PACIFIC
ENVIRONMENTAL
GROUP, INC.

DRAFT
July 15, 1997
Project 320-162.1C

Mr. Phil Briggs
Chevron Products Company
P.O. Box 5004
San Ramon, California 94583

Re: Results of the Soil Vapor Investigation
Former Signal Service Station 0800
800 Center Street at Eighth Street
Oakland, California

Dear Mr. Briggs:

This letter, prepared by Pacific Environmental Group, Inc. (PACIFIC), on behalf of Chevron Products Company (Chevron), presents the results from the soil and soil vapor investigation at the site referenced above (Figure 1). This investigation was performed according to the *Work Plan* prepared by PACIFIC (April 30, 1997), which was approved by Ms. Jennifer Eberle of the Alameda County Health Care Services Agency (ACHCSA), with minor changes, in her letter to Chevron dated May 6, 1997. The changes included collecting soil analytical data as well as soil vapor data, moving Boring SV-1 to the location of former P-3, and adding two additional boring locations (SV-4 and SV-5). These changes were implemented.

SITE BACKGROUND

The site is located at the northeast corner of the intersection of Eighth Street and Center Street in Oakland, California. The former station building and the former pump islands remain at the site, however the site is currently unoccupied. Land use near the site is commercial and residential.

The site was utilized as a retail service station from 1932 to the early 1970s. Station facilities included four 1,000-gallon fuel underground storage tanks (USTs), a waste oil tank, a product island, and associated piping. The USTs were reportedly removed from

2025 Gateway Place, Suite 440, San Jose, California 95110 (408) 441-7500 FAX (408) 441-7539

the site during 1973. A complete description of the site background is presented in the *Work Plan*.

SOIL VAPOR INVESTIGATION

Soil Borings

As specified in the *Work Plan*, it has been proposed that the site be redeveloped, along with two adjacent properties, into residential housing. In order to determine if the remaining concentrations of petroleum hydrocarbons in the soil and groundwater at the former Signal service station would pose a risk to human health and safety, soil and soil vapor samples were collected from the site using Geoprobe borings. The locations of the five borings, SV-1 through SV-5, are presented on Figure 2.

Soil and Soil Vapor Analyses

The soil vapor samples were analyzed by EPA Method TO-3 (aromatic volatile organics in air) for concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX compounds), and total petroleum hydrocarbons (TPH). Along with the vapor analyses, the soil was analyzed for site-specific physical parameters, such as porosity, pH, and moisture content, by EPA Method 584 and ASTM Method D-2974. For the soil BTEX and TPH calculated as gasoline (TPH-g) concentrations, the soil samples were analyzed by EPA Method 8015/8020. The certified analytical results and the chain-of-custody documentation are presented in Attachment A. The soil vapor and physical data were then used to calculate the risk posed by the remaining petroleum hydrocarbon vapors at the site to indoor air inhalation for a residential population of adults and children (1 to 16 years).

Possible Exposure Routes

As stated in the *Work Plan*, the exposure routes deemed possible at the site are:

1. inhalation from groundwater and soil volatilization to indoor and outdoor air
2. dermal contact from any exposed surficial soils that may be impacted.

These exposure routes may affect both the residents who will live on the property and the construction workers who will build the residential housing complex.

For the inhalation exposure pathway, the risk posed by indoor air inhalation is considered the limiting factor. Since the risk from indoor air inhalation is greater, the risk posed from outdoor air inhalation was not calculated in this risk assessment.

INHALATION RISK MODELING

The soil vapor and physical soil data were entered into several equations from the American Society for Testing and Materials' (ASTM) *Standard Guide for Risk-Based corrective Action Applied at Petroleum Release Sites (E 1739-95)* (RBCA). These ASTM equations were compiled by Tom Fojut, Pleas McNeel, and Tim Utterback of Weiss Associates and by Ravi Arulanantham and Stephen Morse of the Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) in order to more accurately model the risk posed to indoor air from the actual soil vapor concentrations in the surficial soil. This model was developed due to the overly conservative outcomes derived from ASTM's original models of risk posed by impacted soil and groundwater volatilizing into indoor air. These overly conservative outcomes were discussed in the *Work Plan*. Due to the extremely unrealistic cleanup-goals derived by these models during the Tier 1 and Tier 2 RBCAs previously performed for the site (RBCA Analysis, PACIFIC, April 1, 1997), the soil vapor samples described were collected to evaluate the actual risk posed by the remaining petroleum hydrocarbons at the site instead of relying upon a conservative model. The soil vapor measurements include both the volatilization from petroleum hydrocarbons remaining in soil and groundwater.

The new model developed by Weiss Associates and the RWQCB (presented as Attachment B) utilizes several equations already presented in ASTM's RBCA guidelines, however it removes some of the uncertainties associated with the former indoor air inhalation models. The new vapor model removes the idea of estimating a crack factor for the building's foundation; in the new model it is assumed that there is no foundation, only a dirt floor with direct flux from the soil. Therefore, the model incorporates actual physical and analytical data for more accurate outcomes, plus it is as conservative as the previous ASTM models.

The model allows the calculation of the actual risk posed by soil vapor samples from the site. Weiss Associates and the RWQCB also have back-calculated the highest acceptable levels of BTEX compounds (cleanup goals) for residential and commercial receptors based on ASTM's Tier 1 default parameters (also presented in Attachment B). The recommended maximum allowable concentrations or risk based screening levels (RBSL) of BTEX compounds in soil vapor at 3 feet bgs (no building slab assumed) for children aged 1 to 16 years are as follows: 10^{-6} - 10^{-5} .38 µg/L

- Benzene: 0.038 µg/L

- Toluene: 103 µg/L
- Ethylbenzene: 304 µg/L
- Xylenes: 2,230 µg/L

The RBSLs presented above are for children in a residential scenario since these are the lowest concentrations allowed among adults and children and are based on a target risk of 10^{-6} for benzene and a hazard quotient of 1 for the non-carcinogenic compounds. As will be shown below, none of the TEX compound soil vapor concentrations collected from 3 feet bgs were greater than these RBSLs. However, Boring SV-1 had a benzene concentration of 0.17 µg/L at a depth of 3 feet. This concentration is slightly above the RBSL of 0.038 µg/L for a target risk level of 10^-6.

0.38

And there were higher benz concs: up to 65 ppm! Why didn't you mention that? Are you considering 6' bgs to be sat. zone?

SOIL VAPOR INVESTIGATION RESULTS

All soil data collected from the site during the investigation was gathered following the protocols set forth in the *Work Plan* and with the ACHCSA changes. The resulting soil vapor TPH-g and BTEX concentrations collected from 3, 6, and 9 feet bgs are presented in Table 1. The physical soil data is presented in Table 2 and the soil analytical data is presented in Table 3. The soil boring logs are presented as Attachment C. Figures 3 through 7 present a graphical representation of the soil vapor BTEX concentrations from each boring plus the amount of oxygen and carbon dioxide collected from Borings SV-1 and SV-2.

As seen on Table 1, the maximum 3 feet bgs soil vapor concentration of benzene was 0.17 micrograms per liter (µg/L) from Boring SV-1, which is located in the former UST complex. Borings SV-2 through SV-5 had no detectable benzene vapor concentrations at 3 feet bgs. The maximum 3 feet bgs soil vapor concentration of toluene was also collected from Boring SV-1, while the 3 feet bgs maximum soil vapor concentrations of ethylbenzene was from Boring SV-3 (1.5 µg/L), xylenes from Boring SV-3 (12 µg/L), and TPH from Boring SV-1 (360 µg/L). The overall maximum soil vapor concentrations of the BTEX compounds and TPH, including each depth, was distributed as follows:

- Maximum benzene: 65 µg/L from Boring SV-1 at 6 feet bgs
- Maximum toluene: 730 µg/L from Boring SV-1 at 9 feet bgs
- Maximum ethylbenzene: 340 µg/L from Boring SV-1 at 9 feet bgs
- Maximum xylenes: 1,400 µg/L from Boring SV-1 at 9 feet bgs
- Maximum TPH: 50,000 µg/L from Boring SV-1 at 6 feet bgs

As shown by the above data and Table 1, the highest soil vapor concentrations of BTEX compounds and TPH are located near the former UST complex.

The graphs presented on Figures 3 through 7 indicate the large degree of bioremediation and natural attenuation that occurs as the petroleum hydrocarbons volatilize upwards. All of the graphs indicate that at 3 feet bgs there are relatively insignificant concentrations of the compounds remaining. The fluctuations of oxygen and carbon dioxide also indicate that bioremediation is occurring at some of the sample locations, such as Boring SV-1 at 6 feet bgs. Bioremediation would be expected to cause a reduction in oxygen and an increase in carbon dioxide; this is seen very clearly in SV-1. On Figure 3, at 6 feet bgs the oxygen concentration dips to 18.97% from 20.97% at 3 feet, while the carbon dioxide concentration increases from 0.87% at 3 feet to 1% at 6 feet bgs. It is clear from the carbon dioxide and oxygen data, plus the soil vapor and soil analytical data, that the largest amount of bioremediation is occurring at approximately 6 feet bgs. Above this, the soil vapor concentrations are relatively minor while below 6 feet bgs the water content of the soil increases to a point where it appears that there is limited bioremediation.

SOIL VAPOR RISK ANALYSES

In order to determine the actual indoor air inhalation risk posed by the remaining petroleum hydrocarbons at the site, the maximum soil vapor concentration of each BTEX compound from 3 feet bgs was utilized in the above mentioned model. The risk to adults and children (ages 1 to 16 years) were calculated and the results are presented in Attachment D.

Model Parameters and Risk Levels

Since benzene is a carcinogen, the risk for indoor air inhalation from benzene was calculated using California's slope factor of 0.1 $(mg/kg\text{-}day)^{-1}$. This slope factor was used in the model to determine if the risk to human health and safety was greater than the target risk level of 10^{-6}. All other BTEX compounds were analyzed for their risk using a hazard quotient of 1. The exposure parameters for adults and children used within the model, such as exposure duration and inhalation rate, were based on ASTM's residential exposure parameters as set forth in the RBCA guidelines (Table X2.4) and by Groundwater Service's Inc. (GSI's) *RBCA Tool Kit*. The building parameters, such as the indoor air exchange rate and indoor volume/infiltration area ratio were also based on ASTM's RBCA guidelines (Table X2.6), as were all of the chemical-specific data, such as the diffusion coefficient for each BTEX compound in air and water (Table X2.7).

Physical Soil Data

The site-specific physical data used in the models are presented on Table 2. The physical soil data used in the model were calculated by averaging the data from Borings SV-1 (2.5 feet bgs) and SV-3 (3.5 feet bgs). Since the model determined the risk posed by vapors at 3 feet bgs, only physical soil data collected near 3 feet bgs were used in the model. The overall average and the vadose zone averages (one at 3.5 feet bgs, the other at 6 feet bgs) are presented in Table 2. The vadose zone average of 6 feet was not utilized in the models since the water content of the physical soil samples increased dramatically with depth and would have produced a less conservative risk analysis if used in the model.

Model Results

The results of the soil vapor flux to indoor air inhalation model determined that the maximum soil vapor BTEX concentrations from the 3 feet bgs depth did not pose a risk above 10^{-5} for benzene, nor did it pose a risk above a hazard quotient of 1 for the TEX compounds.

	Benzene	Toluene	Ethylbenzene	Xylenes
Adult Risk	6.53^{-6}	1.19^{-2}	3.79^{-3}	4.16^{-3}
Child Risk	3.05^{-5}	2.38^{-2}	7.57^{-3}	8.32^{-3}

When the hazard quotients for the non-carcinogenic compounds are added together, the total is 1.99^{-2} for adults and 3.99^{-2} for children. Thus the model outcomes are within the acceptable target risk levels of 10^{-6} and 10^{-5} for benzene, according to the May 6, 1997 ACHCSA's letter, and below the hazard quotient of 1 for the non-carcinogens even when the individual hazard quotients are added together. Therefore, the site is suitable for redevelopment as a residential housing complex.

Uncertainty

It is important to note that a slab on grade building would be suitable for the site as shown by the above risk data, however if another type of building (i.e., with a crawlspace or deep foundation) were to be built, remedial action may be required. Possible remedial action may include the removal of soil in the former UST complex where the largest concentrations of petroleum hydrocarbon vapors were observed.

DERMAL EXPOSURE ROUTE

Per the *Work Plan*, the exposed surficial soil (following development) at the site will be excavated to a depth of 3 feet bgs in order to minimize dermal contact. The risk to a residential population by any petroleum hydrocarbon impacted surficial soils that may be exposed (i.e., landscaped areas) will be minimized by being excavated and replaced with clean fill.

CONSTRUCTION WORKER RISK

Using the physical soil data collected from the site, a Tier 2 RBCA analysis was performed using GSI's *RBCA Tool Kit* to determine the allowable BTEX compound concentrations in surficial soil considering inhalation of dust and particles and dermal contact as the routes of exposure. Again the vadose zone averages (from 3.5 feet) of porosity and moisture content were used in the calculations. The results of the models indicated that 320 milligrams per kilogram (mg/kg) benzene was the maximum allowable concentration for surficial soil exposures at a target risk of 10^{-5}, and for the remaining BTEX compounds, the selected risk level (hazard quotient = 1) is not exceeded for the pure compound present at any concentration. The highest benzene concentration found during this investigation was 86 mg/kg in Boring SV-4 at 9 feet bgs. Therefore, based on the soil analytical data collected during this investigation, no benzene concentrations are above the maximum allowed (320 mg/kg) at the site. Thus the surficial and subsurface soil at the site do not pose a risk to construction workers.

All other concerns regarding the remaining petroleum hydrocarbons at the site, and construction worker safety, will be addressed in a detailed site health and safety plan. Waiting for more details regarding the actual building techniques will allow a more thorough and complete assessment of any risks posed to the construction workers during the building of the residential housing complex.

CONCLUSIONS

Based on the soil vapor data, the site poses no indoor air inhalation risk to adults or children who may live at the site in the proposed residential housing complex at the specified risk levels of 10^{-5} and 10^{-6} and with a hazard quotient of 1. The Tier 2 RBCA modeling and the soil analytical data also indicate that the site does not pose a risk to construction workers.

Once there is a definitive layout for the proposed housing complex it would be beneficial to examine what the use of the former UST complex will be and evaluate if limited excavation in that area may be advantageous. For instance, if the proposed housing plan

has the former UST area in use as a parking area, then there would be no advantage to excavate since the soil would be covered. However, if that area is to be overlaid with a residence it may be beneficial to remove the surficial soil in the former UST area in order to reduce any inhalation risk below 10^{-5}.

If you have any questions regarding this letter, please call.

Sincerely,

Pacific Environmental Group, Inc.

