	37,000	?	11.74	-	-	-	28.7	-	-	-	-	-	-	-	-	-
6/19/02 10:57	-	196	6.0	15	-	-	-	-	-	-	-	-	1.0	0.38	+	-	+	+	0	0	0.03
6/19/02 11:43	19	108	9.0	20	-	-	-	-	-	-	-	-	-	+	1.75	-	+	+	0	0	0.02
6/19/02 12:15	23	108	9.0	20	-	-	-	-	-	-	-	-	3.2	+	2.45	-	+	+	0.05	0	0.02
6/20/02 9:30	23	108	9.0	21	-	-	-	-	-	-	-	-	2.6	+	3.60	-	+	+	0.02	0	0.02
6/20/02 11:15	23	108	9.0	21	1,700	2,140	0.26	20.72	-	-	-	3.7	-	-	-	-	-	-	-	-	-
6/20/02 14:30	-	-	-	-	-	-	-	-	8.00	8.25	0.25	-	-	-	-	-	-	-	-	-	-
Well RW-D4 Test																					
6/20/02 12:05	-	-	7.0	10	-	46,280 ^a	12.14 ^a	6.72 ^a	6.78 ^a	6.91 ^a	0.13 ^a	-	1.0	0	0	0.3	-	+	0.02	0	0
6/20/02 12:55	-	-	7.0	15	-	-	-	-	-	-	-	-	2.0	0	0	0.3	-	+	0.02	0	0
6/20/02 13:35	-20	-100	7.0	20	570	-	-	-	-	-	-	1.2	-	0	0	0	-	0	0.02	0	0
6/20/02 14:30	-	-	-	-	-	-	-	-	6.90	7.25	0.35	-	-	-	-	-	-	-	-	-	-
Well RW-D5 Test																					
6/20/02 14:30	-	-	-	-	-	5,950 ^a	3.84 ^a	18.94 ^a	-	6.56 ^a	-	-	-	-	-	-	-	-	-	-	-
6/20/02 15:20	-20	-95	11.0	23	-	-	-	-	6.70	6.77	0.07	-	-	0	0	0	+	0	0.02	0.02	0
6/21/02 9:00	17.5	92	11.0	21	-	-	-	-	-	-	-	-	2.4	+	0.40	+	0.43	-	0.05	0.01	0.15
6/21/02 9:50	-	-	-	-	3,100	5,780	1.40	19.94	-	-	-	5.2	-	-	-	-	-	-	-	-	-
6/21/02 12:45	-	-	-	-	-	-	-	-	7.63	7.65	0.02	-	3.4	-	-	-	-	-	-	-	-
Well TBW-5 Test																					
6/21/02 10:00	-	-	9.0	21	-	40,000 ^a	15.04 ^a	0.82 ^a	6.70 ^a	6.93 ^a	0.23 ^a	-	-	-	-	-	-	-	-	-	-
6/21/02 12:45	-15	-81	9.0	21	-	-	-	-	7.83	7.85	0.02	57.2	3.4	-	-	-	-	-	-	-	-
system left running overnight on RW-D2, shut down TPE test on Sat. 6/22/02 at 3:15PM																					
a = background parameter measured prior to TPE testing on June 3 (Plume C) and June 17, 2002 (Plume D) - = estimated value + = positive pressure measurement ? = meter readings negative																					

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Table 2. Laboratory Analytical Results

City of Oakland, Municipal Service Center
7101 Edgewater Drive, Oakland, California

Test Area	Extraction Well	Date	Time	Media	TPHd (ppmv)	TPHg (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Xylenes (ppmv)	MTBE (ppmv)
					Analytical Method:	8020	8020	8020	8020	8020	8015C
Plume C											
	MW-C5	06/11/02	15:00	air	--	1,300	49	8.4	2.5	5.2	<14
	OB-C1	06/13/02	9:00	air	--	11,000	170	35	12	15	<50
	RW-C3	06/13/02	20:15	air	--	12,000	120	120	20	120	<50
Plume D											
	RW-D2	06/18/02	12:55	air	--	40,000	1,000	800	49	180	430
	RW-D2	06/19/02	9:25	air	--	13,000	340	216	9.6	40	<70
	RW-D3	06/19/02	10:40	air	--	36,000	870	610	32	120	350
	RW-D3	06/20/02	11:15	air	--	1,700	33	30	4.8	21	na
	RW-D4	06/20/02	13:30	air	--	570	9.8	5.5	3.2	13	na
	RW-D5	06/21/02	9:50	air	--	3,100	200	31	10	39	<60

not confirmed

Sample ID	Date	Time		TPHd (ppb)	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes (ppb)	MTBE (ppb)
				Analytical Method:	8015	8020	8020	8020	8020	8015
TANK (Plume C)	06/17/02	15:00	water	3,300	7,700	390	520	38	1,200	<50
TANK (Plume D)	07/11/02	7:00	water	10,000	48,000	1,000	3,700	930	7,000	<250

TPHd = Total Petroleum Hydrocarbons as diesel
 TPHg = Total Petroleum Hydrocarbons as gasoline
 MTBE = Methyl tertiary butyl ether
 ppmv = parts per million by volume
 ppb = parts per billion
 <n = less than method reporting limit
 na = not analyzed

