CAMBRIA

STID 5557

April 14, 1998

Ms. Susan L. Hugo
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Ground Water Monitoring and**
Risk-Based Corrective Action (RBCA) Evaluation
Former Lathrop Property
5813-15 Shellmound Street
Emeryville, California
Cambria Project No. 190-0122.010

Dear Ms. Hugo:

This report presents the results of a ground water monitoring effort and a Tier 2 Risk-Based Corrective Action (RBCA) evaluation conducted by Cambria Environmental Technology, Inc., (Cambria) at the above-referenced site. Cambria's objectives for this work were to establish a reliable water quality data set and then to incorporate that data into a RBCA evaluation. Cambria's RBCA analysis was based on risk assessment guidelines for petroleum release sites set forth by the American Society of Testing and Materials[1], and utilized the RBCA Spreadsheet System developed by Groundwater Services, Inc.[2] Specifically, the objectives of these efforts were:

- To monitor and evaluate the site ground water quality and establish the ground water flow direction, as directed by Ms. Susan Hugo of the Alameda County Department of Environmental Health (ACDEH) in her September 20, 1996 correspondence to Mr. F.P. Lathrop; and
- To assess the potential risk that residual petroleum hydrocarbons and semi-volatile organic compounds (SVOCs), including polynuclear aromatics (PNAs), may pose to the health of future on- and off-site occupants.

A brief site summary, ground water monitoring procedures, ground water monitoring results, the results of our Tier 2 RBCA evaluation, and our conclusions and recommendations are presented below.

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1 **ASTM Designation E 1739-95 (Revised December 1996)**: Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

2 **Tier 2 RBCA: Spreadsheet System and Modeling Guidelines, 1995**: Groundwater Services, Inc., 2211 Norfolk, Suite 1000, Houston, Texas 77098-4044.

SITE HISTORY AND BACKGROUND

The site is located at 5813 Shellmound Street in the City of Emeryville, California (Attachment A). The property was purchased by Mr. F.P. Lathrop from the Fiberboard Corporation in the late 1960s. In 1971, Mr. Lathrop erected a single story commercial building on the eastern portion of the property and a concrete parking surface over the western portion. The property was leased from May 1, 1972 to April 30, 1987 by the F.P. Lathrop Construction Company for use as a construction yard and associated storage and office facilities. The site is currently used as a stereo installation facility by the Good Guys Retail Chain and as a retail storage and sales site by Sherwin Williams Paints.

The first environmental investigation conducted on the Lathrop property occurred in October 1989 during the removal of a gasoline underground storage tank (UST) that had been used to fuel F.P. Lathrop Construction Company construction vehicles. No hydrocarbons were detected in soil beneath the tank and only 23 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg) were detected in a stockpile of the backfill material removed with the tank. However, in response to a lawsuit filed by the owners of the adjacent property, who had detected benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds in a well on their property, Crosby, Heafey, Roach and May (Crosby) directed Cambria to conduct a subsurface investigation of the former UST pit in late 1994.

1994 Subsurface Investigation: To determine the subsurface distribution of hydrocarbons, volatile organic compounds (VOCs), polynuclear aromatics (PNAs) and metals, Cambria drilled thirty-one soil borings and converted three of these borings to monitoring wells C-1, C-2, and C-3 in September and December 1994. Results of this work indicated the limited presence of VOCs, benzene, and toluene along the western property line, and elevated concentrations of heavy oil-range hydrocarbons and PNAs in the center and southwestern portions of the site. Detailed results of this investigation are summarized in a Cambria report prepared for Crosby in March 1995.

1997 Subsurface Investigation: To determine the extent of contaminants along and immediately beyond the southwestern/downgradient portion of the site, Cambria drilled three soil borings and converted one of these to monitoring well C-4 in February 1997. The results of this investigation were consistent with those of previous investigations which have suggested that the source of the VOCs is on the adjacent site to the west. The presence of elevated concentrations of petroleum hydrocarbons and semi-volatile organic compound (SVOCs) suggested that the extent of these compounds was not completely defined. Details of this investigation were summarized in the May 1997 report prepared by Cambria.[3] Historical soil analytical data for the site are included as Attachment B.

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[3] Cambria Environmental Technology, Inc: **Site Investigation and Ground Water Monitoring, Lathrop Property,** May 20, 1997. Submitted to Crosby, Heafey, Roach and May.

GROUND WATER MONITORING PROCEDURES

The results of Cambria's 1997 ground water monitoring are summarized below. Figures 1 and 2, Attachment A, depict ground water elevation contours and petroleum hydrocarbons/SVOC concentrations. Tabulated ground water analytic data and laboratory analytic reports are included as Attachment C and documentation confirming waste water disposal is presented as Attachment C-1.

Sampling Dates: December 16, 1994
March 19, 1997
May 30, 1997
July 3, 1997
August 7, 1997

Purging Method: A minimum of four well volumes was hand bailed from each well while monitoring physio-chemical parameters (pH, conductivity, suspended solids and temperature) for stabilization.

Laboratory Analyses: Ground water samples from the wells were analyzed for:

- TPHg by modified EPA Method 8015;
- Total petroleum hydrocarbons as creosote (TPHcr), total petroleum hydrocarbons as motor oil (TPHmo), and total petroleum hydrocarbons as diesel (TPHd) by modified EPA Method 8015;
- BTEX and methyl tertiary-butyl ether (MTBE) by EPA Method 8020; and
- SVOCs (including PNAs) by EPA Method 8270.

Ground Water Flow Direction: Based on the August 7, 1997 depth to ground water measurements, ground water flows toward the south at a gradient of about 0.017 ft/ft (Figure 1). The historical ground water flow direction has ranged from the south to the southwest beneath this site.

Waste Water Disposal: Purge water generated during the 1997 sampling events was stored on site in sealed, labeled, D.O.T.-approved 55-gallon steel drums. On October 1, 1997, this water was disposed of at Integrated Waste Stream Management, Inc. in Milpitas, California (Attachment C-1).

GROUND WATER MONITORING RESULTS

Analytical data for ground water samples collected from monitoring wells C-1 through C-4 are presented on Tables 1 and 2, Attachment C, and summarized below. The general trends of analyte concentrations in ground water and the maximum current concentrations of each analyte detected are presented on the following page.

- TPHcr were detected consistently at relatively stable concentrations in wells C-3 and C-4.
- TPHd detections in wells C-1 and C-2 most likely represent weathered motor oil, because (1) all diesel detections are qualified by the laboratory as appearing to be a heavier hydrocarbon than diesel, and (2) diesel detections mimic the motor oil detections. Diesel does not appear to be a contaminant of concern for this site.
- TPHmo have been stable in well C-2 but have been increasing in well C-1. The possible increase in TPHmo concentration in well C-1 may be related to the receding water level at the site. No detections have been reported for wells C-3 and C-4 at a detection limit of 5,000 ppb.
- TPHg, benzene, and SVOCs have been consistently detected in wells C-3 and C-4, and both wells show stable trends in the concentrations.
- MTBE was not detected in any wells.

GROUND WATER SAMPLING SUMMARY						
Analysis	*C-1 General Trend*	*C-2 General Trend*	*C-3 General Trend*	*C-4 General Trend*	*Current Maximum Concentration (ppb)*	*Location of Highest Detection*
TPH(cr)	ND	ND	Stable	Decreasing	24,000	C-3
TPH(mo)	Increasing	Stable	ND [b]	ND [b]	8,200	C-1
TPH(g)	ND	ND	Stable	Decreasing	15,000	C-3
TPH(d)	Increasing [a]	Stable [a]	ND	ND	3,700 [a]	C-1
Benzene	ND	ND [c]	Stable	Decreasing	B: 1,200	C-3
T, E, and X	ND	ND [c]	Stable	Stable	T: 110 E: 260 X: 170	C-3 C-3 C-3
MTBE	ND	ND	ND	ND	ND	---
SVOCs [d] (incl. PNAs)	ND	ND [e]	Stable [f]	Decreasing	Benzo(a)pyrene: 230 Naphthalene: 12,000 Phenanthrene: 1,200 Pyrene: 810	C-3 C-3 C-3 C-3

Abbreviations and Notes:
(a): diesel detections most likely represent weathered motor oil.
(b): detection limit typically 5,000 ppb due to elevated concentrations of other analytes.
(c) : Maximum of 1.1 ppb benzene and 2 ppb ethylbenzene detected.
(d): See Table 2 (Attachment C) for the complete list of SVOCs detected.
(e): All sample concentrations were less than detection limits except for a one-time detection of Naphthalene at 11ppb (1ppb above the detection limit).
(f): Concentrations generally stable except for an increase for most analytes during the 7/3/97 sampling event. During the following sampling event (7/3/97), concentrations generally decreased from that of the prior event (5/30/97).

RISK ASSESSMENT

As previously indicated, Cambria's risk assessment followed RBCA guidelines set forth by ASTM for petroleum release sites. The ASTM RBCA process is summarized below, including specific details of our assessment.