Michelle S. Gracia
Senior Staff Scientist

Ross Tinline
Project Geologist
RG 5860

Attachments:
Table 1 - Soil Vapor Data
Table 2 - Physical Soil Data
Table 3 - Analytical Soil Data
Figure 1 - Site Location Map
Figure 2 - Site Map with Boring Locations
Figure 3 - SV-1 Soil Vapor Data
Figure 4 - SV-2 Soil Vapor Data
Figure 5 - SV-3 Soil Vapor Data
Figure 6 - SV-4 Soil Vapor Data
Figure 7 - SV-5 Soil Vapor Data
Attachment A - Certified Analytical Reports and Chain-of-Custody Documentation
Attachment B - Soil Vapor Model and RBSL Tables
Attachment C - Soil Boring Logs
Attachment D - Soil Vapor Model Results

Table 1
Soil Vapor Data

Former Signal Service Station 0800
800 Center Street at Eighth Street
Oakland, California

Sample ID	Sample Date	Sample Depth	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	TPH-g (µg/L)	O_2 %	CO_2 %
SV-1	5/30/97	3	0.17	1.6	0.75	5.3	360	20.97	0.87
		6	65	320	84	430	50,000	18.97	1.00
		9	32	730	340	1,400	24,000	20.97	0.07
SV-2	5/30/97	3	ND	0.11	0.11	0.53	11	15.97	6.00
		6	22	100	19	66	27,000	18.97	2.20
		9	NT	NT	NT	NT	NT	20.97	0.16
SV-3	5/30/97	3	ND	0.54	1.5	12	180	NT	NT
		6	ND	0.42	0.84	5.7	83	NT	NT
		8	0.5	54	30	44	5,400	NT	NT
SV-4	5/30/97	3	ND	0.034	0.17	0.48	71	NT	NT
		6	ND	0.08	0.48	1.4	270	NT	NT
		9	1.7	150	36	160	5,400	NT	NT
SV-5	5/30/97	3	ND	0.015	0.009	0.071	5	NT	NT
		6	0.31	6.1	0.79	3.3	660	NT	NT
		9	11	84	24	110	1,100	NT	NT

µg/L = Micrograms per liter
TPH-g = Total petroleum hydrocarbons calculated as gasoline
O_2 = Oxygen
CO_2 = Carbon dioxide

Table 2
Physical Soil Data

Former Signal Service Station 0800
800 Center Street at Eighth Street
Oakland, California

Sample ID	Sample Date	Sample Depth feet	Total Porosity %	Air Content %	Water Content %	Saturation %	pH	Foc %	Soil Density g/cc
SV-1	5/30/97	2.5	44.75	36	8.8	19.67	6.31	NT	0.068
		6	39.52	4.3	35.21	89.1	NT	NT	0.275
		8.5	NT	NT	NT	NT	NT	0.12	NT
		9.5	33.6	0.15	33.6	99.57	6.8	NT	0.26
SV-2	5/30/97	3	NT	NT	NT	NT	7.53	NT	NT
		3.5	NT	NT	NT	NT	NT	0.083	NT
		9	NT	NT	NT	NT	NT	0.067	NT
		10	34.02	0.95	33.1	97.21	7.03	NT	0.257
SV-3	5/30/97	3.5	46	30	16	35.01	7.68	NT	0.126
Overall Averages =			39.65	14.3	25.34	68.11	7.07	0.09	0.197
Vadose Zone Average (to 3.5 feet) =			45.57*	33*	12.4*	27.34	6.99*	NT	0.097*
Vadose Zone Average (to 6 feet) =			43.4	23.4	20	47.9	6.99	NT	0.156

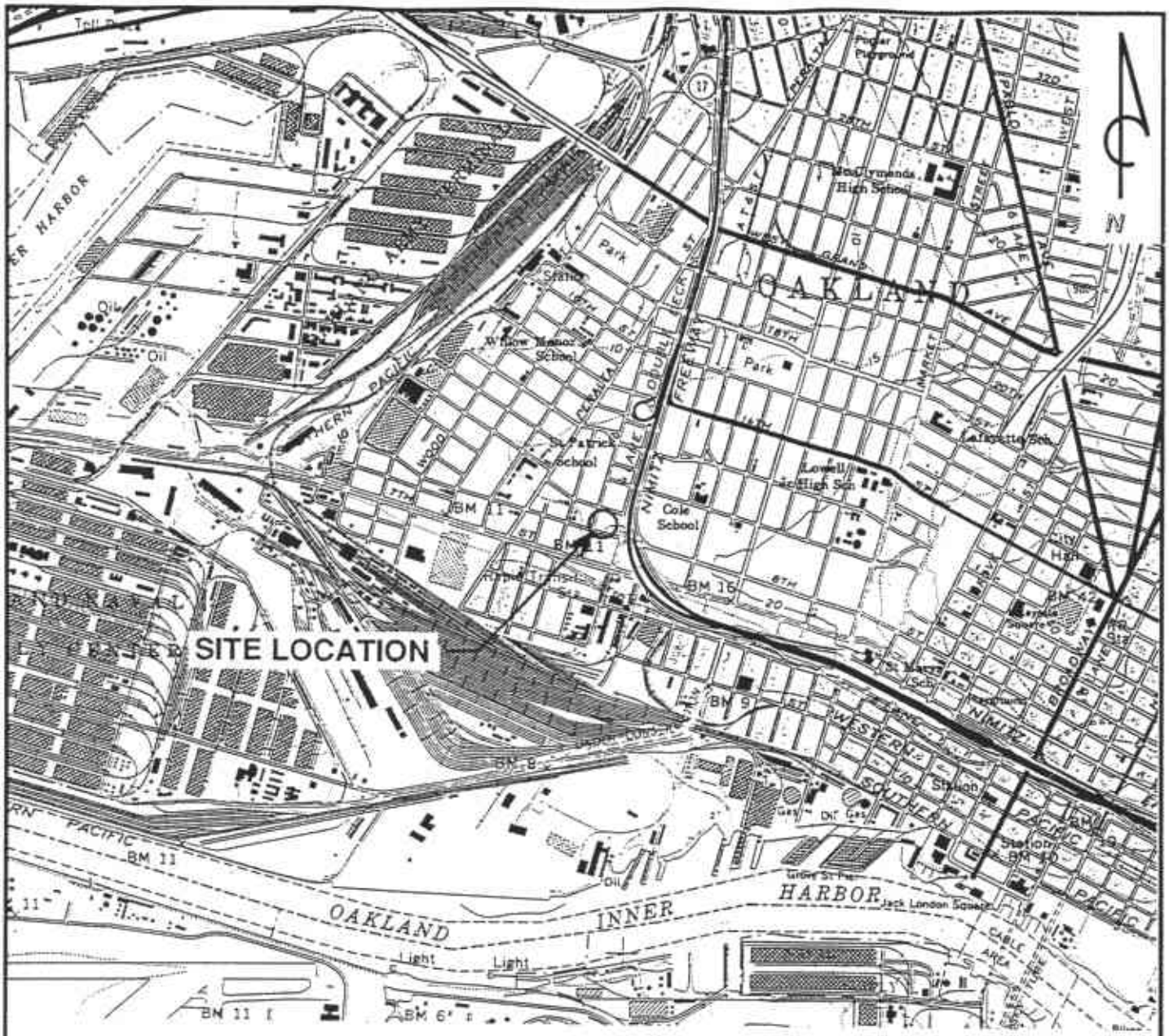
NT = Not tested
Soil Density = Dry density x moisture %
g/cc = grams per cubic centimeter
* = These values were used to calculate the soil vapor model risk and the construction worker RBSL
Foc = Fraction of organic carbon

Table 3
Analytical Soil Data

Former Signal Service Station 0800
800 Center Street at Eighth Street
Oakland, California

Soil Sample ID	Sample Date	Sample Depth	TPHg (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
SV-1	5/30/97	3	<1.0	<0.005	<0.005	<0.005	<0.005
		6	2,100	<2.5	46	57	300
		8.5	7,600	52	360	140	720
SV-2	5/30/97	3.5	<1.0	<0.005	<0.005	<0.005	<0.005
		6	11	<0.005	0.009	0.01	0.057
		9	8,000	12	420	150	710
SV-3	5/30/97	3	1.4	<0.005	0.029	0.014	0.1
		6	84	0.13	0.28	1.4	1.9
		9	3,200	5.8	130	83	340
SV-4	5/30/97	3	<1.0	<0.005	0.0058	<0.005	0.01
		6	1.3	<0.005	<0.005	<0.005	<0.005
		9	10,000	86	470	210	960
SV-5	5/30/97	3	<1.0	<0.005	<0.005	<0.005	<0.005
		6	<1.0	<0.005	<0.005	<0.005	<0.005
		9	7,900	20	410	130	690

mg/kg = Milligrams per kilograms
TPH-g = Total petroleum hydrocarbons calculated as gasoline



QUADRANGLE LOCATION

REFERENCES:
USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: OAKLAND WEST, CALIFORNIA
DATED: 1959 REVISED: 1980

SCALE IN FEET

2000 0 2000

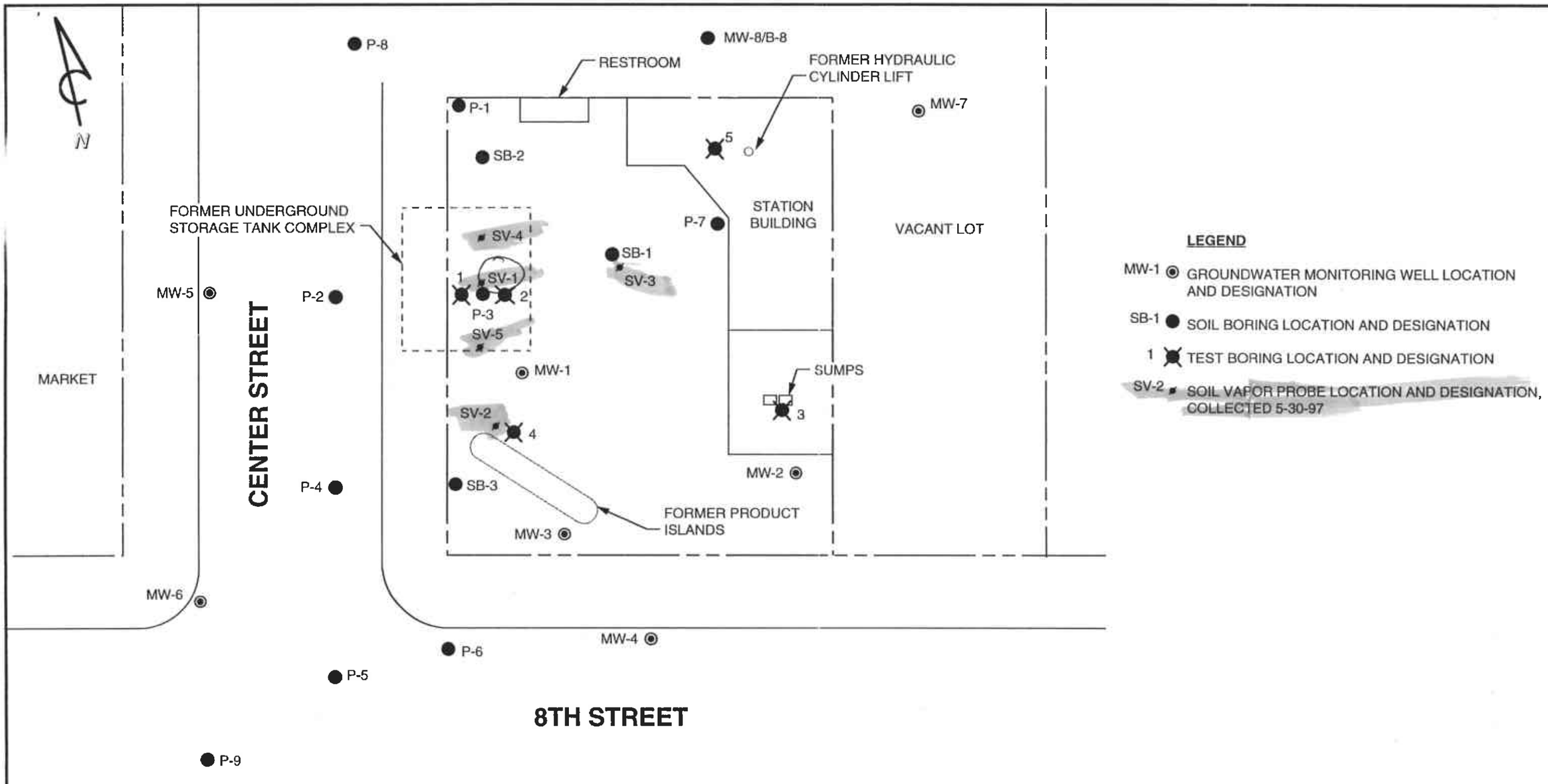
PACIFIC ENVIRONMENTAL GROUP, INC.

FORMER SIGNAL SERVICE STATION S0800
800 Center Street at 8th Street
Oakland, California

SITE LOCATION MAP

FIGURE: 1

PROJECT: 320-162.1C



LEGEND

- MW-1 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- SB-1 ● SOIL BORING LOCATION AND DESIGNATION
- 1 ✕ TEST BORING LOCATION AND DESIGNATION
- SV-2 SOIL VAPOR PROBE LOCATION AND DESIGNATION, COLLECTED 5-30-97

SOURCE: MAP BY GROUNDWATER TECHNOLOGY; DATED: 3-7-95

PACIFIC ENVIRONMENTAL GROUP, INC.

SCALE
0 20 40 FEET

FORMER SIGNAL SERVICE STATION S0800
800 Center Street at 8th Street
Oakland, California