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Table 3. Groundwater Monitoring Well Data
 City of Oakland, Municipal Service Center
 7101 Edgewater Drive, Oakland, California

Test Area	Extraction Well	Date	Time	Groundwater	SPH	SPH	Comments
				Depth feet	Depth feet	Thickness feet	
Plume C							
	RW-C1	06/03/02	9:25	6.31	na	0.00	prior to testing
	RW-C1	06/17/02	6:00	8.05	na	0.00	3 days after testing at high tide
	RW-C1	06/17/02	13:10	8.09	na	0.00	3 days after testing at low tide
	RW-C2	06/03/02	8:20	6.13	na	0.00	prior to testing
	RW-C2	06/17/02	6:05	8.20	8.13	0.07	3 days after testing at high tide
	RW-C2	06/17/02	13:15	8.25	8.19	0.06	3 days after testing at low tide
	RW-C3	06/03/02	8:25	6.25	na	0.00	prior to testing
	RW-C3	06/17/02	6:10	8.22	8.20	0.02	3 days after testing at high tide
	RW-C3	06/17/02	13:20	8.21	8.15	0.06	3 days after testing at low tide
	RW-C4	06/03/02	8:30	6.90	na	0.00	prior to testing
	RW-C4	06/17/02	6:15	8.64	na	0.00	3 days after testing at high tide
	RW-C4	06/17/02	13:25	8.67	na	0.00	3 days after testing at low tide
	RW-C5	05/31/02	10:00	6.34	6.32	0.02	prior to VRA injection
	RW-C5	06/03/02	8:48	6.96	6.28	0.68	after VRA injection and prior to testing
	RW-C5	06/07/02	8:04	7.80	6.16	1.64	after VRA injection and prior to testing
	RW-C5	06/10/02	8:30	7.76	6.20	1.56	after VRA injection and prior to testing
	RW-C5	06/17/02	6:20	8.51	8.47	0.04	3 days after testing at high tide
	RW-C5	06/17/02	13:30	8.59	8.43	0.16	3 days after testing at low tide
	RW-C6	06/03/02	8:50	6.02	5.83	0.19	prior to testing
	RW-C6	06/07/02	8:08	6.49	5.75	0.74	prior to testing (affected by VRA?)
	RW-C6	06/10/02	8:50	6.75	5.71	1.04	prior to testing (affected by VRA?)
	RW-C6	06/17/02	6:25	7.90	7.83	0.07	3 days after testing at high tide
	RW-C6	06/17/02	--	--	--	--	
	RW-C7	06/03/02	8:38	6.41	na	0.00	prior to testing
	RW-C7	06/17/02	6:30	8.58	8.55	0.03	3 days after testing at high tide
	RW-C7	06/17/02	13:35	8.84	8.75	0.09	3 days after testing at low tide
	OB-C1	05/31/02	10:00	6.56	6.34	0.22	prior to testing
	OB-C1	06/03/02	8:53	6.71	6.43	0.28	prior to testing (affected by VRA/other wells?)
	OB-C1	06/07/02	8:12	6.60	6.43	0.17	prior to testing (affected by VRA/other wells?)
	OB-C1	06/12/02	14:30	7.75	7.22	0.53	prior to testing (affected by VRA/other wells?)
	OB-C1	06/17/02	--	--	--	--	3 days after testing at high tide
	OB-C1	06/17/02	13:50	8.13	8.02	0.11	3 days after testing at low tide
	TBW-1	06/03/02	8:40	6.33	na	0.00	prior to testing
	TBW-1	06/17/02	6:35	8.60	8.49	0.11	3 days after testing at high tide
	TBW-1	06/17/02	13:40	8.62	8.42	0.20	3 days after testing at low tide
	TBW-2	06/03/02	8:32	6.61	na	0.00	prior to testing
	TBW-2	06/17/02	6:40	8.60	na	0.00	3 days after testing at high tide
	TBW-2	06/17/02	13:45	8.64	na	0.00	3 days after testing at low tide
	Ave. Tidal Change in DTW:			0.06			

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Table 3. Groundwater Monitoring Well Data
 City of Oakland, Municipal Service Center
 7101 Edgewater Drive, Oakland, California

Test Area	Extraction Well	Date	Time	Groundwater Depth feet	SPH Depth feet	SPH Thickness feet	Comments
Plume D							
	RW-1	06/18/02	8:15	6.31	na	0.00	prior to testing
	RW-1	06/24/02	~14:15	6.92	na	0.00	2 days after testing
	RW-D1	06/18/02	10:15	6.26	na	0.00	prior to testing
	RW-D1	06/24/02	~14:15	7.63	na	0.00	2 days after testing
	RW-D2	06/18/02	10:00	7.76	6.06	1.70	prior to testing
	RW-D2	06/24/02	~14:15	8.15	7.67	0.48	2 days after testing
	RW-D3	06/18/02	9:45	7.51	5.88	1.63	prior to testing
	RW-D3	06/24/02	~14:15	7.54	7.49	0.05	2 days after testing
	RW-D4	06/18/02	9:30	6.91	6.78	0.13	prior to testing
	RW-D4	06/24/02	~14:15	7.57	7.47	0.10	2 days after testing
	RW-D5	06/18/02	9:00	6.56	na	0.00	prior to testing
	RW-D5	06/24/02	~14:15	7.42	na	0.00	2 days after testing
	OB-D1	06/18/02	8:45	6.06	na	0.00	prior to testing
	OB-D1	06/24/02	~14:15	6.60	na	0.00	2 days after testing
	OB-D2	06/18/02	8:15	5.04	na	0.00	prior to testing
	OB-D2	06/24/02	~14:15	6.93	na	0.00	2 days after testing
	TBW-5	06/18/02	9:15	6.93	6.70	0.23	prior to testing
	TBW-5	06/24/02	~14:15	7.62	7.55	0.07	2 days after testing