Overview of RBCA Process

The RBCA process is the integration of site assessment, remedial action selection, and monitoring with USEPA-recommended risk and exposure assessment practices. This creates a process by which corrective action decisions are made in a consistent manner that is protective of human health and the environment. The RBCA process is implemented in a tiered approach, involving increasingly sophisticated levels of data collection and analysis. Upon completion of each tier, the results are evaluated and, if warranted, assumptions of the current tier are replaced with site-specific data and the analysis proceeds to the next tier.

In the first of the three tiers (Tier 1), a simple look-up table is used to develop numerical cleanup goals based on very conservative contaminant transport and exposure assumptions. If this initial conservative screening indicates acceptable risk, the site generally poses little danger to human health and no additional work is necessary. However, if the initial screening exceeds the conservative risk levels, then the reviewer may proceed to a more site-specific, less-generalized Tier 2 evaluation to establish a more accurate set of site-specific cleanup guidelines. Similarly, if the Tier 2 evaluation shows risk is not below the conservative acceptable level, the reviewer may proceed to a more sophisticated Tier 3. The three tiers are described in detail below.

Tier 1 Evaluation: Cambria first reviews the risk associated with the chemicals of concern (COCs) observed beneath a site by comparing site-specific representative COC concentrations to highly conservative, generic, risk-based screening levels (RBSLs) that are developed from default parameters and equations and a generalized conceptual site model. The Tier 1 process uses simplified contaminant equilibria models, addresses both direct and indirect exposure pathways, and anticipates various potential property use categories (residential and commercial/industrial).

Tier 2 Evaluation: Site-specific target levels (SSTLs) for soil and ground water cleanup are based on site-specific physical soil conditions and points of exposure. Both RBSL and SSTL values represent concentration limits for constituents within the source zone. However, SSTLs differ from RBSLs in the following ways:

- Site-specific data are used to calculate risk-based clean up goals (SSTLs);
- SSTLs are based on the assumption that human exposure to affected media may occur at a separate "point of exposure" (POE), not just at the source zone; and
- The effects of natural attenuation during lateral transport from the source to a downgradient POE are considered in the SSTL calculation; they are not in the RBSL calculations.

Tier 3 Evaluation: A Tier 3 evaluation can be conducted if the reviewer believes that the SSTLs produced by the Tier 2 effort remain unrealistically high. A Tier 3 is a sophisticated site-specific analysis that can incorporate, if necessary, a full range of exposure and toxicological considerations.

Conceptual Model

Cambria's approach to performing this risk assessment, including development of the conceptual site model for the risk assessment, conducting the Tier 1 and Tier 2 analyses, and documenting the need, if any, for future corrective action at the site, is presented below.

As the initial step in quantifying the human health risks due to contaminant exposure, Cambria developed a conceptual site model (CSM) of contaminant occurrence, transport mechanisms, and potential exposure pathways. This CSM model is based on review of all available hydrogeologic data, the current and future land

use and the potential receptors on- and off-site. Specifically, Cambria reviewed soil and ground water quality, ground water level, geologic data and also evaluated future land use and surface features at the site. A flowchart summarizing the CSM is shown in Figure 1.

Exposure Pathways

The site where the contaminants of concern (COCs) were detected in soil and ground water is currently a parking lot. However, to provide a conservative estimate, for the purpose of this risk assessment, we have assumed that the parking area is unpaved. Also, for the purposes of the risk assessment, Cambria conservatively assumed that a commercial building may be constructed on this lot in the future. Accordingly, Cambria also assessed the risk by these exposure routes to on-site indoor occupants of a commercial/industrial building. Hydrocarbons in soil samples collected below the water table/saturated zone are represented by ground water analytic results. Therefore, for on-site receptors, volatilization of BTEX and SVOCs from ground water to ambient and indoor air was also considered. Our exposure pathway analysis is summarized in Table 1 on the following page.

Sensitive Receptors

In November 1997, Cambria contracted Vista Information Solutions, Inc., (Vista) of San Diego, California, to identify all monitoring, domestic, irrigation, and municipal wells within a 1/2-mile radius of the site. Banks Information Solutions, Inc., (Banks) of Austin, Texas, in conjunction with Vista reviewed all available files for the township and range in which the site is located at the Department of Water Resources (DWR), Central District in Sacramento, California. The well survey identified only one well within the 1/2-mile radius of the site. The well is 213 ft deep and is located about 1/2-mile upgradient of the site. It is unknown if the well is currently active. A copy of the area well survey is included as Attachment D.

Although the area well survey identified only one well within a 1/2-mile radius of the site (located upgradient), to be conservative in this risk assessment, we also assessed the potential risk assuming an off-site ground water ingestion receptor existed 60 ft downgradient of the site, beyond the off-site monitoring well C-4.

Table 1 - Exposure Pathway Summary

Exposure Scenario	Considered for this Assessment? Yes	No	Rationale
Soil Exposure Routes			
Surficial soil (<3 ft bgs) ingestion/dermal/inhalation		X	Site paved with asphalt. No direct contact with soil beneath the site.
Soil volatilization to outdoor air	X		Volatilization of COCs from soil and transport of vapors through the air voids in soil to ambient air.
Soil volatilization to indoor air	X		Migration of subsurface COC vapors to top soil, accumulation in building foundation, and then into the building indoor air.
Soil-leachate to protect ground water ingestion		X	No significant infiltration/percolation through site soil due to the shallow ground water depth and asphalt cover.
Ground Water Exposure Routes			
Ground water volatilization to outdoor air	X		Volatilization of COCs from ground water beneath the site and subsequent transport of vapors through the air voids in soil to ambient air.
Ground water vapor intrusion from ground water to buildings	X		Migration of subsurface COC vapors from ground water to top soil, accumulation in building foundation and then into the building indoor air.
Ground water ingestion	X		This pathway is considered for a conservative analysis, assuming a downgradient ground water receptor exists.
Future Property Use			
Residential		X	Site used for a commercial purpose.
Commercial	X		Site is currently a parking lot/retail buildings.
Industrial	X		Retail building/paint warehouse on-site.

Selection of Representative COC Concentrations

COCs in soil: The extent of COCs in the lateral as well as the vertical direction has been well-defined by the numerous soil borings drilled across the site. When such a large data set is available, an appropriate site-specific value for the COC is a statistical estimate, generally the 95% upper confidence limit (UCL) of the mean concentration. Therefore, for this site, the representative COC concentrations are the 95% UCL of their respective concentrations detected in samples from above the water table (about 6.5 feet, considering the most recent measurements from monitoring well C-4). Where the COC was not detected (ND) above the laboratory detection limit, a value of one-half the detection limit for that COC was considered representative for that sample. Historical soil analytical data is included as Attachment B.

COCs in Ground Water: The average concentrations of the COCs from the last five sampling events in monitoring well C-3 were considered representative of ground water concentrations. Historically, the highest BTEX and SVOC concentrations have been detected in on-site monitoring well C-3, which is also located closest to the Good Guys Building (commercial use). Therefore, the use of these concentrations as representative COCs in ground water is conservative. Our conceptual model and the representative concentrations for this evaluation are presented below in Table 2. Ground water monitoring results are included as Attachment E.

Table 2 - Conceptual Model for Risk Assessment

Item		Comment
Contaminant Source Media:	Underlying Soil and Ground Water	Hydrocarbons and SVOCs (including PNAs) have been detected in unsaturated soil and ground water beneath the site.
Potential Chemicals of Concern (COC):	Benzene, Toluene, Ethylbenzene, and Xylenes Anthracene, Benzo(a)anthracene, Benzo(a)Pyrene, Chrysene, Dibenzo(a,h)Anthracene, Fluoranthene, Indeno(1,2,3,c,d) Pyrene, Naphthalene, and Pyrene	All chemicals detected in representative samples in soil and ground water.

Item			Comment
Representative COC Concentrations in Soil:	Benzene: Toluene: Ethylbenzene: Xylenes: Anthracene: Benzo(a)Anthracene: Benzo(a)Pyrene: Chrysene: Fluoranthene: Indeno(1,2,3,c,d)Pyrene: Naphthalene: Pyrene:	0.08 0.14 0.13 0.15 220 190 220 240 730 140 1,400 89	95% UCL of all concentrations detected in unsaturated soils beneath the site.
Representative COC concentrations in ground water (for volatilization pathway)	Benzene: Ethylbenzene: Benzo(a)Anthracene: Benzo(a)Pyrene: Chrysene: Dibenzo(a,h)Anthracene: Indeno(1,2,3,c,d)Pyrene:	1.5 0.21 0.18 0.31 0.41 0.11 0.25	Average concentrations of all sampling events in on-site monitoring well C-3 in all sampling events.
Representative COC concentrations in ground water (for ingestion pathway)	Benzene: Ethylbenzene: Benzo(a)Anthracene: Benzo(a)Pyrene: Chrysene: Dibenzo(a,h)Anthracene: Indeno(1,2,3,c,d)Pyrene:	0.46 0.12 0.40 0.63 0.69 0.14 0.42	Average concentrations of all sampling events in the off-site monitoring well C-4.
Target Carcinogenic Risk Level:	$1x10^{-5}$ and $1x10^{-6}$		Conservative target risk level, considering a commercial receptor scenario on-site and a residential receptor off-site.
Non-Carcinogenic Hazard Quotient:	1.0		Consistent with ASTM default value.
Benzene Slope Factor:	0.1 $(mg/kg/day)^{-1}$		Defined by California EPA.
All concentrations in parts per million (ppm)			

Tier 1 Analysis

Consistent with the tiered approach adopted by the ASTM RBCA guidelines, Cambria initially quantified the risk associated with the site COCs by performing a Tier 1 evaluation. As outlined in ASTM E-1739-95, the site-specific COC source concentrations are compared to highly-conservative, generic Tier 1 RBSLs, which are based on simplified equations and generalized site conditions. Table 3 contains the results of our comparison of site COC source concentrations to Tier 1 RBSLs for those COCs whose site-specific soil and ground water concentrations exceed the Tier 1 RBSLs. Results of the Tier 1 analysis for all the COCs detected in soil and ground water are included as Attachment E.