SITE MAP

FIGURE: **2**
PROJECT: 320-162.1C

Figure 3: SV-1 Soil Vapor Data

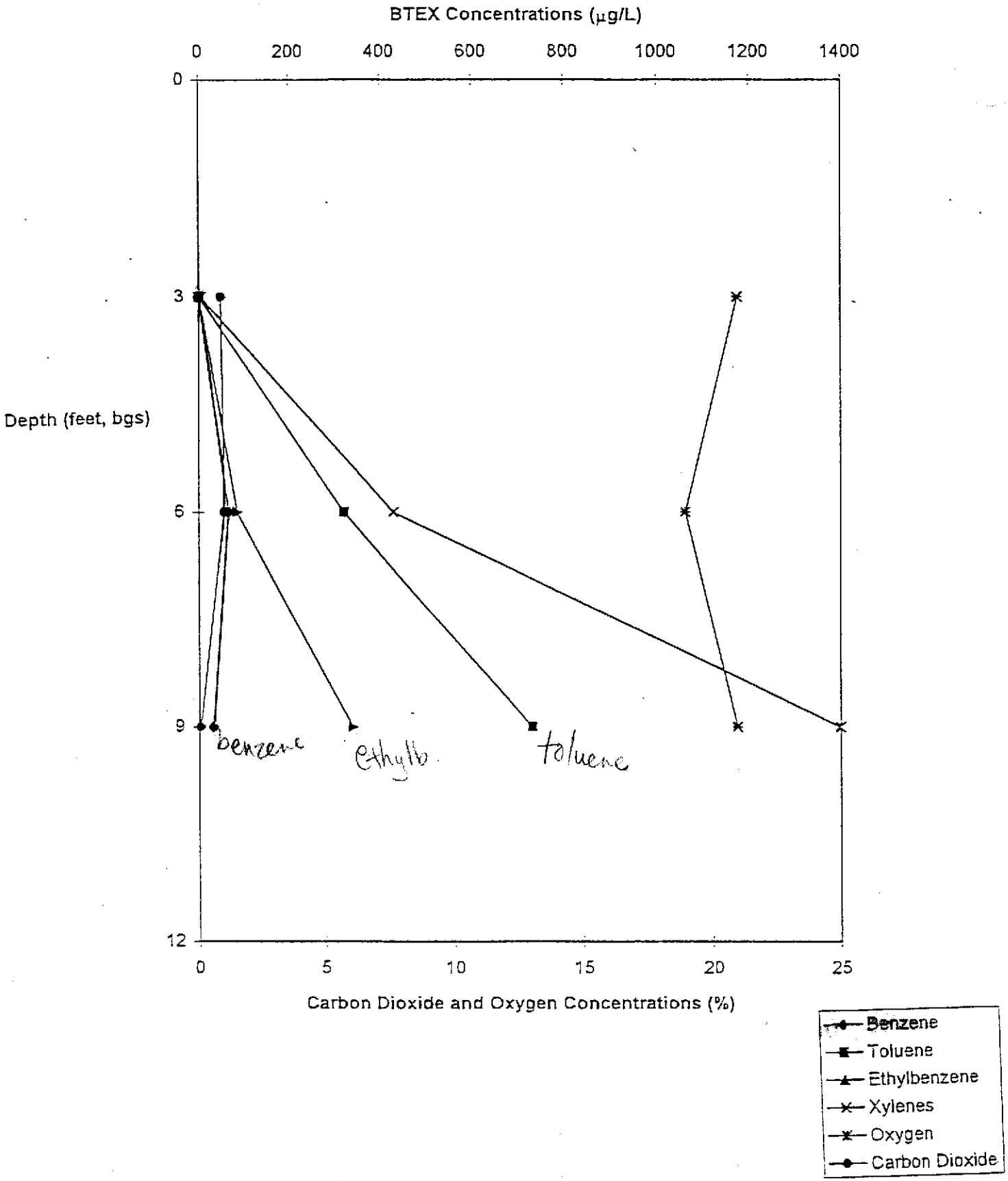


Figure 4: SV-2 Soil Vapor Data

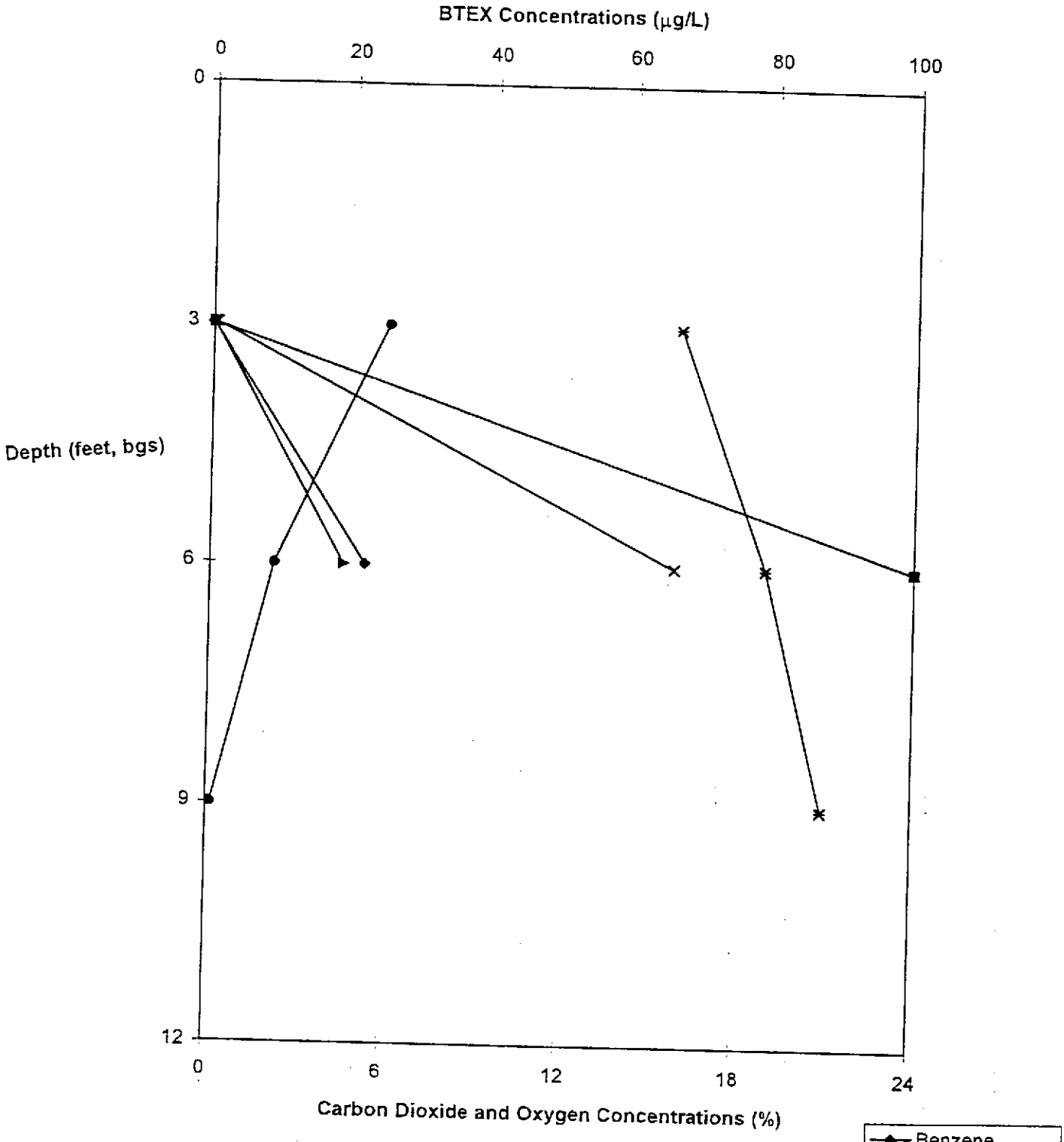
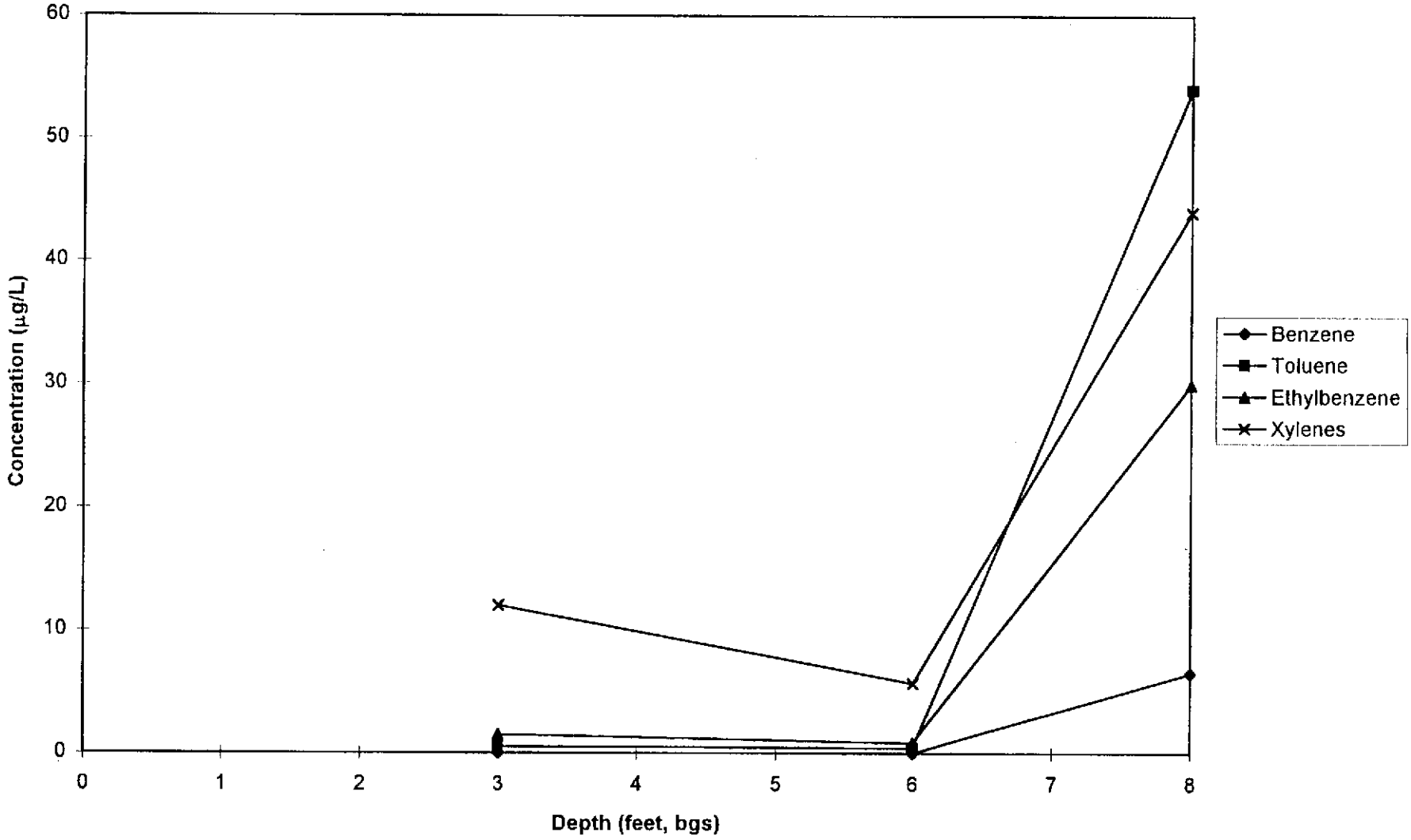
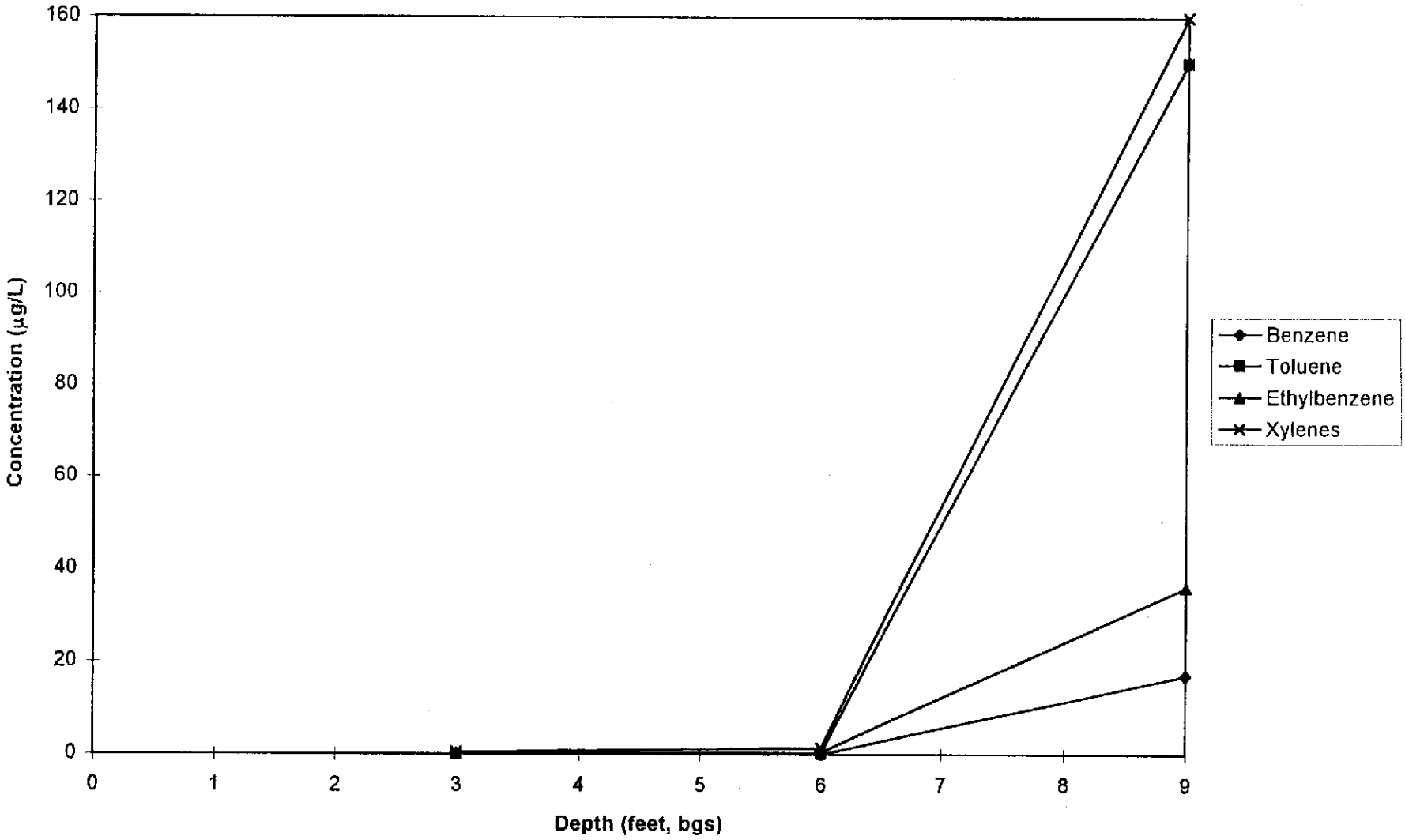


Figure 5: SV-3 Soil Vapor Data



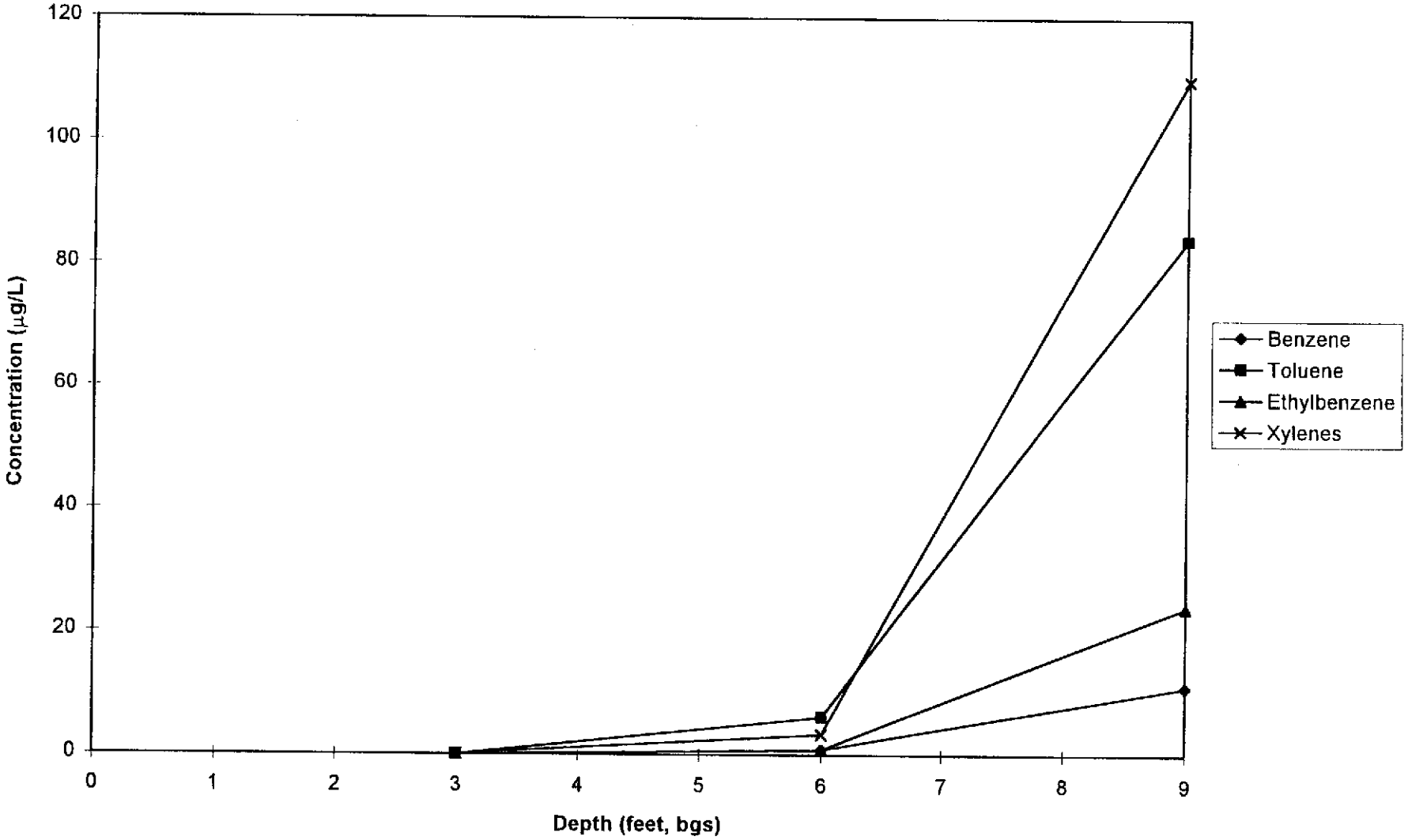
3201621C\RBCA!Figure5

Figure 6: SV-4 Soil Vapor Data



3201621C\RBCA\Figure6

Figure 7: SV-5 Soil Vapor Data



3201621C\RBCA!Figure7

ATTACHMENT A

CERTIFIED ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY DOCUMENTATION

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
404 N. Wiget Lane, Walnut Creek, CA 94598, (510) 988-9600, FAX (510) 988-9673
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110

Attention: Ross Tinline

Client Proj. ID: 320-162.1C/50800,800 CenterSt

Lab Proj. ID: 9706133

Sampled: 05/30/97
Received: 06/03/97
Analyzed: see below

Reported: 06/26/97

LABORATORY ANALYSIS

Analyte	Units	Date Analyzed	Detection Limit	Sample Results
Lab No: 9706133-03				
Sample Desc : **SOLID,SV-1-8.5'**				
Fraction Organic Carbon	**%**	**06/23/97**	**0.020**	**0.12**
Volatile Solids	**mg/Kg**	**06/06/97**	**1.0**	**24000**
Lab No: 9706133-04				
Sample Desc : **SOLID,SV-2-3.5'**				
Fraction Organic Carbon	**%**	**06/23/97**	**0.020**	**0.083**
Volatile Solids	**mg/Kg**	**06/06/97**	**1.0**	**13000**
Lab No: 9706133-06				
Sample Desc : **SOLID,SV-2-9.0'**				
Fraction Organic Carbon	**%**	**06/23/97**	**0.020**	**0.067**
Volatile Solids	**mg/Kg**	**06/06/97**	**1.0**	**19000**

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
404 N. Wiget Lane, Walnut Creek, CA 94598, (510) 988-9600, FAX (510) 988-9673
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110

Attention: Ross Tinline

Client Proj. ID: 320-162.1C/50800,800 CenterSt
Sample Descript: SV-1-3.0'
Matrix: SOLID
Analysis Method: 8015Mod/8020
Lab Number: 9706133-01

Sampled: 05/30/97
Received: 06/03/97
Extracted: 06/09/97
Analyzed: 06/10/97
Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP18

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	112
4-Bromofluorobenzene	60	140	129

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110

Attention: Ross Tinline

Client Proj. ID: 320-162.1C/50800,800 CenterSt
Sample Descript: SV-1-6.0'
Matrix: SOLID
Analysis Method: 8015Mod/8020
Lab Number: 9706133-02

Sampled: 05/30/97
Received: 06/03/97
Extracted: 06/09/97
Analyzed: 06/09/97
Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP07