SPH = separate phase hydrocarbons
 na = data not applicable
 - = data not collected

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Table 4. Hydrocarbons Removal Data
City of Oakland, Municipal Service Center
7101 Edgewater Drive, Oakland, California

Test Area	Vapor-Phase HC (gallons)	Dissolved-Phase HC (gallons)	Separate-Phase HC (gallons)	Total Volume (gallons)
Plume C	297	0.23	200	497
Plume D	1,617	1.2	143	1,761
Total	1,914	1.4	343	2,258

HC = total petroleum hydrocarbons as gasoline and diesel

C A M B R I A



APPENDIX A

TPE Pilot Test Vapor Analytical Data



McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
<http://www.mcccampbell.com> E-mail: main@mcccampbell.com

Cambria Env. Technology 6262 Hollis St. Emeryville, CA 94608	Client Project ID: 153-1653; OAK-MS	Date Sampled: 06/11/02
		Date Received: 06/12/02
	Client Contact: Ron Scheele	Date Reported: 06/18/02
	Client P.O.:	Date Completed: 06/18/02

June 18, 2002

Dear Ron:

Enclosed are:

- 1). the results of 1 samples from your 153-1653; OAK-MS 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. McC Campbell 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,

Angela Rydelius, Lab Manager



McCAMPBELL ANALYTICAL INC.

110 2nd 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 6262 Hollis St. Emeryville, CA 94608	Client Project ID: 153-1653; OAK- MSC	Date Sampled: 06/11/02
	Client Contact: Ron Scheele	Date Received: 06/12/02
	Client P.O:	Date Extracted: 06/13/02
		Date Analyzed: 06/13/02

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
0206197 -001A	MW-C5	Air	1300,c,a	ND<14	49	8.4	2.5	5.2	---*

* ppm (mg/L) to ppmv (uL/L) conversion for TPH(g) assumes the molecular weight of gasoline to be equal to that of hexane.

Reporting Limit unless otherwise stated; ND means not detected above the reporting limit	Air	10 uL/L	1.5	0.15	0.15	0.15	0.15	0.25	
	S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	0.005	

* water and air samples are reported in uL/L(ppmv), 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.



McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
 Telephone : 925-798-1620 Fax : 925-798-1622
 http://www.mccampbell.com E-mail: main@mccampbell.com

QC SUMMARY REPORT FOR SW8021B/8015Cm

BatchID: 2416

Matrix: A

WorkOrder: 0206197

EPA Method: SW8021B/8015Cm		Extraction: SW5030B		Ext. Date: 6/12/02			Spiked Sample ID: N/A			
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(gas)	N/A	60	N/A	N/A	N/A	112	105	6.0	80	120
MTBE	N/A	10	N/A	N/A	N/A	84.6	86.8	2.7	80	120
Benzene	N/A	10	N/A	N/A	N/A	95.2	88.5	7.3	80	120
Toluene	N/A	10	N/A	N/A	N/A	98.5	92.3	6.6	80	120
Ethylbenzene	N/A	10	N/A	N/A	N/A	97.9	93.1	5.0	80	120
Xylenes	N/A	30	N/A	N/A	N/A	99	94	5.2	80	120
%SS	N/A	10	N/A	N/A	N/A	102	101	0.93	80	120

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
 NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike, or analyte concentration in sample exceeds spike amount.

% Recovery = $100 * (MS - Sample) / (Amount\ Spiked)$; RPD = $100 * (MS - MSD) / (MS + MSD) * 2$.

* MS and / or MSD spike recoveries may not be near 100% or their RPDs near 0% if: a) the sample is inhomogeneous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

McC Campbell Analytical Inc.

110 Second Avenue South, #D7
Pacheco, CA 94553-5560
(925) 798-1620

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0206197

Client:

Cambria Env. Technology
6262 Hollis St.
Emeryville, CA 94608

TEL: (510) 450-1983
FAX: (510) 450-8295
ProjectNo: 153-1653; OAK-
PO:

12-Jun-02

Sample ID	ClientSampID	Matrix	Collection Date	Bottle	Requested Tests
0206197-001	MW-C5	Air	6/11/02 3:00:00 PM	8021B/8015 A	

Comments:

Date/Time

Date/Time

Relinquished by: _____

Received by: _____

Relinquished by: _____

Received by: _____

Relinquished by: _____

Received by: _____

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
<http://www.mcccampbell.com> E-mail: main@mcccampbell.com

Cambria Env. Technology 6262 Hollis St. Emeryville, CA 94608	Client Project ID: #153-1653-031; MSC- Oakland	Date Sampled: 06/13/02
		Date Received: 06/14/02
	Client Contact: Ron Scheele	Date Reported: 06/20/02
	Client P.O.:	Date Completed: 06/20/02