Table 3 - COC Concentrations Exceeding RBCA Tier 1 RBSLs

Exposure Pathway	Receptor Scenario	Target Risk Level	Applicable RBSL (USEPA)	California EPA RBSL (0.29xRBSL)	Representative Concentration for COCs
Benzene (in ppm)					
Volatilization from ground water to on-site indoor air	Commercial	$1x10^{-5}$	0.739	0.214	1.5
Ground water ingestion	Residential	$1x10^{-6}$	0.0029	0.00084	0.46
Benzo (a) Anthracene (in ppm)					
Ground water ingestion	Residential	$1x10^{-6}$	0.00012	NA	0.40
Benzo (a) Pyrene (in ppm)					
Ground water ingestion	Residential	$1x10^{-6}$	0.000012	NA	0.63
Chrysene (in ppm)					
Ground water ingestion	Residential	$1x10^{-6}$	0.000074	NA	0.69
Dibenzo (a,h) Anthracene (in ppm)					
Ground water ingestion	Residential	$1x10^{-6}$	0.000012	NA	0.14
Indeno (1,2,3,c,d) Pyrene (in ppm)					
Ground water ingestion	Residential	$1x10^{-6}$	0.00012	NA	0.42

As shown in Table 3, the exposure scenarios exceeding the Tier 1 levels are (1) volatilization of benzene from ground water into on-site indoor air, and (2) residential ingestion of benzene, benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenzo(a,h) anthracene, and indeno(1,2,3,c,d) pyrene in off-site ground water. These scenarios served as the basis for our Tier 2 analysis.

Tier 2 Analysis

In Cambria's Tier 2 analysis, we re-evaluated the exposure scenario for COCs listed in Table 3 by using site-specific data as input into the Tier 2 RBCA Spreadsheet System. Standard exposure scenarios inherent to the Tier 1 ASTM risk evaluation employ conservative assumptions consistent with state and federal guidelines. Risk related input parameters such as duration and frequency are selected to represent the maximally exposed individual and are not an accurate portrayal of time spent at a place of residence or business. The quantitative effect of these uncertainties contributes to overestimation of the overall potential health risk. Our assigned values for key input variables and our justification for use of these values are summarized in Table 4 below and in Attachment F. The results of our Tier 2 analysis are summarized in Table 5 and Attachment F.

Table 4 - Assigned Key Parameter Values

Parameter	Units	Default Value	Value Used in Cambria Evaluation	Justification for Use of Value
Depth to Ground Water (DTW)	cm	300	195	Based on ground water monitoring data for well C-4 (6.5 ft bgs).
Vadose Zone Porosity	cm^3/cm^3-soil	0.38	0.36	Average porosity of soil samples collected from 5 ft depth in borings C-4 and SB-BB, adjoining the site.
Moisture Content	cm^3-water/cm^3-soil	0.12	0.14	Moisture content in a soil sample from boring C-4 at 5 ft depth.
Air-filled voids	cm^3-air/cm^3-soil	0.26	0.22	Difference of porosity and moisture content in the vadose zone.
Fraction Organic Carbon (f_{oc})	g-carbon/g-soil	0.01	0.033	Measured in soil boring SB-BB at 5 ft depth.
Saturated Hydraulic Conductivity (K)	cm/sec	NA	$2.5x10^{-5}$	Typical for clayey sands and sandy clays encountered in the saturated zone beneath the site (Fetter, 1994)

Fetter, C.W., 1994. Applied Hydrogeology, Prentice-Hall, Englewood Cliffs, New Jersey.

Table 5 - Results of Tier 2 Analysis

Exposure Pathway	Receptor Scenario	Target Risk Level	RBCA Tier 2 SSTL for Benzene and SVOCs: Applicable SSTL (USEPA)	RBCA Tier 2 SSTL for Benzene and SVOCs: California EPA SSTL (0.29xRBSL)	Rep. Conc. for COCs	Representative Concentration vs SSTL: Exceed	Representative Concentration vs SSTL: Below
Benzene							
Volatilization from ground water to on-site indoor air	Commercial	$1x10^{-5}$	5.8	1.68	1.5		X
Off-site ground water ingestion	Residential	$1x10^{-6}$	>SOL	>SOL	0.46		X
Benzo (a) Anthracene							
Off-site ground water ingestion	Residential	$1x10^{-6}$	>SOL	NA	0.40		X
Benzo (a) Pyrene							
Off-site ground water ingestion	Residential	$1x10^{-6}$	>SOL	NA	0.63		X
Chrysene							
Off-site ground water ingestion	Residential	$1x10^{-6}$	>SOL	NA	0.69		X
Dibenzo (a,h) Anthracene							
Off-site ground water ingestion	Residential	$1x10^{-6}$	>SOL	NA	0.14		X
Indeno (1,2,3,c,d) Pyrene							
Off-site ground water ingestion	Residential	$1x10^{-6}$	>SOL	NA	0.42		X

All concentrations in ppm.
NA = Not Applicable
>SOL = Selected risk level is not exceeded for all possible dissolved levels (≤pure component solubility)

As the above Table 5 indicates, the site-specific concentrations for benzene and all the SVOCs are below their respective SSTLs, indicating that there is no potential health risk to on-site occupants from the COCs detected beneath the site. Also, as shown in Table 6 on the following page, the risk associated with potential exposure to the site-specific benzene source concentration from ground water is significantly less than the target risk

level set forth by the USEPA. As shown in Attachment F, a benzene concentration of 1,700 ppb[4] is protective of the target risk level of 10^{-6}.

Table 6 - Comparison of Risk Levels (for benzene only)

Exposure Scenario	Calculated Risk Level	Target Risk Level	Result
Volatilization of benzene from ground water beneath the site into indoor air.	$9x10^{-7}$	$1x10^{-6}$	Site-specific source benzene concentration is protective of target risk level.

DISCUSSION

Consistent with ASTM standards, Cambria's risk assessment employed a conservative approach to mathematical formulation and parameter estimation. The effects of both the ASTM process and of our parameter value selections on our conclusions are discussed below.

Inherent Conservatism of ASTM Model

Fate and Transport Modeling: The GSI RBCA Spreadsheet System used by Cambria employs a series of simplified fate and transport models for predicting COC concentrations at points of exposure. The simplified analytic nature of these models, used to simulate fate and transport of contaminants in ground water, particularly the Domenico solution without bioattenuation, often results in over-estimated COC exposure point concentrations. Hence, use of these models may result in over-estimation of health risks.

Toxicological Data: Several aspects of the toxicological data employed in the ASTM RBCA process contain a high degree of uncertainty that affect estimation of risk and delineation of SSTLs. These uncertainties arise in two primary areas. First, slope factors used in this assessment correspond to the 95 percent upper confidence limits (UCL) on the low-dose portion of the chemical's dose-response curve, as extrapolated from high-dose human or animal response data using the EPA linearized multistage model (LMS). This assumption means actual risks are likely to be lower than the risk estimates calculated in this assessment.

Second, results of animal studies are often used to predict the potential human health effects of a chemical. Extrapolation of toxicological data from animal tests is one of the largest sources of uncertainty in the human health risk evaluation process. There may be important but unidentified differences in uptake, metabolism,

[4] The results shown in Attachment G are based on the default ASTM benzene slope factor of 0.029 $(mg/kg\text{-}day)^{-1}$. To account for the more conservative Cal/EPA benzene slope factor of 0.1 $(mg/kg\text{-}day)^{-1}$, we multiply the benzene concentration values in Attachment G by the correction factor of 0.29 (e.g., 5,800 ppb x 0.29 = 1,700 ppb).

distribution, and elimination of chemicals between a test species and humans. Animal studies are usually conducted under high-dose conditions, whereas humans are rarely exposed to such high doses. The dose level itself may be responsible for the observed carcinogenic effects. Also, animal lifetimes tend to be less than two years, while assumed human life expectancy is 70 years.

Interpretation of Risk Levels: The excess lifetime cancer risk used to evaluate carcinogenic compounds is often misunderstood. For example, a risk level of one-in-one million (1×10^{-6}) associated with exposure to a particular chemical is often misconstrued as an expectation that one out of a million people exposed to the chemical will develop cancer. In actuality the carcinogenic risk is not an actual risk, but rather a mathematical risk based on conservative scientific assumptions used in the risk assessment process. The Food and Drug Administration (FDA) uses this conservative estimate to ensure that the risk is not understated.