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	**500**	**2100**
Benzene	2.5	N.D.
Toluene	**2.5**	**46**
Ethyl Benzene	**2.5**	**57**
Xylenes (Total)	**2.5**	**300**
Chromatogram Pattern:		**Gas**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	103
4-Bromofluorobenzene	60	140	3 Q

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110

Attention: Ross Tinline

Client Proj. ID: 320-162.1C/50800,800 CenterSt
Sample Descript: SV-1-8.5'
Matrix: SOLID
Analysis Method: 8015Mod/8020
Lab Number: 9706133-03

Sampled: 05/30/97
Received: 06/03/97
Extracted: 06/09/97
Analyzed: 06/09/97
Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP07

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	500	7600
Benzene	2.5	52
Toluene	2.5	360
Ethyl Benzene	2.5	140
Xylenes (Total)	2.5	720
Chromatogram Pattern:		Gas

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	140 Q
4-Bromofluorobenzene	60	140	7 Q

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-2-3.5'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/10/97
Attention: Ross Tinline	Lab Number: 9706133-04	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP01

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	97
4-Bromofluorobenzene	60	140	112

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-2-6.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/10/97
Attention: Ross Tinline	Lab Number: 9706133-05	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP18

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	**1.0**	**11**
Benzene	0.0050	N.D.
Toluene	**0.0050**	**0.0090**
Ethyl Benzene	**0.0050**	**0.010**
Xylenes (Total)	**0.0050**	**0.057**
Chromatogram Pattern:		**Gas**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	118
4-Bromofluorobenzene	60	140	154 Q

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-2-9.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/10/97
Attention: Ross Tinline	Lab Number: 9706133-06	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP18

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1000	8000
Benzene	5.0	12
Toluene	5.0	420
Ethyl Benzene	5.0	150
Xylenes (Total)	5.0	710
Chromatogram Pattern:		Gas

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	161 Q
4-Bromofluorobenzene	60	140	- Q

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-3-3.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/10/97
Attention: Ross Tinline	Lab Number: 9706133-07	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP01

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	**1.0**	**1.4**
Benzene	0.0050	N.D.
Toluene	**0.0050**	**0.029**
Ethyl Benzene	**0.0050**	**0.014**
Xylenes (Total)	**0.0050**	**0.10**
Chromatogram Pattern:		**Gas**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	98
4-Bromofluorobenzene	60	140	126

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-3-6.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/10/97
Attention: Ross Tinline	Lab Number: 9706133-08	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP01

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	**5.0**	**84**
Benzene	**0.025**	**0.13**
Toluene	**0.025**	**0.28**
Ethyl Benzene	**0.025**	**1.4**
Xylenes (Total)	**0.025**	**1.9**
Chromatogram Pattern:		**Gas**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	214 Q
4-Bromofluorobenzene	60	140	275 Q

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-3-9.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/09/97
Attention: Ross Tinline	Lab Number: 9706133-09	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP01

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	500	3200
Benzene	2.5	5.8
Toluene	2.5	130
Ethyl Benzene	2.5	83
Xylenes (Total)	2.5	340
Chromatogram Pattern:		Gas

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	129
4-Bromofluorobenzene	60	140	Q

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-4-3.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/09/97
Attention: Ross Tinline	Lab Number: 9706133-10	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP01

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	**0.0050**	**0.0058**
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	**0.0050**	**0.010**
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	96
4-Bromofluorobenzene	60	140	113

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-4-6.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/09/97
Attention: Ross Tinline	Lab Number: 9706133-11	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP01

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	**1.0**	**1.3**
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		
Weathered Gas		**C6-C12**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	93
4-Bromofluorobenzene	60	140	111

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-4-9.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/10/97
Attention: Ross Tinline	Lab Number: 9706133-12	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP18

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1000	10000
Benzene	5.0	86
Toluene	5.0	470
Ethyl Benzene	5.0	210
Xylenes (Total)	5.0	960
Chromatogram Pattern:		Gas

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	186 Q
4-Bromofluorobenzene	60	140	Q

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-5-3.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/10/97
Attention: Ross Tinline	Lab Number: 9706133-13	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP01

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	97
4-Bromofluorobenzene	60	140	116

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-5-6.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/10/97
Attention: Ross Tinline	Lab Number: 9706133-14	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP01

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	1.0	N.D.
Benzene	0.0050	N.D.
Toluene	0.0050	N.D.
Ethyl Benzene	0.0050	N.D.
Xylenes (Total)	0.0050	N.D.
Chromatogram Pattern:		

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	85
4-Bromofluorobenzene	60	140	96

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group	Client Proj. ID: 320-162.1C/50800,800 CenterSt	Sampled: 05/30/97
2025 Gateway Place, Suite 440	Sample Descript: SV-5-9.0'	Received: 06/03/97
San Jose, CA 95110	Matrix: SOLID	Extracted: 06/09/97
	Analysis Method: 8015Mod/8020	Analyzed: 06/10/97
Attention: Ross Tinline	Lab Number: 9706133-15	Reported: 06/26/97

QC Batch Number: GC060997BTEXEXA
Instrument ID: GCHP18

Total Purgeable Petroleum Hydrocarbons (TPPH) with BTEX

Analyte	Detection Limit mg/Kg	Sample Results mg/Kg
TPPH as Gas	**1000**	**7900**
Benzene	**5.0**	**20**
Toluene	**5.0**	**410**
Ethyl Benzene	**5.0**	**130**
Xylenes (Total)	**5.0**	**690**
Chromatogram Pattern:		**Gas**

Surrogates	Control Limits %		% Recovery
Trifluorotoluene	70	130	162 Q
4-Bromofluorobenzene	60	140	4 Q

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

SEQUOIA ANALYTICAL - ELAP #1210

Tod Granicher
Project Manager

Sequoia Analytical

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819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Pacific Environmental Group
2025 Gateway Place, Suite 440
San Jose, CA 95110
Attention: Ross Tinline

Client Proj. ID: 320-162.1C/50800,800 CenterSt
Lab Proj. ID: 9706133

Received: 06/03/97
Reported: 06/26/97

LABORATORY NARRATIVE

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

TPPH note:
Surrogates for this analysis co-elute with target compounds such as gasoline. Sequoia Analytical confirms co-elution for every QC set that displays this behavior.
In addition, Bromoflurobenzene is added to each sample before it is extracted. Consequently, whenever a sample is diluted due to the presence of target or non-target compounds, BFB is diluted accordingly. For any sample requiring a large dilution, no BFB recovery can be expected. Trifluortoluene is not affected this way since it is add to each sample immediately before injection into the autosampler.

SEQUOIA ANALYTICAL

Tod Granicher
Project Manager

CLIENT NAME: PEG
REC. BY (PRINT): M. Gaines

WORKORDER: 9706133
DATE OF LOG-IN: 6/5/97

CIRCLE THE APPROPRIATE RESPONSE

1. Custody Seal(s): Present / (Absent) Intact / Broken*
2. Custody Seal #: Put in Remarks Section
3. Chain-of-Custody: (Present) / Absent*
4. Traffic Reports or Packing List: Present / (Absent)
5. Airbill: Airbill / Sticker Present / (Absent)
6. Airbill #: /
7. Sample Tags: (Present) / Absent
   Sample Tags #s: (Listed) / Not Listed on Chain-of-Custody
8. Sample Condition: (Intact) / Broken* / Leaking*
9. Does information on custody reports, traffic reports and sample tags agree? (Yes) / No*
10. Proper Preservatives used: (Yes) / No*
11. Date Rec. at Lab: 6-3-97
12. Time Rec. at Lab: 1332
13. Temp Rec. at Lab: 11°C

LAB SAMPLE #	DASH #	CLIENT IDENTIFICATION	CONTAINER DESCRIPTION	SAMPLE MATRIX	DATE SAMP.	REMARKS: CONDITION (ETC.)
1	A	SU-1-3'	Cure	S	5-30-97	
2		SU-1-6'				
3		-1-8.5'				
4		-2-3.5'				
5		-2-6.0'				
6		-2-9.0'				
7		-3-3.0'				
8		-3-6.0'				
9		-3-9.0'				
10		-4-3.0'				
11		-4-6.0'				
12		-4-9.0'				
13		-5-3.0'				
14		-5-6.0'				
15		-5-9.0'				
			6-3-97			

*if Circled, contact Project Manager and attach record of resolution.

Chain of Custody Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number: 50800
Facility Address: 800 Center Street
Consultant Project Number: 320-162.1C
Consultant Name: Pacific Environmental Group, Inc
Address: 2025 Gateway Place Suite 440
Project Contact (Name): Tom Barry (Ross Tinline)
(408) (Phone) 441-7500 ext 275 (Fax Number) 441-7539

Chevron Contact (Name): Phil Briggs
(Phone): 510 842-9136
Laboratory Name: Sequoia
Laboratory Release Number: P.O. 34473
Samples Collected by (Name): Tom Barry
Collection Date: 5/30/97
Signature:

Analyses To Be Performed: 8270 6(33

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)	Organic Carbon D-2974 Content				
SV-1-3'			S			1	YES	X								X				
SV-1-6'			↓			2		↓												
SV-1-8.5'						3										X				
SV-2-3.5						4										X				
SV-2-6.0'						5														
SV-2-9.0'						6										X				
SV-3-3.0'						7														
SV-3-6.0'						8														
SV-3-9.0'						9														
SV-4-3.0'						10														
SV-4-6.0'						11														
SV-4-9.0'						12														
SV-5-3.0'						13														
SV-5-6.0'			↓			14		↓												

NOTE:
DO NOT BILL
TB-LB SAMPLE

JN 3 1 31

Remarks

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Tom Barry	PEG	6/2 1130	Kristy Flores	PEG	6/2/97 1420
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Kristy Flores	PEG	6/3/97 1111		SEQ	6/3/97 1111
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
	SEQ	6/3/97 1340			6-3-97 1531

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

Fax copy of Lab Report and COC to Chevron Contact: ☐ No

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number _____
Facility Address _____
Consultant Project Number 320-162.1C
Consultant Name _____
Address _____
Project Contact (Name) _____
(Phone) _____ (Fax Number) _____

Chevron Contact (Name) _____
(Phone) _____
Laboratory Name _____
Laboratory Release Number _____
Samples Collected by (Name) _____
Collection Date _____
Signature _____

Analyses To Be Performed 970633

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)					Remarks
SV-S-90			S			HCl	Y	X												NOTE: DO NOT BILL TB-LB SAMPLE

Relinquished By (Signature) Russ Flowers — Organization PEG — Date/Time 6/3/97 1111
Relinquished By (Signature) D. Wright — Organization SEQ — Date/Time 6/3/97 1440
Relinquished By (Signature) _____ — Organization _____ — Date/Time _____

Received By (Signature) D. Wright — Organization SEQ — Date/Time 6/3/97 1111
Received By (Signature) _____ — Organization _____ — Date/Time _____
Received For Laboratory By (Signature) _____ — Date/Time 6-3-97 1331

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

@AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 9706026A

Work Order Summary

CLIENT: Mr. Ross Tinline
Pacific Environmental Group, Inc.
2025 Gateway Place, Suite 440
San Jose, CA 95110

BILL TO: Same

PHONE: 408-441-7500
FAX: 408-441-7539
DATE RECEIVED: 6/3/97
DATE COMPLETED: 6/25/97

P.O. # 34475
PROJECT # 320-162.1C 800 Center Street, Oakland

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A	SV-1-3'	TO-3	0 "Hg
02A	SV-1-6'	TO-3	0 "Hg
03A	SV-1-9'	TO-3	0 "Hg
04A	SV-3-3'	TO-3	1.0 "Hg
05A	SV-3-6'	TO-3	1.0 "Hg
06A	SV-3-8'	TO-3	1.5 "Hg
07A	SV-4-3'	TO-3	1.0 "Hg
08A	SV-4-6'	TO-3	1.5 "Hg
08AA	SV-4-6' Duplicate	TO-3	1.5 "Hg
09A	SV-4-9'	TO-3	1.0 "Hg
10A	SV-5-3.0'	TO-3	1.5 "Hg
11A	SV-5-6.0'	TO-3	4.5 "Hg
12A	SV-5-9.0'	TO-3	1.0 "Hg
13A	SV-2-30	TO-3	1.0 "Hg
14A	SV-2-6.0	TO-3	1.5 "Hg
15A	SV-2-9.0'	TO-3	1.5 "Hg
16A	Method Spike	TO-3	NA
17A	Lab Blank	TO-3	NA
17B	Lab Blank	TO-3	NA

CERTIFIED BY: M Stallard for
Laboratory Director

DATE: 6/26/97

Certification numbers: CA ELAP - 1149, NY ELAP - 11291, UT ELAP - E-217

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA 95630
(916) 985-1000 • (800) 985-5955 • FAX (916) 985-1020

AIR TOXICS LTD.

SAMPLE NAME: SV-1-3'
ID#: 9706026A-01A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061120**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**50.5**	**Date of Analysis:**	**6/11/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.051	0.16	0.053	0.17
Toluene	0.051	0.19	0.43	1.6
Ethyl Benzene	0.051	0.22	0.17	0.75
Total Xylenes	0.051	0.22	1.2	5.3

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061120**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**50.5**	**Date of Analysis:**	**6/11/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.51	2.1	88	360
C2 - C4** Hydrocarbons	0.51	0.92	14	26

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-1-6'
ID#: 9706026A-02A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061122**	**Date of Collection: 5/30/97**	
Dil. Factor:	**5050**	**Date of Analysis: 6/11/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	5.1	16	20	65
Toluene	5.1	19	84	320
Ethyl Benzene	5.1	22	19	84
Total Xylenes	5.1	22	98	430

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061122**	**Date of Collection: 5/30/97**	
Dil. Factor:	**5050**	**Date of Analysis: 6/11/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	51	210	12000	50000
C2 - C4** Hydrocarbons	51	92	1000	1800

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-1-9'
ID#: 9706026A-03A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061123**	**Date of Collection: 5/30/97**	
Dil. Factor:	**2020**	**Date of Analysis: 6/11/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	2.0	6.6	9.9	32
Toluene	2.0	7.7	190	730
Ethyl Benzene	2.0	8.9	76	340
Total Xylenes	2.0	8.9	320	1400

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061123**	**Date of Collection: 5/30/97**	
Dil. Factor:	**2020**	**Date of Analysis: 6/11/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	20	84	5800	24000
C2 - C4** Hydrocarbons	20	37	130	240

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-3-3'
ID#: 9706026A-04A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061126**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**20.9**	**Date of Analysis:**	**6/11/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.021	0.068	Not Detected	Not Detected
Toluene	0.021	0.080	0.14	0.54
Ethyl Benzene	0.021	0.092	0.34	1.5
Total Xylenes	0.021	0.092	2.8	12

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061126**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**20.9**	**Date of Analysis:**	**6/11/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.21	0.87	43	180
C2 - C4** Hydrocarbons	0.21	0.38	27	49

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-3-6'
ID#: 9706026A-05A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061211**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**34.8**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.035	0.11	Not Detected	Not Detected
Toluene	0.035	0.13	0.11	0.42
Ethyl Benzene	0.035	0.15	0.19	0.84
Total Xylenes	0.035	0.15	1.3	5.7

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061211**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**34.8**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.35	1.4	20	83
C2 - C4** Hydrocarbons	0.35	0.64	Not Detected	Not Detected

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-3-8'
ID#: 9706026A-06A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061212**	**Date of Collection: 5/30/97**	
Dil. Factor:	**107**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.11	0.35	2.0	6.5
Toluene	0.11	0.41	14	54
Ethyl Benzene	0.11	0.47	6.8	30
Total Xylenes	0.11	0.47	10	44

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061212**	**Date of Collection: 5/30/97**	
Dil. Factor:	**107**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	1.1	4.4	1300	5400
C2 - C4** Hydrocarbons	1.1	2.0	210	380

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-4-3'
ID#: 9706026A-07A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name: 6061213 **Date of Collection: 5/30/97**
Dil. Factor: 2.09 **Date of Analysis: 6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.002	0.007	Not Detected	Not Detected
Toluene	0.002	0.008	0.009	0.034
Ethyl Benzene	0.002	0.009	0.038	0.17
Total Xylenes	0.002	0.009	0.11	0.48

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name: 6061213 **Date of Collection: 5/30/97**
Dil. Factor: 2.09 **Date of Analysis: 6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.021	0.087	17	71
C2 - C4** Hydrocarbons	0.021	0.038	Not Detected	Not Detected

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-4-6'
ID#: 9706026A-08A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name: 6061214 **Date of Collection:** 5/30/97
Dil. Factor: 2.13 **Date of Analysis:** 6/12/97

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.002	0.007	Not Detected	Not Detected
Toluene	0.002	0.008	0.021	0.080
Ethyl Benzene	0.002	0.009	0.11	0.48
Total Xylenes	0.002	0.009	0.31	1.4