June 20, 2002

Dear Ron:

Enclosed are:

- 1). the results of 2 samples from your #153-1653-031; MSC-Oakland 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. McC Campbell 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,



Angela Rydelius, Lab Manager

QC SUMMARY REPORT FOR SW8021B/8015Cm

BatchID: 2461

Matrix: A

WorkOrder: 0206244

EPA Method: SW8021B/8015Cm		Extraction: SW5030B		Ext. Date: 6/14/02		Spiked Sample ID: 0206240-020A				
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	uL/L	uL/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(gas)	ND	60	107	99.5	7.06	94.5	89.8	5.0	80	120
MTBE	ND	10	113	105	7.43	94	103	8.8	80	120
Benzene	ND	10	116	112	3.63	115	116	0.90	80	120
Toluene	ND	10	118	113	4.71	117	118	1.2	80	120
Ethylbenzene	ND	10	117	114	2.78	118	118	0.070	80	120
Xylenes	ND	30	117	113	2.90	120	120	0	80	120
%SS:	105	10	105	101	3.85	108	106	2.1	80	120

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
 NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike, or analyte concentration in sample exceeds spike amount.

% Recovery = $100 * (MS - Sample) / (Amount Spiked)$; RPD = $100 * (MS - MSD) / (MS + MSD) * 2$.

* MS and / or MSD spike recoveries may not be near 100% or their RPDs near 0% if: a) the sample is inhomogeneous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

ETC

0206244 ZC044.doc

McCAMPBELL ANALYTICAL INC.

110 2ND AVENUE SOUTH, #107
PACIFICCO, CA 94533

Telephone: (925) 798-1620

Fax: (925) 798-1622

Report To: **RON SCHEELE**

Bill To: **SAME**

Company: Cambria Environmental Technology

6262 Hollis Street

Emeryville, CA 94608

Tele: (510) 450-1983

Fax: (510) 450-8295

Project #: 153-163-031

Project Name: **MSC - Oakland**

Project Location: **MSC - Oakland**

Sampler Signature: **Ron Schul**

CHAIN OF CUSTODY RECORD
TURN AROUND TIME

RUSH 24 HOUR 48 HOUR 5 DAY

Analysis Request

Other

Comments

SAMPLE ID	LOCATION	SAMPLING		# Containers	Type Containers	MATRIX					METHOD PRESERVED								
		Date	Time			Water	Soil	Air	Sludge	Other	Ice	HCl	HNO ₃	Other					
OB-C1	Oakland	6/13/02	7:20 AM	1	BAK														
RW-C3	"	6/13/02	8:15 PM	1	BAK			X											

DTEX & TPH as Gas (602/6020 + 8015) MTBE	
TPH as Diesel (8015)	
Total Petroleum Oil & Grease (5520 E&F/R&F)	
Total Petroleum Hydrocarbons (418, I)	
EPA 601 / 8010	
BTEX ONLY (EPA 602 / 8020)	
EPA 608 / 8080	
EPA 608 / 8080 PCB's ONLY	
EPA 624 / 8240 / 8260	
EPA 625 / 8270	
PAH's / PNA's by EPA 625 / 8270 / 8310	
CAM-17 Metals	
LUFT 5 Metals	
Lead (7240/7421/239.2/6010)	
RCI	

PRESERVATION APPROPRIATE
 CONTAINERS
 HEAD SPACE ABSENT
 NO ASBESTOS METALS SLOTS

Relinquished By: Ron Schul	Date: 6/13/02	Time: 9:00 PM	Received By: SECURE PLATON
Relinquished By: [Signature]	Date: 6/14/02	Time: 11 AM	Received By: [Signature]
Relinquished By: [Signature]	Date: 6/14/02	Time: 11:50	Received By: [Signature]

Remarks: report in ugl and ppmv

L.S.V

②

McC Campbell Analytical Inc.

110 Second Avenue South, #D7
 Pacheco, CA 94553-5560
 (925) 798-1620

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0206244

Client:

Cambria Env. Technology
 6262 Hollis St.
 Emeryville, CA 94608

TEL: (510) 450-1983
 FAX: (510) 450-8295
 ProjectNo: #153-1653-031;
 PO:

14-Jun-02

Sample ID	ClientSampleID	Matrix	Collection Date	Bottle	Requested Tests						
					8021B/8015						
0206244-001	OB-C1	Air	6/13/02 9:00:00 AM		A						
0206244-002	RW-C3	Air	6/13/02 8:15:00 AM		A						

Comments:

	Date/Time		Date/Time
Relinquished by: _____	_____	Received by: _____	_____
Relinquished by: _____	_____	Received by: _____	_____
Relinquished by: _____	_____	Received by: _____	_____

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

McC Campbell Analytical Inc.