Uncertainties Associated with Combinations of Conservative Assumptions: Uncertainties from the various sources discussed above are additive; hence, the overall effect of using conservative assumptions in each step of the risk assessment process results in significant overestimation of potential risks/hazards, and an underestimation of action levels. Accordingly, evaluation of applicable SSTLs must be viewed with an understanding of the uncertainty and conservatism involved, and how these effect risk estimations. Because of the high degree of conservatism associated with the RBCA process, findings of insignificant risk (high SSTLs) may reflect conditions close to reality; however, findings of measurable risk (low SSTLs) may reflect conditions that result from the conservative nature of the evaluation.

Cambria's evaluation consistently incorporated conservative assumptions for selection of parameters used to calculate risk, while attempting to maintain a reasonable, site-specific evaluation. The overall effect of using conservative assumptions in each step of the risk assessment process is likely to result in an overestimation of potential risk.

CONCLUSIONS AND RECOMMENDATIONS

Cambria's Tier 2 risk assessment for this site suggests that the COCs detected in soil and ground water do not pose a significant threat to the health of persons currently occupying the site or potentially occupying the site in the future.

Based on the results of the ground water monitoring and on this risk assessment, Cambria recommends that the site be monitored semi-annually for one year, with the sampling events coinciding with seasonal high and low water tables. Analyzed constituents should include TPHg, TPHmo, TPHcr, BTEX and SVOCs. If this monitoring confirms the previous ground water quality trends, then we would recommend that the site be closed or granted a finding of No Further Action (NFA).

CLOSING

We appreciate this opportunity to provide environmental consulting services to Crosby, Heafey, Roach and May. Please call if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc.

Sam Rangarajan
Engineer

Joseph P. Theisen, CEG
Principal Hydrogeologist

Attachments: Figure 1: Flowchart indicating the conceptual site model
- A - Figures
- B - Soil Analytical Data
- C - Ground Water Analytical Data
- C-1 - Waste Water Disposal Forms
- D - Area Well Survey
- E - Tier 1 RBSLs
- F - Tier 2 RBCA Tables

cc: Mr. James Wilson, Crosby, Heafey, Roach and May, 1999 Harrison Street, Oakland, CA 94612

H:\MISC\LATHROP\RBCA\RBCAQM(e) WPD

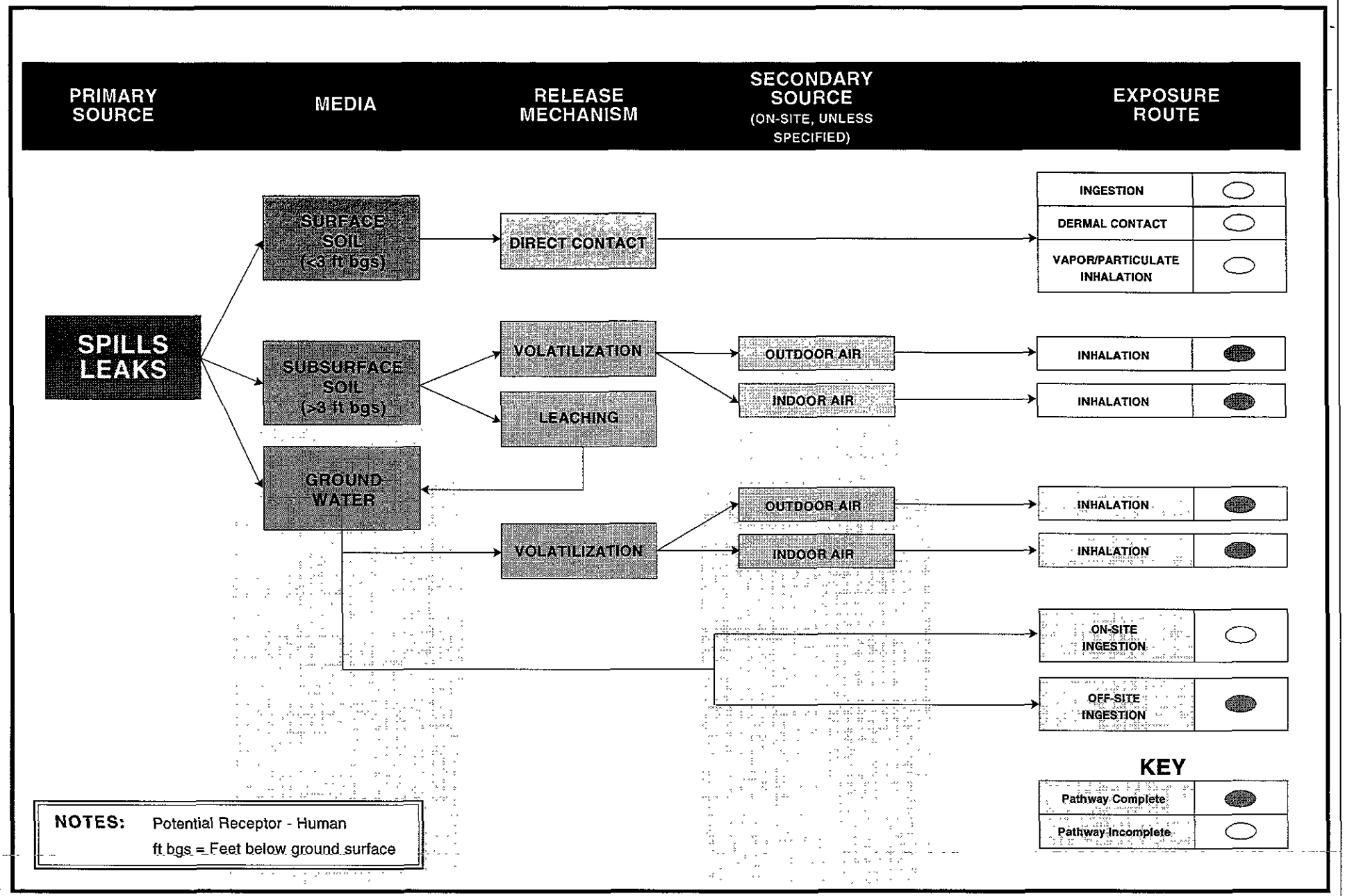
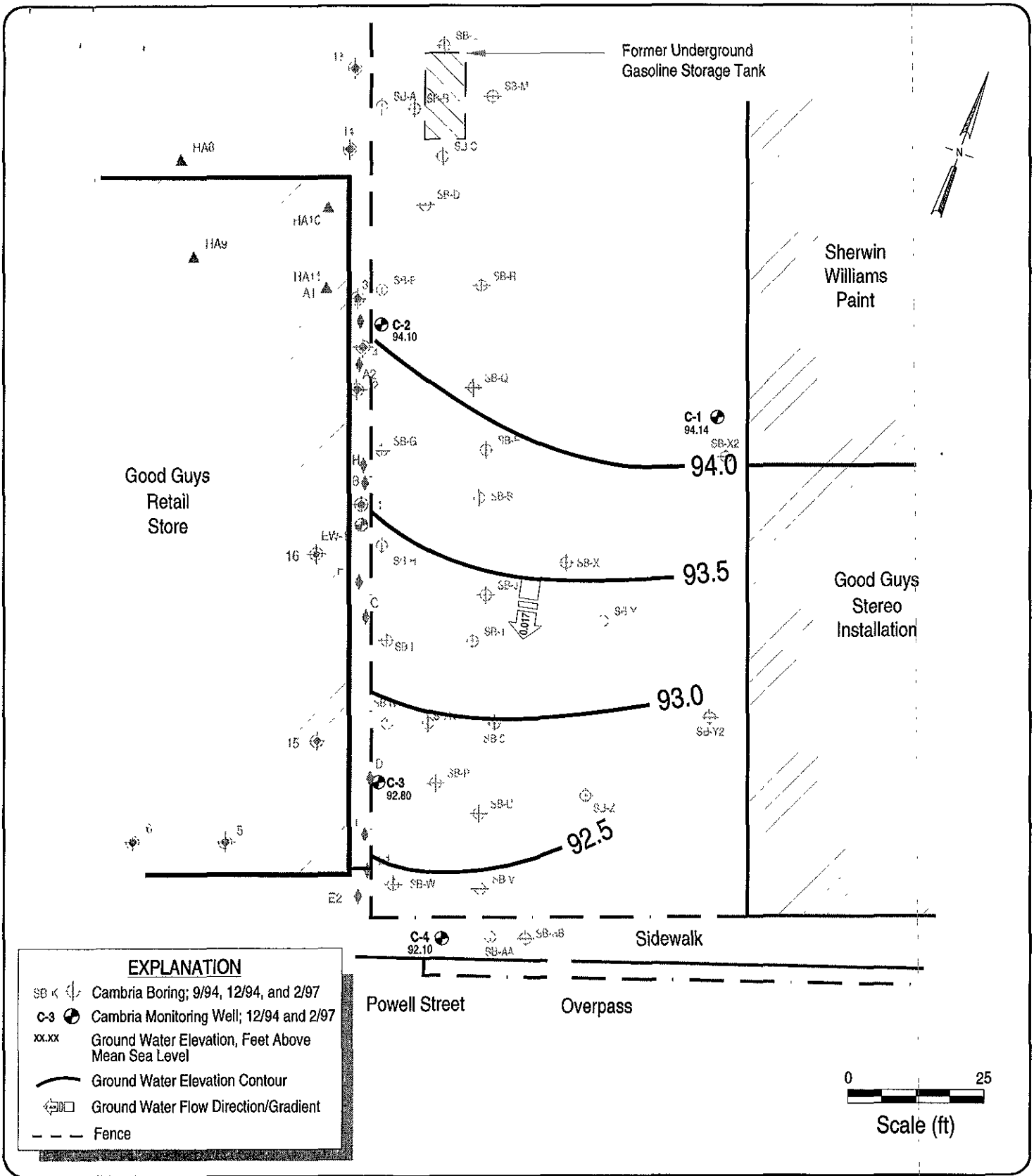


Figure 1. Generic Conceptual Site Model - Former Lathrop Property, 5813-15 Shellmound Street, Emeryville, California

Attachment A
Figures



CAMBRIA
Environmental Technology, Inc.