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name: 6061214 **Date of Collection:** 5/30/97
Dil. Factor: 2.13 **Date of Analysis:** 6/12/97

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.021	0.089	66	270
C2 - C4** Hydrocarbons	0.021	0.039	1.2	2.2

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-4-6' Duplicate
ID#: 9706026A-08AA

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061215**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**5.73**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.006	0.019	Not Detected	Not Detected
Toluene	0.006	0.022	0.022	0.084
Ethyl Benzene	0.006	0.025	0.13	0.57
Total Xylenes	0.006	0.025	0.37	1.6

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061215**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**5.73**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.057	0.24	73	300
C2 - C4** Hydrocarbons	0.057	0.10	1.2	2.2

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-4-9'
ID#: 9706026A-09A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061216**	**Date of Collection: 5/30/97**	
Dil. Factor:	**1040**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	1.0	3.4	5.3	17
Toluene	1.0	4.0	39	150
Ethyl Benzene	1.0	4.6	8.1	36
Total Xylenes	1.0	4.6	36	160

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061216**	**Date of Collection: 5/30/97**	
Dil. Factor:	**1040**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	10	43	1300	5400
C2 - C4** Hydrocarbons	10	19	490	900

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-5-3.0'

ID#: 9706026A-10A

EPA METHOD TO-3

(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061217**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**2.13**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.002	0.007	Not Detected	Not Detected
Toluene	0.002	0.008	0.004	0.015
Ethyl Benzene	0.002	0.009	0.002	0.009
Total Xylenes	0.002	0.009	0.016	0.071

TOTAL PETROLEUM HYDROCARBONS

GC/FID

(Quantitated as Gasoline)

File Name:	**6061217**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**2.13**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.021	0.089	1.2	5.0
C2 - C4** Hydrocarbons	0.021	0.039	0.14	0.26

*TPH referenced to Gasoline (MW=100)

**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-5-6.0'
ID#: 9706026A-11A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061219**	**Date of Collection: 5/30/97**	
Dil. Factor:	**6.71**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.007	0.022	0.26	0.84
Toluene	0.007	0.026	1.6	6.1
Ethyl Benzene	0.007	0.030	0.18	0.79
Total Xylenes	0.007	0.030	0.75	3.3

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061219**	**Date of Collection: 5/30/97**	
Dil. Factor:	**6.71**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.067	0.28	160	660
C2 - C4** Hydrocarbons	0.067	0.12	94	170

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-5-9.0'
ID#: 9706026A-12A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061221**	**Date of Collection: 5/30/97**	
Dil. Factor:	**522**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.52	1.7	3.4	11
Toluene	0.52	2.0	22	84
Ethyl Benzene	0.52	2.3	5.4	24
Total Xylenes	0.52	2.3	25	110

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061221**	**Date of Collection: 5/30/97**	
Dil. Factor:	**522**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	5.2	22	260	1100
C2 - C4** Hydrocarbons	5.2	9.5	13	24

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-2-30
ID#: 9706026A-13A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061222**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**2.09**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.002	0.007	Not Detected	Not Detected
Toluene	0.002	0.008	0.029	0.11
Ethyl Benzene	0.002	0.009	0.025	0.11
Total Xylenes	0.002	0.009	0.12	0.53

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061222**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**2.09**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.021	0.087	2.7	11
C2 - C4** Hydrocarbons	0.021	0.038	0.26	0.48

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-2-6.0
ID#: 9706026A-14A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061223**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**532**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.53	1.7	6.7	22
Toluene	0.53	2.0	27	100
Ethyl Benzene	0.53	2.3	4.4	19
Total Xylenes	0.53	2.3	15	66

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061223**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**532**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	5.32	22	6500	27000
C2 - C4** Hydrocarbons	5.32	9.7	1500	2700

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: SV-2-9.0'
ID#: 9706026A-15A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061225**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**532**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.53	1.7	22	71
Toluene	0.53	2.0	180 E	690 E
Ethyl Benzene	0.53	2.3	58	260
Total Xylenes	0.53	2.3	220	970

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061225**	**Date of Collection:**	**5/30/97**
Dil. Factor:	**532**	**Date of Analysis:**	**6/12/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	5.32	22	3100	13000
C2 - C4** Hydrocarbons	5.32	9.7	120	220

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

E = Exceeds instrument calibration range, but within linear range.

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: Method Spike
ID#: 9706026A-16A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061101**	**Date of Collection:**	**NA**
Dil. Factor:	**1.00**	**Date of Analysis:**	**6/11/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	% Recovery
Benzene	0.001	0.003	101
Toluene	0.001	0.004	101
Ethyl Benzene	0.001	0.004	110
Total Xylenes	0.001	0.004	103

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061102**	**Date of Collection:**	**NA**
Dil. Factor:	**1.00**	**Date of Analysis:**	**6/11/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	% Recovery
TPH* (C5+ Hydrocarbons)	0.010	0.042	92
C2 - C4** Hydrocarbons	0.010	0.018	92

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type:NA

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank
ID#: 9706026A-17A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061103**	**Date of Collection:**	**NA**
Dil. Factor:	**1.00**	**Date of Analysis:**	**6/11/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.001	0.003	Not Detected	Not Detected
Toluene	0.001	0.004	Not Detected	Not Detected
Ethyl Benzene	0.001	0.004	Not Detected	Not Detected
Total Xylenes	0.001	0.004	Not Detected	Not Detected

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061103**	**Date of Collection:**	**NA**
Dil. Factor:	**1.00**	**Date of Analysis:**	**6/11/97**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.010	0.042	Not Detected	Not Detected
C2 - C4** Hydrocarbons	0.010	0.018	Not Detected	Not Detected

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: NA

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank
ID#: 9706026A-17B

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name:	**6061209**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.001	0.003	Not Detected	Not Detected
Toluene	0.001	0.004	Not Detected	Not Detected
Ethyl Benzene	0.001	0.004	Not Detected	Not Detected
Total Xylenes	0.001	0.004	Not Detected	Not Detected

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name:	**6061209**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 6/12/97**	

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.010	0.042	Not Detected	Not Detected
C2 - C4** Hydrocarbons	0.010	0.018	Not Detected	Not Detected

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: NA

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

CHAIN-OF-CUSTODY RECORD

Nº 11079

Contact Person: Tom Barry / Ross Tinline
Company: Pacific Environmental Group Inc
Address: 2025 Gateway City: SJ State: CA Zip: 95110
Phone: 408-441-7500 x275 FAX: 408-441-7539
Collected By: Signature: Tom Barry

Project info:
P.O. #: 34475
Project #: 320-162.1C
Project Name: 800 Center Street, Oakland

Turn Around Time:
☑ Normal
☐ Rush ____ Specify

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
01A	SV-1-3'	5/30 950	TPH-g, BTEX, CO_2, D.O. (TO3)			0"Hg
02A	SV-1-6'	5/30 1000	↓ ↓ ↓ ↓			0"Hg
03A	SV-1-9'	5/30 1020				0"Hg
04A/AA	SV-3-3'	5/30 1023	TPH-g BTEX (TO3)			1.0"Hg
05A	SV-3-6'	5/30 1025				1.0"Hg
06A	SV-3-8'	5/30 1040				1.5"Hg
07A	SV-4-3'	5/30 1107				1.0"Hg
08A	SV-4-6'	5/30 1115				1.5"Hg
09A	SV-4-9'	5/30 1120	↓ ↓			1.0"Hg

Relinquished By: (Signature) Date/Time: 6/2
Print Name: Tom Barry
Relinquished By: (Signature) Date/Time: 6/2 1350
Received By: (Signature) Date/Time
Relinquished By: (Signature) Date/Time
Received By: (Signature) Date/Time: 6/3/17 11:14

Notes:

Lab Use Only

Shipper Name	Air Bill #	Opened By:	Date/Time	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
FED EX	2025445 651		6/3/17 11:14	Ambient	Good	Yes No None (N/A)	970602CA

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

CHAIN-OF-CUSTODY RECORD

Nº 11078

Contact Person: Tom Barry / Ross Tinline
Company: Pacific Environmental Group
Address: 2025 Gateway City: SJ State: CA Zip: 95110
Phone: 408-441-7500x275 FAX: 408-441-7539
Collected By: Signature: Tom Barry

Project info:
P.O. # 34475
Project # 320-162.1C
Project Name: 800 Center Street, Oakland

Turn Around Time:
☑ Normal
☐ Rush ____ Specify

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
10A	SV-5-3.0'	5/30 1150	TPH-g, BTEX (TO3)			1.5"Hg
11A	SV-5-6.0'	5/30 1155	↓ ↓			4.5"Hg
12A	SV-5-9.0'	5/30 1203				1.0"Hg
13A	SV-2-3.0	5/30 1225	TPH-g, BTEX, CO_2, D.O. (TO3)			1.0"Hg
14A	SV-2-6.0	5/30 1232	↓ ↓ ↓ ↓			1.5"Hg
15A	SV-2-9.0'	5/30 1235				1.5"Hg
	Canister 9519	Not Used				Vac
						6/4/97

Relinquished By: (Signature) Date/Time: Tom Barry 6/3
Print Name: Tom Barry
Relinquished By: (Signature) Date/Time: Krissy Elsonda 6/3 1350
Received By: (Signature) Date/Time: [illegible] 6/3/97 1649
Relinquished By: (Signature) Date/Time:
Received By: (Signature) Date/Time:

Notes:

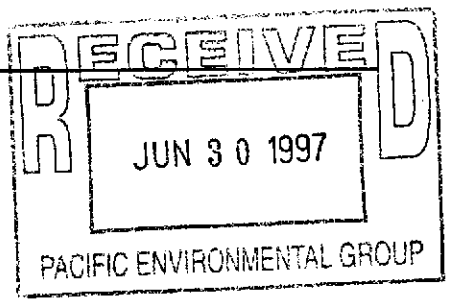
Lab Use Only

Shipper Name	Air Bill #	Opened By:	Date/Time	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
Fed Ex	2025445651	[illegible]	6/3/97 1649	Ambient	Good	Yes No None (N/A)	97060356A

Form 1293 rev. 06

@AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY



WORK ORDER #: 9706026B

Work Order Summary

CLIENT: Mr. Ross Tinline
Pacific Environmental Group, Inc.
2025 Gateway Place, Suite 440
San Jose, CA 95110

BILL TO: Same

PHONE: 408-441-7500
FAX: 408-441-7539
DATE RECEIVED: 6/3/97
DATE COMPLETED: 6/25/97

P.O. # 34475
PROJECT # 320-162.1C 800 Center Street, Oakland

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A	SV-1-3'	ASTM D-3416	0 "Hg
02A	SV-1-6'	ASTM D-3416	0 "Hg
03A	SV-1-9'	ASTM D-3416	0 "Hg
13A	SV-2-30	ASTM D-3416	1.0 "Hg
14A	SV-2-6.0	ASTM D-3416	1.5 "Hg
15A	SV-2-9.0'	ASTM D-3416	1.5 "Hg
16A	Lab Blank	ASTM D-3416	NA
16B	Lab Blank	ASTM D-3416	NA

CERTIFIED BY: _____ Laboratory Director

DATE: 6/26/97

Certification numbers: CA ELAP - 1149, NY ELAP - 11291, UT ELAP - E-217

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA 95630
(916) 985-1000 • (800) 985-5955 • FAX (916) 985-1020

AIR TOXICS LTD.

Atmospheric Gases by Modified ASTM D-3416
GC/TCD/FID

Field Sample I.D.	Lab Sample I.D.	File Name	Sample Date	Analyzed For	Dilution Factor	Det. Limit (%)	Amount (%)
SV-1-3'	9706026B-01A	3060407	5/30/97	Oxygen	2.02	0.020	21 B
				Carbon Dioxide	2.02	0.002	0.87
SV-1-6'	9706026B-02A	3060408	5/30/97	Oxygen	2.02	0.020	19 B
				Carbon Dioxide	2.02	0.002	1.0
SV-1-9'	9706026B-03A	3060409	5/30/97	Oxygen	2.02	0.020	21 B
				Carbon Dioxide	2.02	0.002	0.069
SV-2-30	9706026B-13A	3060516	5/30/97	Oxygen	2.09	0.021	16 B
				Carbon Dioxide	2.09	0.002	6.0 B
SV-2-6.0	9706026B-14A	3060515	5/30/97	Oxygen	2.09	0.021	19 B
				Carbon Dioxide	2.09	0.002	2.2 B
SV-2-9.0'	9706026B-15A	3060517	5/30/97	Oxygen	2.13	0.021	21 B
				Carbon Dioxide	2.13	0.002	0.16 B
Lab Blank	9706026B-16A	3060405	NA	Oxygen	1.00	0.010	0.027
				Carbon Dioxide	1.00	0.001	Not Detected
Lab Blank	9706026B-16B	3060505	NA	Oxygen	1.00	0.010	0.029
				Carbon Dioxide	1.00	0.001	0.004

Analysis Date: 6/4/97& 6/5/97
Container Type: 1 Liter Summa Canister

COMMENTS: NA = Not Applicable
B = Compound present in laboratory blank, background subtraction not performed.

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

CHAIN-OF-CUSTODY RECORD

Contact Person: Tom Barry / Ross Tellez
Company: Pacific Environmental Group Inc
Address: 2025 Gateway City: SJ State: CA Zip: 95110
Phone: 408-441-7500 x275 FAX: 408-441-7539
Collected By: Signature: Tom Barry

Project info:
P.O. #: 34175
Project #: 53.162.1C
Project Name: 2nd & Center Street, Oakland

Turn Around Time:
☑ Normal
☐ Rush ____ Specify

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
01A	SV-1-3'	5/30 950	TPH-g, BTEX, CO2, O2 (TO3)		07½	1.5½
02A	SV-1-6'	5/30 1000	↓		1.0½	
03A	SV-1-9'	5/30 1010	↓		1.0½	7½
04A/AA	SV-3-3'	5/30 1023	TPH-g BTEX (TO3)		1.0½	
05A	SV-3-6'	5/30 1035			1.0½	
06A	SV-3-9'	5/30 1040				
07A	SV-4-3'	5/30 1107				
08A	SV-4-6'	5/30 1115				
09A	SV-4-9'	5/30 1120	↓			

VS 6/11/97

Relinquished By: (Signature) Date/Time: 6/2
Print Name: Tom Barry
Relinquished By: (Signature) Date/Time: 6/2 1350
Received By: (Signature) Date/Time
Relinquished By: (Signature) Date/Time
Received By: (Signature) Date/Time: 6/3/97 1144

Notes:

Lab Use Only

Shipper Name	Air Bill #	Opened By:	Date/Time	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
FED EX	8025445651		6/3/97 1144	Ambient		Yes No None (N/A)	9706026

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

CHAIN-OF-CUSTODY RECORD

Contact Person: Tom Barry/Ron Tubbs
Company: Pacific Environmental Group
Address: 2025 Gateway City: SS State: CA Zip: 9510
Phone: 408-441-7500, 275 FAX: 408-441-7539
Collected By: Signature: Tom Barry

Project info:
P.O. #:
Project #: 300-462.1C
Project Name: 900 Center Street, Oakland

Turn Around Time:
☑ Normal
☐ Rush ____ Specify

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt	
10A	SV-5-3.0'	5/30 11??	TPH-g, BTEX (TO3)				1.5
11A	SV-5-6.0'	5/30 11??	↓ ↓				1.5
12A	SV-5-9.0'	5/30 12??	↓ ↓				1.5
13A	SV-2-3.0'	5/30 1205	TPH-g, BTEX, CO2, H2O (TO3)				1.5
14A	SV-2-6.0'	5/30 1232	↓ ↓ ↓ ↓				1.5
15A	SV-2-9.0'	5/30 1235	↓ ↓ ↓ ↓				1.5
	Canister 9519	Not Used					

Relinquished By: (Signature) Date/Time: Tom Barry 6/2
Print Name: Tom Barry
Relinquished By: (Signature) Date/Time: 6/2 1:50
Received By: (Signature) Date/Time:
Relinquished By: (Signature) Date/Time:
Received By: (Signature) Date/Time:

Notes:

Lab Use Only

Shipper Name	Air Bill #	Opened By:	Date/Time	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
Fed Ex	802 574 5651		6/3/1999	Ambient	Good	Yes No None N/A	9706026B

Form 1293 rev. 06

COOPER
TESTING LABORATORY

COOPER TESTING LABORATORY
1951 Colony, Unit X
Mountain View, California 94043
Tel: 415 968-9472 FAX: 415 968-4228

LETTER OF TRANSMITTAL

TO: Pacific Environmental Group
2025 Gateway Place, #440
San Jose, CA 95110
Attn: Tom Barry

DATE: June 17, 1997

PROJECT: 320-162.1C

CTL#: 049-026

ENCLOSED: Laboratory soil test data.