110 2nd 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 Env. Technology 6262 Hollis St. Emeryville, CA 94608	Client Project ID: 153-1653-031; MSC- Oakland	Date Sampled: 06/18/02
		Date Received: 06/19/02
	Client Contact: Ron Scheele	Date Reported: 06/25/02
	Client P.O.:	Date Completed: 06/25/02

June 25, 2002

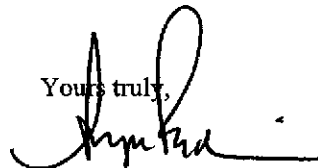
Dear Ron:

Enclosed are:

- 1). the results of 1 samples from your 153-1653-031; MSC-Oakland 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. McC Campbell 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,



Angela Rydelius, Lab Manager



McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
 Telephone : 925-798-1620 Fax : 925-798-1622
 http://www.mcccampbell.com E-mail: main@mcccampbell.com

QC SUMMARY REPORT FOR SW8021B/8015Cm

BatchID: 2522

Matrix: A

WorkOrder: 0206309

EPA Method: SW8021B/8015Cm		Extraction: SW5030B		Ext. Date: 6/19/02		Spiked Sample ID: N/A				
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	uL/L	uL/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(gas)	N/A	60	N/A	N/A	N/A	106	119	11	80	120
MTBE	N/A	10	N/A	N/A	N/A	82.5	81.5	1.2	80	120
Benzene	N/A	10	N/A	N/A	N/A	91.4	89.4	2.2	80	120
Toluene	N/A	10	N/A	N/A	N/A	94.8	93.4	1.5	80	120
Ethylbenzene	N/A	10	N/A	N/A	N/A	96.1	95.3	0.86	80	120
Xylenes	N/A	30	N/A	N/A	N/A	98.7	95	3.8	80	120
%SS:	N/A	10	N/A	N/A	N/A	103	102	1.2	80	120

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
 NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike, or analyte concentration in sample exceeds spike amount.

% Recovery = $100 * (MS - Sample) / (Amount\ Spiked)$; RPD = $100 * (MS - MSD) / (MS + MSD) * 2$.

* MS and / or MSD spike recoveries may not be near 100% or their RPDs near 0% if: a) the sample is inhomogeneous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

McC Campbell Analytical Inc.

110 Second Avenue South, #D7
Pacheco, CA 94553-5560
(925) 798-1620

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

WorkOrder: 0206309

Client:

Cambria Env. Technology
6262 Hollis St.
Emeryville, CA 94608

TEL: (510) 450-1983
FAX: (510) 450-8295
ProjectNo: 153-1653-031; M
PO:

19-Jun-02

Sample ID	ClientSampID	Matrix	Collection Date	Bottle	Requested Tests
0206309-001	RW-D2	Air	6/18/02 12:55:00 PM	8021B/8015 A	

Comments:

Date/Time

Date/Time

Relinquished by:

Received by:

Relinquished by:

Received by:

Relinquished by:

Received by:

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
<http://www.mcccampbell.com> E-mail: main@mcccampbell.com

Cambria Env. Technology 6262 Hollis St. Emeryville, CA 94608	Client Project ID: 153-1653-31; Oak-MS	Date Sampled: 06/19/02
		Date Received: 06/19/02
	Client Contact: Ron Scheele	Date Reported: 06/25/02
	Client P.O.:	Date Completed: 06/25/02

June 25, 2002

Dear Ron:

Enclosed are:

- 1). the results of 2 samples from your 153-1653-31; Oak-MS 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. McC Campbell 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,



Angela Rydelius, Lab Manager



McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mcccampbell.com E-mail: main@mcccampbell.com

QC SUMMARY REPORT FOR SW8021B/8015Cm

BatchID: 2522

Matrix: A

WorkOrder: 0206310

EPA Method: SW8021B/8015Cm Extraction: SW5030B Ext. Date: 6/19/02 Spiked Sample ID: N/A										
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	uL/L	uL/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(gas)	N/A	60	N/A	N/A	N/A	106	119	11	80	120
MTBE	N/A	10	N/A	N/A	N/A	82.5	81.5	1.2	80	120
Benzene	N/A	10	N/A	N/A	N/A	91.4	89.4	2.2	80	120
Toluene	N/A	10	N/A	N/A	N/A	94.8	93.4	1.5	80	120
Ethylbenzene	N/A	10	N/A	N/A	N/A	96.1	95.3	0.86	80	120
Xylenes	N/A	30	N/A	N/A	N/A	98.7	95	3.8	80	120
%SS:	N/A	10	N/A	N/A	N/A	103	102	1.2	80	120

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike, or analyte concentration in sample exceeds spike amount.

% Recovery = $100 * (MS - Sample) / (Amount Spiked)$; RPD = $100 * (MS - MSD) / (MS + MSD) * 2$.

* MS and / or MSD spike recoveries may not be near 100% or their RPDs near 0% if: a) the sample is inhomogeneous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

PR

0200310-2646.doc

McCAMPBELL ANALYTICAL INC.