Lathrop Property
5813 - 15 Shellmound Street
Emeryville, CA 94608

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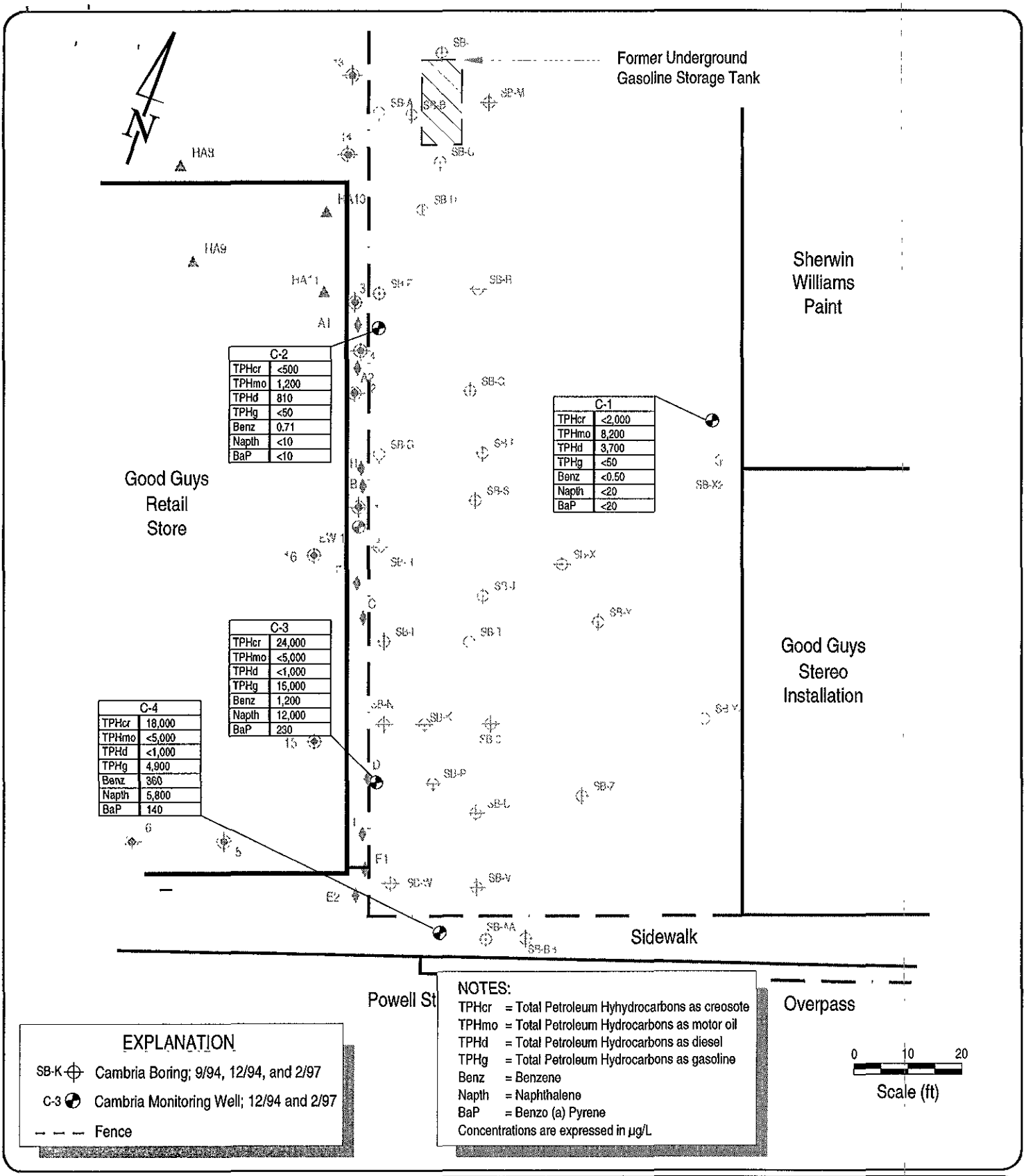
Ground Water Elevation
Contours
August 7, 1997

FIGURE
1

12/11/97



CAMBRIA
Environmental Technology, Inc.

Lathrop Property
5813-15 Shellmound Street
Emeryville, CA 94608

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Petroleum Hydrocarbons/SVOCs In Ground Water

August 7, 1997

FIGURE
2

Attachment B

Soil Analytical Data

Table 1. Soil Analytic Data for Hydrocarbons
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	TPHcr	TPHd	TPHmo	TPHg	Benzene	Toluene	Ethyl benzene	Xylenes
						(Concentration in mg/kg or parts per million)				
LATHROP (5813-5815 Shellmound)										
Tank Excavation Samples										
1512	10/26/89	~4	--	--	--	nd	nd	nd	nd	nd
1521	10/26/89	~4	--	--	--	nd	nd	nd	nd	nd
1533-Comp	10/26/89	NA	--	--	--	23	nd	nd	nd	0.28
Cambria Borings (September 1994)										
SB-A	09/22/94	5.0	--	--	--	nd	nd	nd	nd	nd
SB-A	09/22/94	11.7	--	--	--	nd	nd	nd	nd	nd
SB-B	09/22/94	6.0	--	--	--	1.0	nd	nd	nd	nd
SB-B	09/22/94	11.7	--	--	--	nd	nd	nd	nd	nd
SB-C	09/22/94	5.0	--	--	--	nd	nd	nd	nd	nd
SB-C	09/22/94	11.7	--	--	--	1.1	nd	nd	nd	nd
SB-D	09/22/94	5.0	--	--	--	nd	nd	nd	nd	nd
SB-E	09/22/94	5.0	--	--	--	nd	nd	nd	nd	nd
SB-F	09/22/94	5.0	--	--	--	--	--	--	--	--
SB-G	09/22/94	3.0	--	--	--	nd	32	0.69	4.4	nd
SB-G	09/22/94	5.0	--	--	--	21	0.15	3.4	0.13	1.2
SB-G	09/22/94	11.7	--	--	--	--	--	--	--	--
SB-H	09/22/94	3.0	--	--	--	nd	nd	0.620	0.016	0.180
SB-H	09/22/94	5.0	--	--	--	15	0.052	0.066	9.8	0.380
SB-H	09/22/94	11.7	--	--	--	1.1	0.012	0.650	nd	0.010
SB-I	09/22/94	5.0	--	--	--	nd	0.011	0.0037	nd	nd
SB-J	09/22/94	5.0	--	--	--	--	--	--	--	--

Table continued on next page

Table 1. Soil Analytic Data for Hydrocarbons
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	TPHcr	TPHd	TPHmo	TPHg	Benzene	Toluene	Ethyl benzene	Xylenes
						(Concentration in mg/kg or parts per million)				
SB-N	09/22/94	3.0	--	--	--	--	--	--	--	--
SB-N	09/22/94	5.0	--	--	--	1,700	5.9	2.7	10	9.8
SB-N	09/22/94	10.5	--	--	--	2,600	18	7.3	12	14
SB-N	09/22/94	11.7	--	--	--	--	--	--	--	--
SB-O	09/22/94	5.0	--	--	--	23	0.058	0.034	0.170	0.230
SB-O	09/22/94	11.7	--	--	--	--	--	--	--	--
SB-P	09/22/94	11.7	--	--	--	2,300	17	1.8	13	10
Cambria Borings (December 1994)										
SB-Q	12/07/94	3.5	nd	nd	1,300	--	--	--	--	--
SB-Q	12/07/94	5.5	nd	8.8	26	--	--	--	--	--
SB-R	12/07/94	5.5	nd	9.6	19	--	--	--	--	--
SB-S	12/07/94	5.5	nd	7.1	21	--	--	--	--	--
SB-S	12/07/94	11	nd	nd	690	--	--	--	--	--
SB-T	12/07/94	3.5	11,000	nd	nd	--	--	--	--	--
SB-T	12/07/94	5.5	25,000	nd	68,000	--	--	--	--	--
SB-T	12/07/94	9.0	nd	nd	570	--	--	--	--	--
SB-T	12/07/94	11.0	23	nd	nd	--	--	--	--	--
SB-U	12/07/94	6.0	5,200	nd	13,000	--	--	--	--	--
SB-U	12/07/94	11.0	58	nd	nd	--	--	--	--	--
SB-V	12/07/94	4.0	42,000	nd	nd	--	--	--	--	--
SB-V	12/07/94	11.0	19	nd	nd	--	--	--	--	--
SB-W	12/07/94	4.0	240,000	nd	nd	--	--	--	--	--
SB-W	12/07/94	6.0	nd	3,900	5,600	--	--	--	--	--
SB-W	12/07/94	11.0	36	nd	nd	--	--	--	--	--
SB-X	12/08/94	5.5	nd	nd	nd	--	--	--	--	--
SB-X	12/08/94	8.5	nd	1,300	3,300	--	--	--	--	--
SB-X2	12/08/94	3.5	nd	nd	67	--	--	--	--	--