REMARKS:

David R Coy

COOPER TESTING LAB

Falling Head Permeability
ASTM D 5084
Cooper Testing Lab, Inc.

Job No:	049-026	Boring:		Date:	06/06/97
Client:	Pacific Env.	Sample:	SV-1-2.5	By:	DC
Project:	320-162.1c	Depth:			
Soil:	yellow brown silty SAND, dry				

Sample Pressures:
Cell: 80 psi Bot. Cap: 75.5 psi Top Cap: 74.5 psi Max. Hydraulic Gradient: 19

Elapsed Time (min)	Head, (cm)	Permeability cm/sec
0	98.33	Start of Test
0.7	78.33	9.2 x 10E-4
1.6	58.33	9.1 x 10E-4
2.6	42.33	9.1 x 10E-4
0	98.33	
0.7	78.33	8.5 x 10E-4
1.4	58.33	8.8 x 10E-4
2.4	42.33	8.7 x 10E-4
0	98.33	
1	72.43	8.5 x 10E-4

Average Permeability: 9 x 10E-4 cm/sec

Sample Data:	Initial		Final
Height, in.:	2.00		1.98
Diameter, in.:	1.60		1.49
Area, in2:	2.01		1.74
Volume, in3:	4.02		3.45
Total Volume, cc:	65.90		56.58
Vol of Solids, cc:	36.41		36.41
Vol. of Voids, cc:	29.49		20.17
Void Ratio:	0.81		0.55
Porosity, %:	44.75		35.65
Saturation, %	19.67		99.17
Sp. Gravity:	2.70	assumed	2.70
Wet Weight, gm:	104.1		118.3
Dry Weight, gm:	98.3		98.3
Tare, gm:	0.00		0.00
Moisture, %:	5.9		20.3
Dry Density, pcf:	93.1		108.4

Remarks:

Falling Head Permeability
ASTM D 5084
Cooper Testing Lab, Inc.

Job No:	049-026b	Boring:		Date:	06/10/97
Client:	Pacific Env.	Sample:	SV-2-10	By:	DC
Project:	320-162-1C	Depth:			
Soil:	orange brown silty SAND, (smells of solvents)				

Sample Pressures:
Cell: 70 psi Bot. Cap: 66 psi Top Cap: 64 psi Max. Hydraulic Gradient: 34

Elapsed Time (min)	Head, (cm)	Permeability cm/sec
0	168.67	Start of Test
95	167.47	2.2 x 10E-7
130	166.97	2.3 x 10E-7
232	165.87	2.1 x 10E-7
404	164.07	1.9 x 10E-7
625	161.67	1.9 x 10E-7
1404	152.87	2.0 x 10E-7
2059	146.57	1.8 x 10E-7
4579	121.97	2.0 x 10E-7

Average Permeability: 2 x 10E-7 cm/sec

Sample Data:	Initial	Final
Height, in.:	1.97	1.95
Diameter, in.:	1.59	1.60
Area, in2:	1.99	2.01
Volume, in3:	3.91	3.91
Total Volume, cc:	64.10	64.08
Vol of Solids, cc:	42.29	43.07
Vol. of Voids, cc:	21.81	21.01
Void Ratio:	0.52	0.49
Porosity, %:	34.02	32.78
Saturation, %	97.21	99.48
Sp. Gravity:	2.75 assumed	2.70
Wet Weight, gm:	137.5	137.2
Dry Weight, gm:	116.3	116.3
Tare, gm:	0.00	0.00
Moisture, %:	18.2	18.0
Dry Density, pcf:	113.2	113.2

Remarks:

Falling Head Permeability
ASTM D 5084
Cooper Testing Lab, Inc.

Job No:	049-026c	Boring:		Date:	06/12/97
Client:	Pacific Env.	Sample:	SV-1-9.5	By:	DC
Project:	320-162-1C	Depth:			
Soil:	olive clayey SAND				

Sample Pressures:
Cell: 70 psi Bot. Cap: 66 psi Top Cap: 64 psi Max. Hydraulic Gradient: 33

Elapsed Time (min)	Head, (cm)	Permeability cm/sec
0	168.67	Start of Test
559	166.87	5.2 x 10E-8
1388	164.47	5.1 x 10E-8
2084	162.67	4.7 x 10E-8
3008	160.07	5.1 x 10E-8
3199	159.47	5.0 x 10E-8

Average Permeability: 5 x 10E-8 cm/sec

Sample Data:	Initial		Final
Height, in.:	2.04		2.05
Diameter, in.:	1.67		1.66
Area, in2:	2.19		2.16
Volume, in3:	4.47		4.42
Total Volume, cc:	73.22		72.44
Vol of Solids, cc:	48.62		48.62
Vol. of Voids, cc:	24.61		23.82
Void Ratio:	0.51		0.49
Porosity, %:	33.60		32.88
Saturation, %	99.57		99.91
Sp. Gravity:	2.75	assumed	2.75
Wet Weight, gm:	158.2		157.5
Dry Weight, gm:	133.7		133.7
Tare, gm:	0.00		0.00
Moisture, %:	18.3		17.8
Dry Density, pcf:	113.9		115.2

Remarks:

		pH of Soils, ASTM D-4972 Cooper Testing Lab, Inc.				
Job No.: 049-026a		Client: Project:	Pacific Env. 320-162.1C		Date: By:	06/10/97 DC
Boring No.:	SV-1-2.5	SV-1-9.5	SV-2-3.0	SV-2-10		
Sample No.:						
Soil Type:	brown silty SAND	olive clayey SAND	yellow brown silty SAND	orange brown silty SAND, mottled rust		
pH:	6.31	6.8	7.53	7.03		
Remarks:						

Fax copy of Lab Report and COC to Chevron Contact: ☐ No

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number: 50800
Facility Address: 320 Center Street
Consultant Project Number: 320-160.1C
Consultant Name: Pacific Environmental Group, Inc.
Address: 2025 Gateway Place Suite 440
Project Contact (Name): Tom Barry
(Phone) 441-7500 x275 (Fax Number) 441-7539

Chevron Contact (Name): Phil Briggs
(Phone): 510 842 9136
Laboratory Name: Cooper Testing Lab
Laboratory Release Number: P.O. 34474
Samples Collected by (Name): Tom Barry
Collection Date: 5/30/97
Signature:

Sample Number	Lab Sample Number	Number of Containers	Matrix: S = Soil A = Air W = Water C = Charcoal	Type: G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	Analyses To Be Performed: BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd, Cr, Pb, Zn, Ni (ICAP or AA)	Permeability D-5084	pH 5384				Remarks
SV-1-2.5			S													X	X				NOTE: DO NOT BILL TB-LB SAMPLE
SV-1-9.5			S											~~X~~		X	X				
SV-2-3.0			S											~~X~~		X	X				
SV-2-10.0			S													X	X				
SV-3-3.5			S												HOLD						
SV-3-9.5			S												HOLD						

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Tom Barry	GPG PEG	6/2 1130	Russ Flesner	PEG	6/2/97 1320
Russ Flesner	6/2/97 PEG				
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

COOPER TESTING LABORATORY

RECEIVED
JUL - 3 1997
PACIFIC ENVIRONMENTAL GROUP

COOPER TESTING LABORATORY
1951 Colony, Unit X
Mountain View, California 94043
Tel: 415 968-9472 FAX: 415 968-4228

LETTER OF TRANSMITTAL

TO: Pacific Environmental Group
2025 Gateway Place, #440
San Jose, CA 95110
Attn: Tom Barry

DATE: July 1, 1997

PROJECT: 320-162.1C

CTL#: 049-027

ENCLOSED: Laboratory soil test data.

REMARKS:

COOPER TESTING LAB

Falling Head Permeability
ASTM D 5084
Cooper Testing Lab, Inc.

Job No:	049-027	Boring:		Date:	06/26/97
Client:	Pacific Env.	Sample:	SV-1-6	By:	DC
Project:	320-162.1C	Depth:			
Soil:	gray, mottled orange clayey SAND near sandy CLAY, cemented				

Sample Pressures:
Cell: 60 psi Bot. Cap: 56 psi Top Cap: 54 psi Max. Hydraulic Gradient: 27

Elapsed Time (min)	Head, (cm)	Permeability cm/sec
0	168.67	Start of Test
357	167.97	4.1 x 10E-8
614	167.57	3.6 x 10E-8
1592	165.87	3.9 x 10E-8
2914	164.17	3.4 x 10E-8
4339	162.57	3.0 x 10E-8
4594	162.37	2.9 x 10E-8
4962	162.17	2.5 x 10E-8
5727	161.27	2.7 x 10E-8
6426	160.67	2.4 x 10E-8
7171	159.77	2.5 x 10E-8
	Average Permeability:	3 x 10E-8 cm/sec

Sample Data:	Initial	Final
Height, in.:	2.50	2.51
Diameter, in.:	1.60	1.59
Area, in2:	2.01	1.98
Volume, in3:	5.03	4.98
Total Volume, cc:	82.37	81.57
Vol of Solids, cc:	49.82	49.82
Vol. of Voids, cc:	32.55	31.74
Void Ratio:	0.65	0.64
Porosity, %:	39.52	38.92
Saturation, %	89.10	98.91
Sp. Gravity:	2.80 assumed	2.80
Wet Weight, gm:	168.5	170.9
Dry Weight, gm:	139.5	139.5
Tare, gm:	0.00	0.00
Moisture, %:	20.8	22.5
Dry Density, pcf:	105.7	106.7

Remarks:

Chain of Custody Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number
Facility Address 300 Center Street
Consultant Project Number Pacific Environmental Group 520-162.1C
Consultant Name
Address 2025 Gateway Suite 440
Project Contact (Name) Tom Barry
(408) (Phone) 441-7500 ext 71 (Fax Number) 441-7539

Chevron Contact (Name) Phil Briggs
(Phone)
Laboratory Name Cooper Testing Lab
Laboratory Release Number
Samples Collected by (Name) Tom Barry
Collection Date 5/30/97
Signature Tom Barry

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	Analyses To Be Performed: BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd,Cr,Pb,Zn,Ni (ICP or AA)	Permeability C-5084				Remarks
SV-1-6'																X				Sample Contain. with Gasoline

NOTE:
DO NOT BILL
TB-LB SAMPLE

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Tom Barry	PEG	6/17 350	Russell Flesher	PEG	6/17/97 9AM
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Russell Flesher	PEG	6/17/97		G. Exp.	6/17/97 0940
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

COOPER
TESTING LABORATORY

COOPER TESTING LABORATORY
1951 Colony, Unit X
Mountain View, California 94043
Tel: 415 968-9472 FAX: 415 968-4228

LETTER OF TRANSMITTAL

TO: Pacific Environmental Group
2025 Gateway Place, #440
San Jose, CA 95110
Attn: Tom Barry

DATE: July 8, 1997

PROJECT: 320-162.1C

CTL#: 049-028

ENCLOSED: Laboratory soil test data.

REMARKS:

COOPER TESTING LAB

pH of Soils, ASTM D-4972
Cooper Testing Lab, Inc.

Job No.: 049-028a		Client:	Pacific Env.		Date:	07/07/97
		Project:	320-162.1C320-162.		By:	DC
Boring No.:	SV-3					
Sample No.:	3.5					
Soil Type:	brown silty SAND					
pH:	7.68					

Remarks:

ATTACHMENT B

SOIL VAPOR MODEL AND RBSL TABLES

Determination of Maximum Allowable Concentration of Benzene In Vapor at 3 Feet Below Ground Surface

Residential Receptor - Child Ages 1 Through 16 Years

		Soil Specific Parameters	
ASTM 95	ρ_b	1.7	Bulk Density(g/cm^3) or (kg/L)
ASTM 95	θ_{as}	0.26	Air Content (v/v)
ASTM 95	θ_{ws}	0.12	Water Content (v/v)
ASTM 95	θ_T	0.38	Porosity (v/v)
Recommended	d	91	Depth to (location of) vapor sample (cm) - 3 foot depth
		Diffusivity Parameters	
ASTM 95	H	0.22	Henry's Constant for Benzene
ASTM 95	D^{air}	9.30E-02	Air Diffusion Coefficient (cm^2/s) ✓
ASTM 95	D^{wat}	1.10E-05	Water Diffusion Coefficient (cm^2/s)
Calculated	D^{eff}_s	0.007258	Effective Diffusion Coefficient soil (cm^2/s)
		Prediction of Flux From Benzene Concentration in Soil Vapor	
Iterative Calc	$C_{v,max}$	116	**Maximum Allowable Benzene Concentration In Vapor (ppbv)**
Unit Conv	$C_{v,max}$	0.38	Maximum Allowable Benzene Concentration in Vapor (ug/L)
Calculated	F_{max}	2.99E-08	Maximum Diffusive Vapor Flux Predicted by Benzene Concentration in Soil Vapor (ug/cm^2-sec)
		Indoor Air Concentration	
ASTM 95	Lb	200	Enclosed Space Volume/Infiltration Area Ratio (cm)
ASTM 95	ER_{air}-Indoor	0.00014	Enclosed Space Air Exchange Rate (sec^{-1})
Calculated	C_{indoor}	1.07E-06	Enclosed Space Air Concentration (ug/cm^3) = 1 ug/m^3
		Dose	
ASTM 95	IR_{air}-Indoor	15	Daily Indoor Inhalation Rate (m^3/day)
ASTM 95	EF	350	Exposure Frequency (days/year)
USEPA 1985	ED	16	Child Exposure Duration (years)
Calculated	Dose	89.56591	Dose (mg)
		Risk	
CAL EPA	SF_I	0.1	California Cancer Slope Factor for Benzene (kg-day/mg)
USEPA 1985	BW	35	Child Body Weight (kg)
ASTM 95	AT_c	70	Averaging Time for Carcinogens (years)
Calculated	Risk	1.00E-05	Risk (positives/population)

Formulas

$$D_s^{eff} = D^{air}\frac{\theta_{as}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{ws}^{3.33}}{\theta_T^2}$$

$$F_{max} = D_s^{eff}\frac{C_{v,max}}{d}$$

$$C_{indoor} = \frac{F_{max}}{ER_{air-indoor} \times L_b}$$

$$Dose = C_{indoor} \times IR_{air-indoor} \times EF \times ED$$

$$Risk = \frac{Dose}{BW \times AT} \times SF_I$$

Notes:

ASTM 95 = American Society for Testing and Materials, 1995. Standard Guide for Risk Based Corrective Action Applied at Petroleum Release Sites, E 1739-95.

Calculations: Effective diffusivity, diffusive vapor flux, enclosed space air concentration, dose and risk calculations from ASTM 95 guidance. Formulas presented above. Maximum allowable vapor concentration calculated by iteration to achieve acceptable risk level.

Prepared and Reviewed by:
Tim Utterback, Tom Fojut, Pleas McNeel, Weiss Associates
Ravi Arulanantham, Stephen I. Morse, Regional Water Quality Control Board - San Francisco Bay Region

DRAFT

Residential Receptors (Children Ages 1 Through 16 Years) - Risk Based Screening Levels (RBSLs), Recommended Maximum Allowable Concentration of BTEX in Vapor at 3 Feet Below Ground Surface[a], No Building Slab Assumed (ie. dirt floor).

Units	Benzene[b]		Toluene[c]	Ethylbenzene[c]	Xylenes[c]
	10^{-5} Risk	10^{-6} Risk			
ppbv	116	11.6	27,000	69,000	505,000
µg/L	0.38	0.038	103	304	2,230
µg/m^3	380	38	103,000	304,000	2,230,000

Notes:

a = Calculated using equations and parameters from Tables X2.2, X2.3, X2.4, X2.5, X2.6 and X2.7 of American Society for Testing and Materials, 1995, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, E 1739-95.

b = Concentrations for benzene are based on a carcinogenic risk of 1 in 100,000 (10^{-5}) and 1 in 1,000,000 (10^{-6}) using California's standard cancer slope factor of 0.1 kg-day/mg.

c = Concentrations for non-carcinogenic compounds are based on a chronic hazard quotient of 1.0.

Prepared by Tim Utterback, Tom Fojut & Pleas McNeel, Weiss Associates; Ravi Arulanantham & Stephen I. Morse, RWQCB-SFB

Commercial Receptors - Risk Based Screening Levels (RBSLs), Recommended Maximum Allowable Concentration of BTEX in Vapor at 3 Feet Below Ground Surface[a], No Building Slab Assumed (ie. dirt floor).