110 2nd AVENUE SOUTH, #107
PACHICO, CA 94553

Telephone: (925) 798-1620 Fax: (925) 798-1622

CHAIN OF CUSTODY RECORD

TURN AROUND TIME RUSH 24 HOUR 48 HOUR 5 DAY

Report To: Ron Scheele Bill To: SAME
 Company: Cambria Environmental Technology
 6262 Hollis Street
 Emeryville, CA 94608
 Tele: (510) 450-1983 Fax: (510) 450-8295
 Project #: 153-1653-31 Project Name: OAK-MSL
 Project Location: 7101 Edgewater, OAKLAND
 Sampler Signature: *Tammy Full*

Analysis Request Other Comments

SAMPLE ID	LOCATION	SAMPLING		# Containers	Type Containers	MATRIX					METHOD PRESERVED							
		Date	Time			Water	Soil	Air	Sludge	Other	Ice	HCl	HNO ₃	Other				
RW-D2	OAK-MSL	6/19/02	9:25a	1	Bag			X										
RW-D3	OAK-MSL	6/19/02	10:40a	1	Bag			X										

RTX & TPH as Gas (602/8050, 8013X, MTBE)	
TPH as Diesel (8015)	
Total Petroleum Oil & Grease (5520 E&F/R&F)	
Total Petroleum Hydrocarbons (418.1)	
EPA 801 / 8010	
RTX ONLY (EPA 602 / 8030)	
EPA 808 / 8080	
EPA 608 / 8080: PCH's ONLY	
EPA 624 / 8240 / 8260	
EPA 625 / 8270	
PAH's / PNA's by EPA 625 / 8270 / 8310	
CAM-17 Metals	
LUFT 5 Metals	
Lead (7240/7421/239.2/6010)	
RCI	

PRESERVATION APPROPRIATE CONTAINERS
 VOCS / SEMI-METALS / OTHER
 HEAD SPACE ABSENT

Relinquished By: *Tammy Full* Date: 6/19/02 Time: 12pm Received By: SECURED LOCATION
 Relinquished By: *Ron Scheele* Date: 6/19/02 Time: 2:20pm Received By: *Nancy*
 Relinquished By: *Nancy* Date: 6/19/02 Time: 3:50pm Received By: *Wm Vance*

Remarks: Report in ppmv per V.S. 6/19

(2)

McCampbell Analytical Inc.

110 Second Avenue South, #D7

Pacheco, CA 94553-5560

(925) 798-1620

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

WorkOrder: 0206310

Client:

Cambria Env. Technology

6262 Hollis St.

Emeryville, CA 94608

TEL: (510) 450-1983

FAX: (510) 450-8295

ProjectNo: 153-1653-31; Oa

PO:

19-Jun-02

Sample ID	ClientSampID	Matrix	Collection Date	Bottle	Requested Tests
				8021B/8015	
0206310-001	RW-D2	Air	6/19/02 9:25:00 AM		A
0206310-002	RW-D3	Air	6/19/02 10:40:00 AM		A

Comments:

	Date/Time		Date/Time
Relinquished by:		Received by:	
Relinquished by:		Received by:	
Relinquished by:		Received by:	

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
<http://www.mcccampbell.com> E-mail: main@mcccampbell.com

Cambria Env. Technology 6262 Hollis St. Emeryville, CA 94608	Client Project ID: #153-1653-031; MSC Oakland	Date Sampled: 06/20/02
		Date Received: 06/21/02
	Client Contact: Ron Scheele	Date Reported: 06/27/02
	Client P.O.:	Date Completed: 06/27/02

June 27, 2002

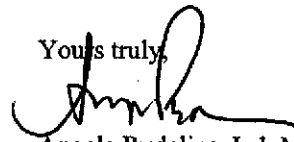
Dear Ron:

Enclosed are:

- 1). the results of 2 samples from your #153-1653-031; MSC Oakland 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. McC Campbell 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,



Angela Rydelius, Lab Manager

QC SUMMARY REPORT FOR BATCH 2571

BatchID: 2571

Matrix: A

WorkOrder: 0206360

EPA Method: SW8021B/8015Cm		Extraction: SW5030B		Ext. Date: 6/21/02		Spiked Sample ID: 0206355-006A				
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	uL/L	uL/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(gas)	ND	60	111	110	0.982	117	115	2.3	80	120
MTBE	ND	10	99.6	96.8	2.88	100	94.8	5.7	80	120
Benzene	ND	10	95.1	93.9	1.30	108	103	4.7	80	120
Toluene	ND	10	99.5	98.9	0.643	110	106	3.6	80	120
Ethylbenzene	ND	10	99.7	98.6	1.19	111	108	2.8	80	120
Xylenes	ND	30	99.7	99.3	0.335	107	110	3.1	80	120
%SS:	101	10	101	101	0.0203	107	102	4.0	80	120

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike, or analyte concentration in sample exceeds spike amount.

% Recovery = $100 * (MS - Sample) / (Amount Spiked)$; RPD = $100 * (MS - MSD) / (MS + MSD) * 2$.

* MS and / or MSD spike recoveries may not be near 100% or their RPDs near 0% if: a) the sample is inhomogeneous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

McC Campbell Analytical Inc.