Table continued on next page

Table 1. Soil Analytic Data for Hydrocarbons
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	TPHcr	TPHd	TPHmo	TPHg	Benzene	Toluene	Ethyl benzene	Xylenes
							(Concentration in mg/kg or parts per million)			
SB-X2	12/08/94	5.5	nd	nd	87,000	--	--	--	--	--
SB-X2	12/08/94	9.0	nd	nd	nd	--	--	--	--	--
SB-X2	12/08/94	11.0	nd	150	550	--	--	--	--	--
SB-Y	12/08/94	3.5	40,000	nd	nd	--	--	--	--	--
SB-Y	12/08/94	5.5	nd	nd	nd	--	--	--	--	--
SB-Y2	12/08/94	4.0	nd	nd	nd	--	--	--	--	--
SB-Y2	12/08/94	6.0	nd	nd	nd	--	--	--	--	--
SB-Y2	12/08/94	9.0	nd	nd	nd	--	--	--	--	--
SB-Y2	12/08/94	11.0	nd	nd	nd	--	--	--	--	--
SB-Z	12/08/94	3.5	nd	nd	170	--	--	--	--	--
SB-Z	12/08/94	6.0	nd	nd	nd	--	--	--	--	--
C-1	12/09/94	5.5	nd	nd	2,300	--	--	--	--	--
C-1	12/09/94	8.5	nd	nd	23	--	--	--	--	--
C-1	12/09/94	13.5	nd	nd	nd	--	--	--	--	--
C-1	12/09/94	18.5	nd	nd	nd	--	--	--	--	--
C-2	12/09/94	3.5	nd	nd	nd	--	--	--	--	--
C-2	12/09/94	5.5	nd	31	50	--	--	--	--	--
C-2	12/09/94	8.5	nd	7.9	18	--	--	--	--	--
C-2	12/09/94	11.0	12	2.30	nd	--	--	--	--	--
C-2	12/09/94	15.0	nd	--	--	--	--	--	--	--
C-3	12/09/94	3.5	3,700	nd	nd	--	--	--	--	--
C-3	12/09/94	5.5	19,000	nd	nd	--	--	--	--	--
C-3	12/09/94	8.5	62,000	nd	nd	--	--	--	--	--
C-3	12/09/94	11.0	14	nd	nd	--	--	--	--	--
C-3	12/09/94	14.0	nd	nd	nd	--	--	--	--	--
C-3	12/09/94	15.0	81.00	--	--	--	--	--	--	--

Table continued on next page

Table 1. Soil Analytic Data for Hydrocarbons
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	TPHcr	TPHd	TPHmo	TPHg	Benzene	Toluene	Ethyl benzene	Xylenes
							(Concentration in mg/kg or parts per million)			
COLEY AND HERRING INVESTMENT (5800 Christie Street)										
Borings by Gils Associates										
1 (9665)	12/28/88	4.0	--	--	--	--	nd	1,400	3	8.4
1 (9666)	12/28/88	6.0	--	--	--	--	nd	26	nd	nd
2 (9668)	12/28/88	7.0	--	--	--	--	nd	87	nd	nd
2 (9667)	12/28/88	12.0	--	--	--	35	nd	56	nd	nd
3 (9669)	12/28/88	5.0	--	--	--	--	nd	33	nd	nd
3 (9670)	12/28/88	12.0	--	--	--	1.4	nd	0.81	nd	nd
4 (9653)	10/12/88	2.4	--	--	--	--	nd	2800	28	42
5 (9661)	10/12/88	3.4	--	--	--	--	nd	nd	nd	nd
6 (9660)	10/12/88	3.0	--	--	--	--	nd	0.0060	nd	0.0049
7 (9658)	10/12/88	3.0	--	--	--	--	nd	nd	nd	nd
8 (9659)	10/12/88	3.3	--	--	--	--	nd	nd	nd	nd
9 (9655)	10/12/88	2.0	--	--	--	--	nd	0.0032	nd	nd
10 (9656)	10/12/88	6.3	--	--	--	--	nd	0.0040	nd	nd
11 (9654)	10/12/88	4.0	--	--	--	--	nd	0.0055	nd	nd
12 (9657)	10/12/88	2.0	--	--	--	--	nd	0.0028	nd	nd
13 (9663)	10/27/88	6.0	--	--	--	nd	nd	nd	nd	nd
13 (9664)	10/27/88	11.0	--	--	--	3	nd	nd	nd	nd
14 (9662)	10/27/88	11.0	--	--	--	5	nd	nd	nd	0.057
McLaren Foundation Excavation Samples										
HA-1	04/14/89	2.3	--	--	--	--	nd	0.019	nd	nd
HA-4	04/14/89	2.0	--	--	--	--	nd	0.16	nd	nd
HA-5	04/14/89	2.7	--	--	--	--	nd	0.80	nd	nd
HA-6	04/14/89	3.5	--	--	--	--	nd	0.12	nd	nd
HA-7	04/14/89	3.5	--	--	--	--	nd	0.072	nd	nd

Table continued on next page

Table 1. Soil Analytic Data for Hydrocarbons
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	TPHcr	TPHd	TPHmo	TPHg	Benzene	Toluene	Ethyl benzene	Xylenes
							(Concentration in mg/kg or parts per million)			
HA-8	04/14/89	3.5	--	--	--	--	nd	0.048	nd	nd
HA-9	04/14/89	3.5	--	--	--	--	nd	nd	nd	nd
HA-10	04/14/89	3.5	--	--	--	--	nd	0.049	nd	nd
HA-11	04/14/89	2.5	--	--	--	--	nd	0.030	nd	nd
ETS Excavation Wall Samples										
A1	1989	5.0	--	--	--	--	nd	nd	nd	nd
A2	1989	5.0	--	--	--	--	nd	0.11	nd	nd
B	1989	5.0	--	--	--	--	nd	180	3.8	28
C	1989	5.0	--	--	--	--	nd	320	9.3	48
D	1989	5.0	--	--	--	--	nd	1.8	nd	nd
E1	1989	5.0	--	--	--	--	0.70	0.70	0.60	1.1
E2	1989	5.0	--	--	--	--	nd	nd	nd	nd
F	1989	5.0	--	--	--	--	nd	2,700	14	35
Confirmation Borings After SVE										
G	12/03/91	3-5	--	--	--	nd	nd	nd	nd	nd
H	12/03/91	3-5	--	--	--	1.5	nd	0.076	0.0062	0.10
I	12/03/91	3-5	--	--	--	nd	nd	nd	nd	nd

Abbreviations
TPHcr = Total petroleum hydrocarbons as creosote by EPA Method 5020, 5030 or by modified EPA Method 8015
TPHd = Total petroleum hydrocarbons as diesel by EPA Method 5020, 5030 or by modified EPA Method 8015
TPmo = Total petroleum hydrocarbons as motor oil by EPA Method 5020, 5030 or by modified EPA Method 8015
TPHg = Total petroleum hydrocarbons as gasoline by EPA Method 5020, 5030 or by modified EPA Method 8015
BTEX = BTEX compounds by EPA Method 601/8240 unless 8020/5030 performed also.
-- = Constituent not analyzed
nd = Not detected, or no limit given by previous consultant

Table 2. Soil Analytic Data for Volatile Organic Compounds (VOCs)
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	VC	1,1 DCA	1.2 DCE	MC	1,2 DCA	1,1,1 TCA	TCE	PCE	carbon tet	Comments
			(Concentration in mg/kg or parts per million)									
LATHROP (5813-5815 Shellmound)												
Tank Excavation Samples												
1512	10/26/89	~4	--	--	--	--	--	--	--	--	--	
1521	10/26/89	~4	--	--	--	--	--	--	--	--	--	
1533-Comp	10/26/89	NA	--	--	--	--	--	--	--	--	--	stockpile sample
Cambria Borings												
SB-A	09/22/94	5.0	--	--	--	--	--	--	--	--	--	
SB-A	09/22/94	11.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	a
SB-B	09/22/94	6.0	--	--	--	--	--	--	--	--	--	
SB-B	09/22/94	11.7	--	--	--	--	--	--	--	--	--	
SB-C	09/22/94	5.0	--	--	--	--	--	--	--	--	--	
SB-C	09/22/94	11.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	
SB-D	09/22/94	5.0	--	--	--	--	--	--	--	--	--	
SB-E	09/22/94	5.0	--	--	--	--	--	--	--	--	--	
SB-F	09/22/94	5.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	
SB-G	09/22/94	3.0	0.12	2.3	0.014	0.051	0.014	0.036	6.2	nd	nd	
SB-G	09/22/94	5.0	0.034	0.35	nd	nd	nd	nd	0.042	nd	nd	
SB-G	09/22/94	11.7	nd	0.0062	nd	0.059	nd	nd	nd	nd	nd	
SB-H	09/22/94	3.0	nd	0.19	nd	nd	nd	nd	nd	nd	nd	
SB-H	09/22/94	5.0	3.2	1.6	0.025	0.056	0.039	nd	0.0081	nd	nd	0.067 chloroethane
SB-H	09/22/94	11.7	2.3	0.66	0.059	nd	nd	nd	nd	nd	nd	0.010 bromoform
SB-I	09/22/94	5.0	nd	0.0062	nd	nd	nd	nd	nd	nd	nd	0.0066 bromomethane