Units	Benzene[b]		Toluene[c]	Ethylbenzene[c]	Xylenes[c]
	10^{-5} Risk	10^{-6} Risk			
ppbv	384	38.4	140,000	358,000	2,604,000
µg/L	1.24	0.124	535	1,580	11,500
µg/m^3	1,240	124	535,000	1,580,000	11,500,000

Notes:

a = Calculated using equations and parameters from Tables X2.2, X2.3, X2.4, X2.5, X2.6 and X2.7 of American Society for Testing and Materials, 1995, Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, E 1739-95.

b = Concentrations for benzene are based on a carcinogenic risk of 1 in 100,000 (10^{-5}) and 1 in 1,000,000 (10^{-6}) using California's standard cancer slope factor of 0.1 kg-day/mg.

c = Concentrations for non-carcinogenic compounds are based on a chronic hazard quotient of 1.0.

Prepared by Tim Utterback, Tom Fojut & Pleas McNeel, Weiss Associates; Ravi Arulanantham & Stephen I. Morse, RWQCB-SFB

DRAFT

Determination of Maximum Allowable Concentration of Benzene in Vapor at 3 Feet Below Ground Surface

Commercial Receptor - Adult

		Soil Specific Parameters	
ASTM 95	ρ_s	1.7	Bulk Density(g/cm^3) or (kg/L)
ASTM 95	θ_{as}	0.26	Air Content (v/v)
ASTM 95	θ_{ws}	0.12	Water Content (v/v)
ASTM 95	θ_T	0.38	Porosity (v/v)
Recommended	d	91	Depth to (location of) vapor sample (cm) - 3 foot depth
		Diffusivity Parameters	
ASTM 95	H	0.22	Henry's Constant for Benzene
ASTM 95	D^{air}	9.30E-02	Air Diffusion Coefficient (cm^2/s)
ASTM 95	D^{wat}	1.10E-05	Water Diffusion Coefficient (cm^2/s)
Calculated	D^{eff}_s	0.007258	Effective Diffusion Coefficient soil (cm^2/s)
		Prediction of Flux From Benzene Concentration in Soil Vapor	
Iterative Calc	$C_{v/max}$	364	Maximum Allowable Benzene Concentration in Vapor (ppbv)
Unit Conv	$C_{v/max}$	1.24	Maximum Allowable Benzene Concentration in Vapor (ug/L)
Calculated	F_{max}	9.87E-08	Maximum Diffusive Vapor Flux Predicted by Benzene Concentration in Soil Vapor (ug/cm^2-sec)
		Indoor Air Concentration	
ASTM 95	Lb	300	Enclosed Space Volume/Infiltration Area Ratio (cm)
ASTM 95	ER_{air}-Indoor	0.00023	Enclosed Space Air Exchange Rate (sec^{-1})
Calculated	C_{indoor}	1.43E-06	Enclosed Space Air Concentration (ug/cm^3)
		Dose	
ASTM 95	IR_{air}-Indoor	20	Daily Indoor Inhalation Rate (m^3/day)
ASTM 95	EF	250	Exposure Frequency (days/year)
ASTM 95	ED	25	Exposure Duration (years)
Calculated	Dose	178.6558	Dose (mg)
		Risk	
CAL EPA	SF_i	0.1	California Cancer Slope Factor for Benzene (kg-day/mg)
ASTM 95	BW	70	Body Weight (kg)
ASTM 95	AT_c	70	Averaging Time for Carcinogens (years)
Calculated	Risk	1.00E-05	Risk (positives/population)

Fmax

Formulas

$$D_s^{eff} = D^{air}\frac{\theta_{as}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{ws}^{3.33}}{\theta_T^2}$$

$$F_{max} = D_s^{eff}\frac{C_{v/max}}{d}$$

$$C_{indoor} = \frac{F_{max}}{ER_{air-indoor} \times L_b}$$

$$Dose = C_{indoor} \times IR_{air-indoor} \times EF \times ED$$

$$Risk = \frac{Dose \times SF_i}{BW \times AT}$$

Notes:

ASTM 95 = American Society for Testing and Materials, 1995. Standard Guide for Risk Based Corrective Action Applied at Petroleum Release Sites, E 1739-95.

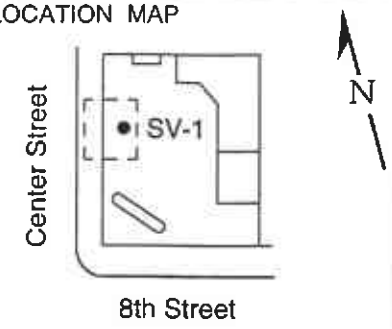
Calculations: Effective diffusivity, diffusive vapor flux, enclosed space air concentration, dose and risk calculations from ASTM 95 guidance. Formulas presented above. Maximum allowable vapor concentration calculated by iteration to achieve acceptable risk level.

Prepared and Reviewed by:
Tim Ulterback, Tom Fojut, Pleas McNeal, Weiss Associates
Ravi Arulananthan, Stephen I. Morse, Regional Water Quality Control Board - San Francisco Bay Region

ATTACHMENT C

SOIL BORING LOGS

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

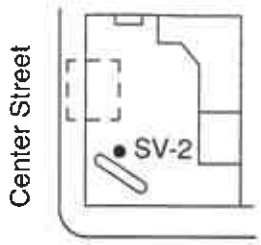
BORING NO. SV-1
PAGE 1 OF 1

PROJECT NO. 320-162.1C
LOGGED BY: T.F.B.
DRILLER: VIRONEX
DRILLING METHOD: GEOPROBE
SAMPLING METHOD: GEOPROBE
CASING TYPE: NA
SLOT SIZE: NA
SAND PACK: NA

CLIENT: CHEVRON
DATE DRILLED: 5-30-97
LOCATION: 800 Center Street
HOLE DIAMETER: 2"
HOLE DEPTH: 12'
WELL DIAMETER: NA
WELL DEPTH: NA
CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	FID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY / SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
Backfilled With Grout				1–7			SM	ASPHALT; TANK BACKFILL SILTY SAND: dark brown; 35% fines; 65% fine sand; faint product odor.
	Dry	20						
	Mst	high		8			CL	SANDY CLAY: dark brown;70% fines; 30% fine sand; strong product odor.
				9–11			SM	SILTY SAND: dark brown; 30% fines; 70% fine sand; strong product odor.
	Wt	high		12				@12': dark brown.
				13–22				BOTTOM OF BORING AT 12'

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

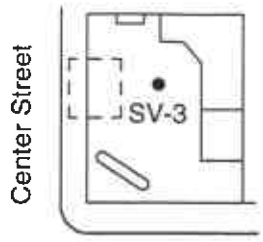
BORING NO. SV-2
PAGE 1 OF 1

PROJECT NO. 320-162.1C
LOGGED BY: T.F.B.
DRILLER: VIRONEX
DRILLING METHOD: GEOPROBE
SAMPLING METHOD: GEOPROBE
CASING TYPE: NA
SLOT SIZE: NA
SAND PACK: NA

CLIENT: CHEVRON
DATE DRILLED: 5-30-97
LOCATION: 800 Center Street
HOLE DIAMETER: 2"
HOLE DEPTH: 10.5'
WELL DIAMETER: NA
WELL DEPTH: NA
CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	FID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY / SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
Backfilled With Grout	Dry	50		1–5			ML	ASPHALT SANDY SILT: dark brown; 65% fines; 35% fine sand; faint product odor.
	Mst			6				@6': as above; gray mottling; moderate product odor.
	Wt			9				@9': as above; some gray and yellow mottling; strong product odor.
				10				BOTTOM OF BORING AT 10.5'
				11–22				

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

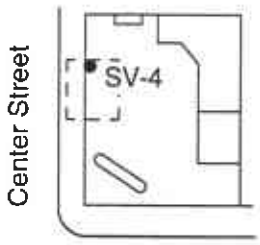
BORING NO. SV-3
PAGE 1 OF 1

PROJECT NO. 320-162.1C
LOGGED BY: T.F.B.
DRILLER: VIRONEX
DRILLING METHOD: GEOPROBE
SAMPLING METHOD: GEOPROBE
CASING TYPE: NA
SLOT SIZE: NA
SAND PACK: NA

CLIENT: CHEVRON
DATE DRILLED: 5-30-97
LOCATION: 800 Center Street
HOLE DIAMETER: 2"
HOLE DEPTH: 10'
WELL DIAMETER: NA
WELL DEPTH: NA
CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	FID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY / SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
Backfilled With Grout	Dry	10		1–10			SM	ASPHALT SILTY SAND: dark brown; 35% fines; 65% fine sand; faint product odor.
	Wt			6				@6': as above; dark brown; 40% fines; 60% fine sand.
▽	Wt			9				@9': as above; dark brown; 45% fines; 55% fine sand; strong product odor.
				10				BOTTOM OF BORING AT 10'
				11–22				

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

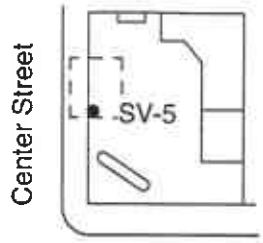
BORING NO. SV-4
PAGE 1 OF 1

PROJECT NO. 320-162.1C
LOGGED BY: T.F.B.
DRILLER: VIRONEX
DRILLING METHOD: GEOPROBE
SAMPLING METHOD: GEOPROBE
CASING TYPE: NA
SLOT SIZE: NA
SAND PACK: NA

CLIENT: CHEVRON
DATE DRILLED: 5-30-97
LOCATION: 800 Center Street
HOLE DIAMETER: 2"
HOLE DEPTH: 9.5'
WELL DIAMETER: NA
WELL DEPTH: NA
CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	FID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY / SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
Backfilled With Grout				1			SM	ASPHALT; TANK BACKFILL SILTY SAND: dark brown; 30% fines; 70% fine sand; faint product odor.
	Dry	30		3				
	Mst	High		6				@6': as above; dark brown; 30% fines; 70% fine sand; moderate product odor.
	Wt	High		9				@9': as above; 35% fines; 65% fine sand; [illegible] product odor.
				10				BOTTOM OF BORING AT 9.5'
				11				
				12				
				13				
				14				
				15				
				16				
				17				
				18				
				19				
				20				
				21				
				22				

LOCATION MAP



PACIFIC ENVIRONMENTAL GROUP, INC.

BORING NO. SV-5
PAGE 1 OF 1

PROJECT NO. 320-162.1C
LOGGED BY: T.F.B.
DRILLER: VIRONEX
DRILLING METHOD: GEOPROBE
SAMPLING METHOD: GEOPROBE
CASING TYPE: NA
SLOT SIZE: NA
SAND PACK: NA

CLIENT: CHEVRON
DATE DRILLED: 5-30-97
LOCATION: 800 Center Street
HOLE DIAMETER: 2"
HOLE DEPTH: 9.5'
WELL DIAMETER: NA
WELL DEPTH: NA
CASING STICKUP: NA

WELL COMPLETION	MOISTURE CONTENT	FID	PENETRATION (BLOWS/FT)	DEPTH (FEET)	RECOVERY / SAMPLE INTERVAL	GRAPHIC	SOIL TYPE	LITHOLOGY / REMARKS
Backfilled With Grout				1			ML	ASPHALT SANDY SILT: dark brown; 65% fines; 35% fine sand; slight product odor.
	Dp	40		3				
	Wt	High		6				@6': as above; 70% fines; 30% fine sand; [illegible] product odor.
	Wt	High		9				@9': as above; strong product odor.
				10				BOTTOM OF BORING AT 9.5'
				22				

049-028

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

049-026

Chevron Facility Number 5080
Facility Address 800 Center Street
Consultant Project Number 320-160.1C
Consultant Name Pacific Environmental Group, Inc.
Address 2025 Gateway Place Suite 440
Project Contact (Name) Tom Barry
408 (Phone) 441-7500 x275 (Fax Number) 441-7539

Chevron Contact (Name) Phil Briggs
(Phone) 510 842 9136
Laboratory Name Cooper Testing Lab
Laboratory Release Number P.O. 34474
Samples Collected by (Name) Tom Barry
Collection Date 5/30/97
Signature

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd,Cr,Pb,Zn,Ni (ICAP or AA)	Permeability D-5084	pH 5884				Remarks
SV-1-2.5			S													X	X				
SV-1-9.5			S													X	X				
SV-2-3.0'			S													X	X				
SV-2-10.0'			S	SMELLS OF GAS												X	X				
SV-3-3.5'			S													HOLD	X				
SV-3-9.5'			S													HOLD	X				

NOTE:
DO NOT BILL
TB-LB SAMPLE

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	PEG	6/2 1130		PEG	6/2/97 1320
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	6/2/97 PEG				
Relinquished By (Signature)	Organization	Date/Time	Received for Laboratory By (Signature)		Date/Time
D. COOPER	CTL	6/17			

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

Table 2
Benzene Child (1 to 16 years) Carcinogenic Risk
maximum concentration from 3 feet below ground surface
SV-1 = 0.17 µg/L

Former Signal Service Station
800 Center Street
Oakland, California

$D^{eff}s$ = Effective diffusion coefficient in soil based on vapor-phase concentration
$D^{eff}s = ((D^{air} * (\theta as^{*3.33}/\theta T^{*2}))+((D^{wat*}1/H^{*}(\theta ws^{*3.33}/\theta T^{*2})))$

$D^{eff}s$ =	0.0112	(cm^2/s)
D^{air} = diffusion coefficient in air =	0.093	(cm^2/s)
Θ_{as} = volumetric air content of vadose zone soils =	0.33	
Θ_{ws} = volumetric water content of vadose zone soils	0.124	
Θ_T = total soil porosity =	0.4557	
D^{wat} = diffusion coefficient in water =	1.10E-05	(cm^2/s)
H = Henry's law constant =	0.22	(L - H_2O/L - air)

F_{max} = Diffusive vapor flux predicted by benzene concentration in soil vapor

$F_{max} = D^{eff}s^{*}$ (Cv/d) =	2.08E-08	(µg/cm2 - sec)	
Cv = maximum benzene concentration in vapor =	0.00017	(µg/cm^3) or	0.17 (µg/L)
d = depth of vapor sample =	91.44	(cm) or	3 (ft)

C_{indoor} = Indoor benzene concentration

$C_{indoor} = F_{max}/ER_{air\text{-}indoor}{}^{*} L_B$ =	7.41E-07	(µg/cm^3)
$ER_{air\text{-}indoor}$ = indoor air exchange rate =	0.00014	(sec^{-1})
L_B = indoor volume/infiltration area ratio =	200	(cm)
Dose = $C_{indoor}{}^{*}IR_{air\text{-}indoor}{}^{*}EF{}^{*}ED$ =	62	(mg)
C_{indoor} =	7.41E-01	(µg/m^3) or 7.41E-07 (µg/cm^3)
$IR_{air\text{-}indoor}$ = Daily indoor inhalation rate =	15	(m^3/day)
EF = exposure frequency =	350	(days/year)
ED = exposure duration =	16	(years)
Risk = ((Dose*SF)/(BW*AT))	3.05E-05	
Dose =	62.261	(mg)
SF = Slope factor =	0.1	(mg/kg-day)$^{-1}$
BW = Body weight =	35	(kg)
AT = Averaging time =	5840	(16 years * 365 days)

70 × 365

Therefore, child carcinogenic risk from maximum benzene soil vapor at 3 feet is 3.05E-05

6.5×10^{-5}

$$\text{Dose} = \frac{\text{ug}}{m^3} \times \frac{m^3}{\text{day}} \times \frac{\text{day}}{\text{year}} \times \text{year} = \text{ug}$$

Table 3
Toluene Adult Non-Carcinogenic Risk
maximum concentration from 3 feet below ground surface
SV-1 = 1.6 μg/L

Former Signal Service Station
800 Center Street
Oakland, California

$D^{eff}s$ = Effective diffusion coefficient in soil based on vapor-phase concentration
$D^{eff}s = ((D^{air} * (\theta as^{*3.33}/\theta T^{*2}))+((D^{wat*}1/H*(\theta ws^{*3.33}/\theta T^{*2})))$

$D^{eff}s$ =	0.0102	(cm^2/s)
D_{air} = diffusion coefficient in air =	0.085	(cm^2/s)
Θ_{as} = volumetric air content of vadose zone soils =	0.33	
Θ_{ws} = volumetric water content of vadose zone soils	0.124	
Θ_T = total soil porosity =	0.4557	
D_{wat} = diffusion coefficient in water =	9.40E-06	(cm^2/s)
H = Henry's law constant =	0.26	(L - H_2O/L - air)