110 Second Avenue South, #D7
 Pacheco, CA 94553-5560
 (925) 798-1620

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0206360

Client:

Cambria Env. Technology
 6262 Hollis St.
 Emeryville, CA 94608

TEL: (510) 450-1983
 FAX: (510) 450-8295
 ProjectNo: #153-1653-031;
 PO:

21-Jun-02

Sample ID	ClientSampleID	Matrix	Collection Date	Bottle	Requested Tests								
					8021B/8015								
0206360-001	RW-D3	Air	6/20/02 11:15:00 AM		A								
0206360-002	RW-D4	Air	6/20/02 1:30:00 AM		A								

Comments: Report Data in PPMV

	Date/Time		Date/Time
Relinquished by: _____		Received by: _____	
Relinquished by: _____		Received by: _____	
Relinquished by: _____		Received by: _____	

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
<http://www.mcccampbell.com> E-mail: main@mcccampbell.com

Cambria Env. Technology 6262 Hollis St. Emeryville, CA 94608	Client Project ID: #153-1653-31; OAK- MSC	Date Sampled: 06/21/02
		Date Received: 06/21/02
	Client Contact: Ron Scheele	Date Reported: 06/27/02
	Client P.O.:	Date Completed: 06/27/02

June 27, 2002

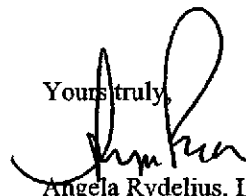
Dear Ron:

Enclosed are:

- 1). the results of 1 samples from your #153-1653-31; OAK-MSC 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. McC Campbell 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,



Angela Rydelius, Lab Manager



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

QC SUMMARY REPORT FOR BATCH 2571

BatchID: 2571

Matrix: A

WorkOrder: 0206361

EPA Method: SW8021B/8015Cm		Extraction: SW5030B		Ext. Date: 6/21/02		Spiked Sample ID: 0206355-006A				
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	u/L	u/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(gas)	ND	60	111	110	0.982	117	115	2.3	80	120
MTBE	ND	10	99.6	96.8	2.88	100	94.8	5.7	80	120
Benzene	ND	10	95.1	93.9	1.30	108	103	4.7	80	120
Toluene	ND	10	99.5	98.9	0.643	110	106	3.6	80	120
Ethylbenzene	ND	10	99.7	98.6	1.19	111	108	2.8	80	120
Xylenes	ND	30	99.7	99.3	0.335	107	110	3.1	80	120
%SS:	101	10	101	101	0.0203	107	102	4.0	80	120

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
 NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike, or analyte concentration in sample exceeds spike amount.

% Recovery = $100 * (MS - Sample) / (Amount Spiked)$; $RPD = 100 * (MS - MSD) / (MS + MSD) * 2$.

* MS and / or MSD spike recoveries may not be near 100% or their RPDs near 0% if: a) the sample is inhomogeneous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

McC Campbell Analytical Inc.

110 Second Avenue South, #D7
Pacheco, CA 94553-5560
(925) 798-1620

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0206361

Client:

Cambria Env. Technology
6262 Hollis St.
Emeryville, CA 94608

TEL: (510) 450-1983
FAX: (510) 450-8295
ProjectNo: #153-1653-31; O
PO:

21-Jun-02

Sample ID	ClientSamplID	Matrix	Collection Date	Bottle	Requested Tests									
0206361-001	RW-D5	Air	6/21/02 9:50:00 AM	A										

Comments: Report Data in PPMV

	Date/Time		Date/Time
Relinquished by: _____	_____	Received by: _____	_____
Relinquished by: _____	_____	Received by: _____	_____
Relinquished by: _____	_____	Received by: _____	_____

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

C A M B R I A



APPENDIX B

Baker Tank Water Analytical Data

McC Campbell Analytical Inc.

110 2nd 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 Env. Technology 6262 Hollis St. Emeryville, CA 94608	Client Project ID: #153-1653-031; City of Oakland	Date Sampled: 06/17/02
		Date Received: 06/18/02
	Client Contact: Ron Scheele	Date Reported: 06/24/02
	Client P.O.:	Date Completed: 06/24/02

June 24, 2002

Dear Ron:

Enclosed are:

- 1). the results of 1 samples from your #153-1653-031; City of Oakland 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. McC Campbell 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



Angela Rydelius, Lab Manager



McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
 Telephone : 925-798-1620 Fax : 925-798-1622
 http://www.mccampbell.com E-mail: main@mccampbell.com

QC SUMMARY REPORT FOR SW8021B/8015Cm

BatchID: 2506

Matrix: W

WorkOrder: 0206290

EPA Method: SW8021B/8015Cm		Extraction: SW5030B		Ext. Date: 6/18/02			Spiked Sample ID: N/A			
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(gas)	N/A	60	N/A	N/A	N/A	105	119	12	80	120
MTBE	N/A	10	N/A	N/A	N/A	87	90.6	4.0	80	120
Benzene	N/A	10	N/A	N/A	N/A	106	110	3.5	80	120
Toluene	N/A	10	N/A	N/A	N/A	104	108	3.3	80	120
Ethylbenzene	N/A	10	N/A	N/A	N/A	109	111	1.6	80	120
Xylenes	N/A	30	N/A	N/A	N/A	110	107	3.1	80	120
%SS	N/A	10	N/A	N/A	N/A	104	107	2.9	80	120

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:

NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike, or analyte concentration in sample exceeds spike amount.

% Recovery = $100 * (MS - Sample) / (Amount\ Spiked)$; RPD = $100 * (MS - MSD) / (MS + MSD) * 2$.

* MS and / or MSD spike recoveries may not be near 100% or their RPDs near 0% if: a) the sample is inhomogeneous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.



McC Campbell Analytical Inc.