Table continued on next page

Table 2. Soil Analytic Data for Volatile Organic Compounds (VOCs)
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	VC	1,1 DCA	1.2 DCE	MC	1,2 DCA	1.1,1 TCA	TCE	PCE	carbon tet	Comments
								(Concentration in mg/kg or parts per million)				
SB-J	09/22/94	5.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	
SB-N	09/22/94	3.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	
SB-N	09/22/94	5.0	0.25	0.043	nd	0.20	0.02	0.016	nd	nd	nd	0.027 chloroform
SB-N	09/22/94	10.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	
SB-N	09/22/94	11.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	
SB-O	09/22/94	5.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	
SB-O	09/22/94	11.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	
SB-P	09/22/94	11.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	
CROLEY AND HERRING INVESTMENT (5800 Christie Street)												
Borings by Gils Associates												
1 (9665)	12/28/88	4	nd	nd	nd	nd	nd	190	960	nd	23	
1 (9666)	12/28/88	6	nd	nd	nd	nd	nd	3.7	19	nd	nd	
2 (9668)	12/28/88	7	nd	4.2	nd	nd	nd	76	160	nd	12	
2 (9667)	12/28/88	12	nd	nd	nd	nd	nd	69	93	nd	11	
3 (9669)	12/28/88	5	nd	nd	nd	nd	nd	7.3	88	nd	nd	
3 (9670)	12/28/88	12	nd	nd	nd	nd	nd	0.49	2.9	nd	nd	
4 (9653)	10/12/88	2.4	nd	nd	nd	nd	nd	280	3600	nd	27	
5 (9661)	10/12/88	3.4	nd	nd	nd	nd	nd	nd	nd	nd	nd	
6 (9660)	10/12/88	3	nd	0.0076	0.059	nd	nd	0.077	0.14	0.034	nd	
7 (9658)	10/12/88	3	nd	nd	nd	nd	nd	nd	nd	nd	nd	
8 (9659)	10/12/88	3.3	nd	nd	nd	nd	nd	nd	nd	nd	nd	
9 (9655)	10/12/88	2	nd	nd	nd	0.0025	nd	nd	0.012	0.012	nd	
10 (9656)	10/12/88	6.3	nd	nd	nd	nd	nd	0.0036	0.0091	nd	nd	
11 (9654)	10/12/88	4	nd	nd	nd	nd	nd	nd	0.0086	nd	nd	
12 (9657)	10/12/88	2	nd	nd	nd	nd	nd	nd	0.0078	nd	nd	

Table continued on next page

Table 2. Soil Analytic Data for Volatile Organic Compounds (VOCs)
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	VC	1,1 DCA	1,2 DCE	MC	1.2 DCA	1,1,1 TCA	TCE	PCE	carbon tet	Comments
			(Concentration in mg/kg or parts per million)									
13 (9663)	10/27/88	6	--	--	--	--	--	--	--	--	--	
13 (9664)	10/27/88	11	--	--	--	--	--	--	--	--	--	
14 (9662)	10/27/88	11	--	--	--	--	--	--	--	--	--	
McLaren Foundation Excavation Samples												
HA-1	04/14/89	2.25	nd	nd	nd	0.067	nd	nd	nd	nd	nd	
HA-4	04/14/89	2	nd	nd	nd	0.13	nd	nd	nd	nd	nd	
HA-5	04/14/89	2.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	
HA-6	04/14/89	3.5	nd	nd	nd	0.13	nd	nd	nd	nd	nd	
HA-7	04/14/89	3.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	b
HA-8	04/14/89	3.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	c
HA-9	04/14/89	3.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	d
HA-10	04/14/89	3.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	e
HA-11	04/14/89	2.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	f
ETS Excavation Wall Samples												
A1	1989	5	nd	nd	nd	0.18	nd	nd	0.019	?	?	0.011 freon
A2	1989	5	nd	nd	0.12	nd	nd	nd	0.10	?	?	
B	1989	5	nd	nd	nd	nd	nd	130	150	?	?	
C	1989	5	nd	nd	nd	nd	nd	23	42	?	?	
D	1989	5	nd	nd	nd	nd	nd	1.0	18	?	?	
E1	1989	5	nd	nd	nd	nd	nd	0.50	0.80	?	?	
E2	1989	5	nd	nd	nd	nd	nd	nd	nd	?	?	
F	1989	5	nd	nd	nd	nd	nd	280	1,300	?	?	18'chlorobenzene
Confirmation Borings After SVE												

Table continued on next page

Table 2. Soil Analytic Data for Volatile Organic Compounds (VOCs)
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	VC	1,1 DCA	1,2 DCE	MC	1,2 DCA	1,1,1 TCA	TCE	PCE	carbon tet	Comments
			(Concentration in mg/kg or parts per million)									
G	12/03/91	3-5	nd	nd	nd	nd	nd	nd	nd	?	?	
H	12/03/91	3-5	nd	nd	nd	nd	nd	nd	nd	?	?	g
I	12/03/91	3-5	nd	nd	nd	nd	nd	0.420	0.580	?	?	h

Abbreviations
TPHg = Total petroleum hydrocarbons as gasoline by EPA Method 5020, 5030 or by modified EPA Method 8015
BTEX = BTEX compounds by EPA Method 601/8240 unless 8020/5030 performed also.
--- = Constituent not analyzed
nd = Not detected, or no limit given by previous consultant
VC= Vinyl chloride by EPA Method 8010 or 8240.
1,1 DCA = 1,1 dichloroethane by EPA Method 8010 or 8240.
1,2 DCE = Trans 1,2 dichloroethene by EPA Method 8010 or 8240.
MC= methylene chloride by EPA Method 8010 or 8240.
1,2 DCA = 1,2 dichloroethane by EPA Method 8010 or 8240.
1,1,1 TCA = 1,1,1 trichloroethane by EPA Method 8010 or 8240.
TCE = Trichloroethene by EPA Method 8010 or 8240.
PCE = Tetrachloroethene by EPA Method 8010 or 8240.
? = Data unavailable.
Comments
a = 0.021 chloroform and 0.0072 bromodichloromethane
b = methylene chloride and freon detected at 0.11 and 0.014 ppm,respectively, which were less than the raised reporting limit.
c = methylene chloride was detected at 0.073 ppm which was less than the raised reporting limit.
d = methylene chloride and toluene present at 0.063 ppm and 0.0070 ppm, respectively, which were less than the raised reporting limit.
e = methylene chloride was present at 0.071 ppm which was less than the raised reporting limit.
f = methylene choride was detected at 0.043 ppm which was less than the raised reporting limit.
g = chloroform and cis-1, 2 - dichloroethene were detected at 0.040 ppm and 0.033 ppm, respectively.
h = 0.017 ppm and cis-1,2 - dichloroethene detected.

Table 3. Soil Analytic Data for Polynucleararomatics (PNAs)
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	Acenaph-thene	Acenaph-thylene	Anthra-cene	Benzo-(a)an-thracene	Benzo-(b)fluor-anthene	Benzo-(k)fluor-anthene	Benzo-(a) pyrene	Benzo-(g,h,i) perylene	Chrysene	Fluor-anthene	Flourene	Indeno-(1,2,3-cd) pyrene	2-Methyl-naphtha-lene	Naphtha-lene	Phenan-threne	Pyrene
			(Concentration in mg/kg or parts per million)															
LATHROP (5813-5815 Shellmound)																		
Cambria, October 1994																		
SB-G	09/22/94	5.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
SB-N	09/22/94	10.5	380	2,100	960	1,100	nd	nd	1,100	880	870	500	880	650	740	5,900	3,800	2,800
Cambria, December 1994																		
SB-T	12/07/94	5.5	720	nd	250	190	140	120	210	130	290	890	250	110*	170	1,400	1,600	1
SB-X2	12/08/94	5.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
C-2	12/09/94	5.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
C-3	12/07/94	5.5	nd	1,500	640	540	390	480	810	700	760	2,400	580	500	540	5,700	3,500	2,600
C-3	12/07/94	14.0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
C-3	12/07/94	15.0	640	1,700	980	920	700	820	1,300	1,200	1,300	3,600	0,850	0,880	0,530	4,400	5,300	4,100

Abbreviations
nd = Not detected, or no limit given by previous consultant.
* = Lab estimated value.