F_{max} = Diffusive vapor flux predicted by toluene concentration in soil vapor

F_{max} = $D^{eff}s$* (Cv/d) =	1.79E-07	(μg/cm^2 - sec)	
Cv = maximum toluene concentration in soil vapor	0.0016	(μg/cm^3) or	1.6 (μg/L)
d = depth of vapor sample =	91.44	(cm) or	3 (ft)

C_{indoor} = Indoor toluene concentration

C_{indoor} = $F_{max}/ER_{air\text{-}indoor}$* L_B =	6.38E-06	(μg/cm^3)	
$ER_{air\text{-}indoor}$ = indoor air exchange rate =	0.00014	(sec^{-1})	
L_B = indoor volume/infiltration area ratio =	200	(cm)	
Dose = C_{indoor}*$IR_{air\text{-}indoor}$*EF*ED =	1004	(mg)	
C_{indoor} =	6	(μg/m^3) or	6.38E-06 (μg/cm^3)
$IR_{air\text{-}indoor}$ = Daily indoor inhalation rate =	15	(m^3/day)	
EF = exposure frequency =	350	(days/year)	
ED = exposure duration =	30	(years)	

Risk = (Dose/(Rfd*BW*AT))	1.19E-02	
Dose =	1004	(mg)
Rfd = Inhalation reference dose =	0.11	$(mg/kg\text{-}day)^{-1}$
BW = Body weight =	70	(kg)
AT = Averaging time =	10950	(30 years * 365 days)

Therefore, adult non-carcinogenic risk from maximum toluene soil vapor at 3 feet is 1.19E-02

Table 4
Toluene Child (1 to 16 years) Non-Carcinogenic Risk
maximum concentration from 3 feet below ground surface
SV-1 = 1.6 µg/L

Former Signal Service Station
800 Center Street
Oakland, California

$D^{eff}s$ = Effective diffusion coefficient in soil based on vapor-phase concentration

$D^{eff}s = ((D^{air} * (\theta as^{*3.33}/\theta T^{*2}))+((D^{wat}*1/H*(\theta ws^{*3.33}/\theta T^{*2})))$

$D^{eff}s$ =	0.0102	(cm^2/s)
D_{air} = diffusion coefficient in air =	0.085	(cm^2/s)
Θ_{as} = volumetric air content of vadose zone soils =	0.33	
Θ_{ws} = volumetric water content of vadose zone soils	0.124	
Θ_T = total soil porosity =	0.4557	
D_{wat} = diffusion coefficient in water =	9.40E-06	(cm^2/s)
H = Henry's law constant =	0.26	(L - H_2O/L - air)

F_{max} = Diffusive vapor flux predicted by toluene concentration in soil vapor

$F_{max} = D^{eff}s^* (Cv/d)$ =	1.79E-07	(µg/cm^2 - sec)
Cv = maximum toluene concentration in soil vapor	0.0016	(µg/cm^3) or 1.6 (µg/L)
d = depth of vapor sample =	91.44	(cm) or 3 (ft)

C_{indoor} = Indoor toluene concentration

$C_{indoor} = F_{max}/ER_{air\text{-}indoor} * L_B$ =	6.38E-06	(µg/cm^3)
$ER_{air\text{-}indoor}$ = indoor air exchange rate =	0.00014	(sec^{-1})
L_B = indoor volume/infiltration area ratio =	200	(cm)

Dose = $C_{indoor}*IR_{air\text{-}indoor}*EF*ED$ =	536	(mg)
C_{indoor} =	6.38E+00	(µg/m^3) or 6.38E-06 (µg/cm^3)
$IR_{air\text{-}indoor}$ = Daily indoor inhalation rate =	15	(m^3/day)
EF = exposure frequency =	350	(days/year)
ED = exposure duration =	16	(years)

Risk = (Dose/(Rfd*BW*AT))	2.38E-02	
Dose =	536	(mg)
Rfd = Inhalation reference dose =	0.11	$(mg/kg\text{-}day)^{-1}$
BW = Body weight =	35	(kg)
AT = Averaging time =	5840	(16 years * 365 days)

Therefore, child non-carcinogenic risk from maximum toluene soil vapor at 3 feet is 2.38E-02

Table 5
Ethylbenzene Adult Non-Carcinogenic Risk
maximum concentration from 3 feet below ground surface
SV-3 = 1.5 µg/L

Former Signal Service Station
800 Center Street
Oakland, California

$D^{eff}s$ = Effective diffusion coefficient in soil based on vapor-phase concentration

$D^{eff}s = ((D^{air} * (\theta as^{*3.33}/\theta T^{*2}))+((D^{wat*}1/H^{*}(\theta ws^{*3.33}/\theta T^{*2})))$

$D^{eff}s$ =	0.0091	(cm^2/s)
D_{air} = diffusion coefficient in air =	0.076	(cm^2/s)
Θ_{as} = volumetric air content of vadose zone soils =	0.33	
Θ_{ws} = volumetric water content of vadose zone soils =	0.124	
Θ_T = total soil porosity =	0.4557	
D_{wat} = diffusion coefficient in water =	8.50E-06	(cm^2/s)
H = Henry's law constant =	0.32	(L - H_2O/L - air)

F_{max} = Diffusive vapor flux predicted by ethylbenzene concentration in soil vapor

$F_{max} = D^{eff}s^{*}$ (Cv/d) =	1.50E-07	(µg/cm^2 - sec)
Cv = maximum ethylbenzene concentration in soil vapor	0.0015	(µg/cm^3) or 1.5 (µg/L)
d = depth of vapor sample =	91.44	(cm) or 3 (ft)

C_{indoor} = Indoor ethylbenzene concentration

$C_{indoor} = F_{max}/ER_{air\text{-}indoor}{}^{*} L_B$ =	5.34E-06	(µg/cm^3)
$ER_{air\text{-}indoor}$ = indoor air exchange rate =	0.00014	(sec^{-1})
L_B = indoor volume/infiltration area ratio =	200	(cm)

Dose = $C_{indoor}{}^{*}IR_{air\text{-}indoor}{}^{*}EF{}^{*}ED$ =	842	(mg)
C_{indoor} =	5	(µg/m^3) or 5.34E-06 (µg/cm^3)
$IR_{air\text{-}indoor}$ = Daily indoor inhalation rate =	15	(m^3/day)
EF = exposure frequency =	350	(days/year)
ED = exposure duration =	30	(years)

Risk = (Dose/(Rfd*BW*AT))	3.79E-03	
Dose =	842	(mg)
Rfd = Inhalation reference dose =	0.29	$(mg/kg\text{-}day)^{-1}$
BW = Body weight =	70	(kg)
AT = Averaging time =	10950	(30 years * 365 days)

Therefore, adult non-carcinogenic risk from maximum ethylbenzene soil vapor at 3 feet is 3.79E-03

Table 6
Ethylbenzene Child (1 to 16 years) Non-Carcinogenic Risk
maximum concentration from 3 feet below ground surface
SV-3 = 1.5 µg/L

Former Signal Service Station
800 Center Street
Oakland, California

$D^{eff}s$ = Effective diffusion coefficient in soil based on vapor-phase concentration
$D^{eff}s = ((D^{air} * (\theta as^{\wedge 3.33}/\theta T^{\wedge 2}))+((D^{wat*}1/H*(\theta ws^{\wedge 3.33}/\theta T^{\wedge 2})))$

$D^{eff}s$ =	0.0091	(cm^2/s)	
D_{air} = diffusion coefficient in air =	0.076	(cm^2/s)	
Θ_{as} = volumetric air content of vadose zone soils =	0.33		
Θ_{ws} = volumetric water content of vadose zone soils =	0.124		
Θ_T = total soil porosity =	0.4557		
D_{wat} = diffusion coefficient in water =	8.50E-06	(cm^2/s)	
H = Henry's law constant =	0.32	(L - H_2O/L - air)	

F_{max} = Diffusive vapor flux predicted by ethylbenzene concentration in soil vapor

$F_{max} = D^{eff}s* (Cv/d)$ =	1.50E-07	(µg/cm^2 - sec)	
Cv = maximum ethylbenzene concentration in soil vapor	0.0015	(µg/cm^3) or	1.5 (µg/L)
d = depth of vapor sample =	91.44	(cm) or	3 (ft)

C_{indoor} = Indoor ethylbenzene concentration

$C_{indoor} = F_{max}/ER_{air\text{-}indoor}* L_B$ =	5.34E-06	(µg/cm^3)	
$ER_{air\text{-}indoor}$ = indoor air exchange rate =	0.00014	(sec^{-1})	
L_B = indoor volume/infiltration area ratio =	200	(cm)	
Dose = $C_{indoor}*IR_{air\text{-}indoor}*EF*ED$ =	449	(mg)	
C_{indoor} =	5	(µg/m^3) or	5.34E-06 (µg/cm^3)
$IR_{air\text{-}indoor}$ = Daily indoor inhalation rate =	15	(m^3/day)	
EF = exposure frequency =	350	(days/year)	
ED = exposure duration =	16	(years)	
Risk = (Dose/(Rfd*BW*AT))	7.57E-03		
Dose =	449	(mg)	
Rfd = Inhalation reference dose =	0.29	$(mg/kg\text{-}day)^{-1}$	
BW = Body weight =	35	(kg)	
AT = Averaging time =	5840	(16 years * 365 days)	

Therefore, child non-carcinogenic risk from maximum ethylbenzene
soil vapor at 3 feet is 7.57E-03

Table 7
Xylene Adult Non-Carcinogenic Risk
maximum concentration from 3 feet below ground surface
SV-3 = 12 µg/L

Former Signal Service Station
800 Center Street
Oakland, California

$D^{eff}s$ = Effective diffusion coefficient in soil based on vapor-phase concentration

$D^{eff}s = ((D^{air} * (\theta as^{3.33}/\theta T^{2}))+((D^{wat}*1/H*(\theta ws^{3.33}/\theta T^{2})))$

$D^{eff}s$ =	0.0086	(cm^2/s)
D_{air} = diffusion coefficient in air =	0.072	(cm^2/s)
Θ_{as} = volumetric air content of vadose zone soils =	0.33	
Θ_{ws} = volumetric water content of vadose zone soils	0.124	
Θ_T = total soil porosity =	0.4557	
D_{wat} = diffusion coefficient in water =	8.50E-06	(cm^2/s)
H = Henry's law constant =	0.29	(L - H_2O/L - air)

F_{max} = Diffusive vapor flux predicted by xylene concentration in soil vapor

$F_{max} = D^{eff}s^* (Cv/d)$ =	1.13E-06	(µg/cm^2 - sec)
Cv = maximum xylene concentration in soil vapor =	0.012	(µg/cm^3) or 12 (µg/L)
d = depth of vapor sample =	91.44	(cm) or 3 (ft)

C_{indoor} = Indoor xylene concentration

$C_{indoor} = F_{max}/ER_{air\text{-}indoor}* L_B$ =	4.05E-05	(µg/cm^3)
$ER_{air\text{-}indoor}$ = indoor air exchange rate =	0.00014	(sec^{-1})
L_B = indoor volume/infiltration area ratio =	200	(cm)

Dose = $C_{indoor}*IR_{air\text{-}indoor}*EF*ED$ =	6380	(mg)
C_{indoor} =	41	(µg/m^3) or 4.05E-05 (µg/cm^3)
$IR_{air\text{-}indoor}$ = Daily indoor inhalation rate =	15	(m^3/day)
EF = exposure frequency =	350	(days/year)
ED = exposure duration =	30	(years)

Risk = (Dose/Rfd*BW*AT)	4.16E-03	
Dose =	6380	(mg)
Rfd = Inhalation reference dose =	2	(mg/kg-day)$^{-1}$
BW = Body weight =	70	(kg)
AT = Averaging time =	10950	(30 years * 365 days)

Therefore, adult non-carcinogenic risk from maximum xylene soil vapor at 3 feet is 4.16E-03

Table 8
Xylene Child (1 to 16 years) Non-Carcinogenic Risk
maximum concentration from 3 feet below ground surface
SV-3 = 12 µg/L

Former Signal Service Station
800 Center Street
Oakland, California

$D^{eff}s$ = Effective diffusion coefficient in soil based on vapor-phase concentration
$D^{eff}s = ((D^{air} * (\theta as^{*3.33}/\theta T^{*2}))+((D^{wat}*1/H*(\theta ws^{*3.33}/\theta T^{*2})))$
$D^{eff}s$ = 0.0086 (cm^2/s)

D_{air} = diffusion coefficient in air =	0.072	(cm^2/s)
Θ_{as} = volumetric air content of vadose zone soils =	0.33	
Θ_{ws} = volumetric water content of vadose zone soils	0.124	
Θ_T = total soil porosity =	0.4557	
D_{wat} = diffusion coefficient in water =	8.50E-06	(cm^2/s)
H = Henry's law constant =	0.29	(L - H_2O/L - air)

F_{max} = Diffusive vapor flux predicted by xylene concentration in soil vapor
$F_{max} = D^{eff}s* (Cv/d)$ = 1.13E-06 (µg/cm^2 - sec)

Cv = maximum xylene concentration in soil vapor =	0.012	(µg/cm^3) or	12 (µg/L)
d = depth of vapor sample =	91.44	(cm) or	3 (ft)

C_{indoor} = Indoor xylene concentration
$C_{indoor} = F_{max}/ER_{air\text{-}indoor} * L_B$ = 4.05E-05 (µg/cm^3)

$ER_{air\text{-}indoor}$ = indoor air exchange rate =	0.00014	(sec^{-1})
L_B = indoor volume/infiltration area ratio =	200	(cm)

Dose = $C_{indoor}*IR_{air\text{-}indoor}*EF*ED$ = 3403 (mg)

C_{indoor} =	41	(µg/m^3) or	4.05E-05 (µg/cm^3)
$IR_{air\text{-}indoor}$ = Daily indoor inhalation rate =	15	(m^3/day)	
EF = exposure frequency =	350	(days/year)	
ED = exposure duration =	16	(years)	

Risk = (Dose/(Rfd*BW*AT)) 8.32E-03

Dose =	3403	(mg)
Rfd = Inhalation reference dose =	2	($(mg/kg\text{-}day)^{-1}$)
BW = Body weight =	35	(kg)
AT = Averaging time =	5840	(16 years * 365 days)

Therefore, child non-carcinogenic risk from maximum xylene soil vapor at 3 feet is 8.32E-03

Enclosure

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Table 1
Benzene Adult Carcinogenic Risk
maximum concentration from 3 feet below ground surface
SV-1 = 0.17 µg/L

Former Signal Service Station
800 Center Street
Oakland, California

$D^{eff}s$ = Effective diffusion coefficient in soil based on vapor-phase concentration
$D^{eff}s = ((D^{air} * (\theta as^{3.33}/\theta T^{2})) + ((D^{wat} * 1/H * (\theta ws^{3.33}/\theta T^{2})))$
$D^{eff}s$ = 0.0112 (cm^2/s)

D^{air} = diffusion coefficient in air =	0.093	(cm^2/s)
Θ_{as} = volumetric air content of vadose zone soils =	0.33	
Θ_{ws} = volumetric water content of vadose zone soils	0.124	
Θ_T = total soil porosity =	0.4557	
D^{wat} = diffusion coefficient in water =	1.10E-05	(cm^2/s)
H = Henry's law constant =	0.22	(L - H_2O/L - air)

F_{max} = Diffusive vapor flux predicted by benzene concentration in soil vapor
$F_{max} = D^{eff}s^* (Cv/d)$ = 2.08E-08 (µg/cm^2 - sec)

Cv = maximum benzene concentration in vapor =	0.00017	(µg/cm^3) or	0.17 (µg/L)
d = depth of vapor sample =	91.44	(cm) or	3 (ft)

C_{indoor} = Indoor benzene concentration = 7.41E-07 (µg/cm^3)
$C_{indoor} = F_{max}/ER_{air\text{-}indoor} * L_B$

$ER_{air\text{-}indoor}$ = indoor air exchange rate =	0.00014	(sec^{-1})
L_B = indoor volume/infiltration area ratio =	200	(cm)

Dose = $C_{indoor} * IR_{air\text{-}indoor} * EF * ED$ = 117 (mg)

C_{indoor} =	7.41E-01	(µg/m^3) or	7.41E-07 (µg/cm^3)
$IR_{air\text{-}indoor}$ = Daily indoor inhalation rate =	15	(m^3/day)	
EF = exposure frequency =	350	(days/year)	
ED = exposure duration =	30	(years)	

Risk = ((Dose*SF)/(BW*AT)) 6.53E-06

Dose =	117	(mg)
SF = Slope factor =	0.1	($(mg/kg\text{-}day)^{-1}$)
BW = Body weight =	70	(kg)
AT = Averaging time =	25550	(70 years * 365 days)

Therefore, adult carcinogenic risk from maximum benzene soil vapor at 3 feet is 6.53E-06