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Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

QC SUMMARY REPORT FOR SW8015C

BatchID: 2521

Matrix: W

WorkOrder: 0206290

EPA Method: SW8015C		Extraction: SW3510C			Ext. Date: 6/19/02		Spiked Sample ID: N/A			
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(d)	N/A	7500	N/A	N/A	N/A	101	104	2.7	70	130
%SS:	N/A	2500	N/A	N/A	N/A	103	106	2.2	70	130
All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions: NONE										

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike, or analyte concentration in sample exceeds spike amount.

% Recovery = 100 * (MS-Sample)/(Amount Spiked); RPD = 100 * (MS - MSD)/(MS + MSD) * 2.

* MS and / or MSD spike recoveries may not be near 100% or the RPDs near 0% if: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

Laboratory extraction solvents such as methylene chloride and acetone may occasionally appear in the method blank at low levels.

McC Campbell Analytical Inc.

110 Second Avenue South, #D7
 Pacheco, CA 94553-5560
 (925) 798-1620

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0206290

Client:

Cambria Env. Technology
 6262 Hollis St.
 Emeryville, CA 94608

TEL: (510) 450-1983
 FAX: (510) 450-8295
 ProjectNo: #153-1653-031;
 PO:

18-Jun-02

Sample ID	ClientSampID	Matrix	Collection Date	Bottle	Requested Tests						
					SW8015C	8021B/8015					
0206290-001	TANK	Water	6/17/02 3:00:00 PM		B	A					

Comments:

	Date/Time		Date/Time
Relinquished by: _____		Received by: _____	
Relinquished by: _____		Received by: _____	
Relinquished by: _____		Received by: _____	

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other



McC Campbell Analytical Inc.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
<http://www.mcccampbell.com> E-mail: main@mcccampbell.com

Cambria Env. Technology 6262 Hollis St. Emeryville, CA 94608	Client Project ID: #153-1653-001; MSC-Oakland	Date Sampled: 07/11/02
		Date Received: 07/12/02
	Client Contact: Ron Scheele	Date Reported: 07/18/02
	Client P.O.:	Date Completed: 07/18/02

July 18, 2002

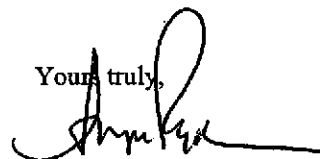
Dear Ron:

Enclosed are:

- 1). the results of 1 samples from your #153-1653-001; MSC-Oakland 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. McC Campbell 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,

Angela Rydelius, Lab Manager



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QC SUMMARY REPORT FOR SW8021B/8015Cm

Matrix: W

WorkOrder: 0207170

EPA Method: SW8021B/8015Cm		Extraction: SW5030B		BatchID: 2917			Spiked Sample ID: N/A			
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(gas)	N/A	60	N/A	N/A	N/A	105	105	0.412	80	120
MTBE	N/A	10	N/A	N/A	N/A	99.8	97.1	2.73	80	120
Benzene	N/A	10	N/A	N/A	N/A	109	109	0.509	80	120
Toluene	N/A	10	N/A	N/A	N/A	111	111	0.639	80	120
Ethylbenzene	N/A	10	N/A	N/A	N/A	112	111	0.662	80	120
Xylenes	N/A	30	N/A	N/A	N/A	113	113	0	80	120
%SS:	N/A	100	N/A	N/A	N/A	102	102	0.197	80	120

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
 NONE

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.

% Recovery = $100 * (MS - Sample) / (Amount Spiked)$; $RPD = 100 * (MS - MSD) / (MS + MSD) * 2$.

* MS and / or MSD spike recoveries may not be near 100% or the RPDs near 0% if: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.



McC Campbell Analytical Inc.

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 Telephone : 925-798-1620 Fax : 925-798-1622
 http://www.mccampbell.com E-mail: main@mccampbell.com

QC SUMMARY REPORT FOR SW8015C

Matrix: W

WorkOrder: 0207170

EPA Method: SW8015C		Extraction: SW3510C			BatchID: 2915			Spiked Sample ID: N/A		
Compound	Sample	Spiked	MS*	MSD*	MS-MSD*	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)	
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	Low	High
TPH(d)	N/A	7500	N/A	N/A	N/A	93.6	94.2	0.664	70	130
%SS:	N/A	100	N/A	N/A	N/A	97.7	97.6	0.0662	70	130
All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions: NONE										

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.

% Recovery = $100 * (MS - Sample) / (Amount\ Spiked)$; RPD = $100 * (MS - MSD) / (MS + MSD) * 2$.

* MS and / or MSD spike recoveries may not be near 100% or the RPDs near 0% if: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) if that specific sample matrix interferes with spike recovery.

McC Campbell Analytical Inc.

110 Second Avenue South, #D7
Pacheco, CA 94553-5560
(925) 798-1620

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0207170

Client:

Cambria Env. Technology
6262 Hollis St.
Emeryville, CA 94608

TEL: (510) 450-1983
FAX: (510) 450-8295
ProjectNo: #153-1653-001;
PO:

18-Jul-02

Sample ID	ClientSampID	Matrix	Collection Date	Bottle	Requested Tests						
					SW8015C	V8021B/8015C					
0207170-001	Tank Plume D	Water	07/11/02 7:00:00 AM	B	A						

Comments:

	Date/Time		Date/Time
Relinquished by: _____		Received by: _____	
Relinquished by: _____		Received by: _____	
Relinquished by: _____		Received by: _____	

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