Table 4. Soil Analytic Data for Metals
- Lathrop Investigation, Emeryville, California

Sample ID	Date Sampled	Sample Depth (ft)	Arsenic	Barium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Tin	Vanadium	Zinc
			(Concentration in mg/kg or parts per million)										
LATHROP (5813-5815 Shellmound)													
Cambria, December 1994													
SB-T	12/07/94	5.5	1.1	170	44	9.0	47	94	0.9	51	18	31	590
C-3	12/07/94	5.5	5.3	550	17	4.6	1,700	400	nd	41	nd	20	370
DTSC TTLC	--	--	500	1,000	500	8,000	2,500	1,000	20	2,000	ne	2,400	5,000

Abbreviations
nd = Not detected, or no limit given by previous consultant
DTSC = Department of toxic Substance Control
TTLC = Total Limit Threshold Concentration
ne = None estabalished

Table 1. Soil Analytic Data for Petroleum Hydrocarbons and Volatile Organic Compounds (VOC's) - Lathrop Investigation, 5813 - 15 Shellmound Street, Emeryville, California

Sample ID	Depth (ft)	Date	TPHcr	TPHmo	TPHg	TPHd (Concentrations in mg/kg)	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	BM[a]	Freon
C-4-5	5	2/25/97	3,800	<1,000	<1.0	<100	<0.0025	<0.0025	<0.0025	<0 0025	<0.010	0.0062	0.0053
SB-BB-5	5	2/25/97	4,200	<1,000	1.0	<100	0.0035	<0.0025	0.0058	0.0076	<0.010	0.004	<0.0020
SB-AA-5	5	2/25/97	34,000	<12,000	1,700	<1,200	5.6	2.5	17	14	<1.0	NA	NA

Abbreviations:

ft = feet

a = Bromomethane was detected in method blank at 0.005 mg/kg

TPHcr = Total petroleum hydrocarbons as creosote by modified EPA Method 8015

TPHmo = Total petroleum hydrocarbons as motor oil by modified EPA Method 8015

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

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

Benzene , Toluene, Ethylbenzene, and Xylenes by EPA Method 8020

MTBE = Methyl Tertiary-Butyl Ether by EPA Method 8020

BM = Bromomethane by EPA Method 8010

Freon = Freon 113 by EPA Method 8010

Only the VOC's that were detected are reported here. For the complete suite of analytes, see lab report

Table 2. Soil Analytic Data for Semi-Volatile Organic Compounds (including PNAs) - 5813-15 Shellmound Street, Emeryville, California

Sample ID	Date Sampled	Depth (ft)	Acenaph-thene	Acenaph-thylene	Anthra-cene	Benzo (a) anthracene	Benzo (b&k) fluor-anthene	Benzo (a) pyrene	Benzo (g,h,i) perylene	Chrysene	Dibenzo (a,h) anthracene	Fluor-anthene	Fluorene	Indeo-(1,2,3-cd) pyrene	2-Methyl-naphtha-lene	Naphtha-lene	Phenan-threne	Pyrene
									(Concentrations in mg/kg)									
C-4-5	02/25/97	5	3.4	26	18	53	120	90	84	65	17	170	5.1	63	<3.3	19	87	210
SB-BB-5	02/25/97	5	<3.3	29	27	60	140	100	97	70	18	170	11	71	5.1	68	130	230

Notes:
Only constituents that were detected are only reported here. For the complete suite of analytes, see lab report.
All analytes detected by EPA Method 8270

Attachment C

Ground Water Analytical Data

Table 1. Ground Water Elevation and Analytic Data for Petroleum Hydrocarbons - Lathrop Investigation, 5813-15 Shellmound St., Emeryville, California

Sample ID	Date Sampled	TOC Elevation (ft)	GW Depth (ft)	GW Elevation (ft)	TPHcr	TPHd	TPHmo	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE
					← (Concentrations in ug/L) →								
Grab Ground Water Analytic Data													
SB-BB	02/25/97	---	---	---	35,000	<500	<5,000	790	4.0	2.1	9.3	7.5	<2.0
Quarterly Monitoring													
C-1	12/16/94	100.00	3.82	96.18	<500	NA	NA	<50	<0.5	<0.5	<0.5	<0.5	NA
	03/19/97		4.21	95.79	<500	590[a]	750	<50	<0.50	<0.50	<0.50	0.6	<2.0
	05/30/97		5.45	94.55	<1,000	1,100[a]	2,600	<50	<0.50	<0.50	<0.50	<0.50	<2.0
	07/03/97		5.67	94.33	<2,000	2,600[a]	3,900	<50	<0.50	<0.50	<0.50	<0.50	<2.0
	08/07/97		5.86	94.14	<2,000	3,700[a]	8,200	<50	<0.50	<0.50	<0.50	1.5	<2.0
C-2	12/16/94	99.22	3.33	95.89	<500	NA	NA	<50	<0.5	<0.5	<0.5	<0.5	NA
	03/19/97		3.61	95.61	<500	590[a]	790	<50	<0.50	<0.50	<0.50	<0.50	<2.0
	05/30/97		5.94	93.28	<500	650[a]	1,200	<50	1.1	<0.50	0.6	<0.50	<2.0
	07/03/97		4.91	94.31	<500	1,000[a]	1,200	<50	1.1	<0.50	1.4	<0.50	<2.0
	08/07/97		5.12	94.10	<500	810[a]	1,200	<50	0.71	<0.50	2.0	<0.50	<2.0
C-3	12/16/94	99.24	3.82	95.42	5,100	NA	NA	17,000	1,900	120	5.1	250	NA
	03/19/97		5.82	93.42	10,000	250	<2,500	9,600	1,300	120	170	150	<20
	05/30/97		5.19	94.05	21,000	<500	<5,000	16,000	1,700	230	320	230	<100
	07/03/97		6.31	92.93	25,000	<500	<5,000	21,000	1,400	160	300	200	<200
	08/07/97		6.44	92.80	24,000	<1,000	<5,000	15,000	1,200	110	260	170	<2.0
C-4	03/19/97	98.64	6.46	92.18	25,000	<500	<5,000	5,400	540	19	62	87	<20
	05/30/97		6.52	92.12	25,000	<500	<5,000	8,800	470	22	170	97	<40
	07/03/97		6.52	92.12	16,000	<500	<5,000	6,800	470	12	140	74	<40
	08/07/97		6.54	92.10	18,000	<1,000	<5,000	4,900	360	13	120	67	<20

Table 1. Ground Water Elevation and Analytic Data for Petroleum Hydrocarbons - Lathrop Investigation, 5813-15 Shellmound St., Emeryville, California

Sample ID	Date Sampled	TOC Elevation (ft)	GW Depth (ft)	GW Elevation (ft)	TPHcr	TPHd	TPHmo	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE
					← (Concentrations in ug/L) →								

Abbreviations and Notes:

ug/L = Micrograms per liter
ft = feet
NA = Not Analyzed
TOC = Top of Casing
a = The result appears to be a heavier hydrocarbon than diesel

TPHcr = Total petroleum hydrocarbons as creosote by modified EPA Method 8015
TPHmo = Total petroleum hydrocarbons as motor oil by modified EPA Method 8015
TPHg = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015
TPHd = Total petroleum hydrocarbons as diesel by modified EPA Method 8015
Benzene , Ethylbenzene, Toluene, and Xylenes by EPA Method 8020
MTBE = Methyl Tertiary-Butyl Ether by EPA Method 8020

Table 2. Ground Water Elevation and Analytic Data for Semi-Volatile Organic Compounds (including PNAs) - Lathrop Investigation, 5813-15 Shellmound Street, Emeryville, California

Sample ID	Date Sampled	TOC Elevation (ft)	GW Depth (ft)	GW Elevation (ft)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(g,h,i)perylene	Chrysene	Fluoranthene	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Additional Compounds Detected
					← (Concentrations in ug/L) →													
Quarterly Sampling																		
C-1	12/16/94	100.00	3.82	96.18	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
	03/19/97		4.21	95.79	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
	05/30/97		5.45	94.55	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	
	07/03/97		5.67	94.33	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
	08/07/97		5.86	94.14	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
C-2	12/16/94	99.22	3.33	95.89	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
	03/19/97		3.61	95.61	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	11	<10	<10	
	05/30/97		5.94	93.28	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	<9.3	
	07/30/97		4.91	94.31	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
	08/07/97		5.12	94.10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
C-3	12/16/94	99.24	3.82	95.42	150	780	37	7.2f	8.5f	7.3[f]	20	50	110	490	11,000	260	61	a
	03/19/97		5.82	93.42	570	310	140	49	95	86	130	210	170	360	12,000	560	240	b
	05/30/97		5.19	94.05	800	550	410	<100	350	230	430	850	330	680	11,000	1,200	1,000	c
	07/03/97		6.31	92.93	2,400	520	1,200	600	850	850	1,200	2,900	670	760	16,000	4,700	3,100	g
	08/07/97		6.44	92.80	930	300	270	180	230	220	280	550	240	460	12,000	1,200	810	j
C-4	03/19/97	98.64	6.46	92.18	2,400	880	1,600	1,300	1,800	1,700	2,000	5,400	1,100	500	13,000	7,300	6,400	d
	05/30/97		6.52	92.12	760	210	400	<100	440	290	460	1,100	300	230	5,000	1,400	1,300	e
	07/03/97		6.52	92.12	680	96	140	130	150	170	160	790	140	95	5,400	1,100	850	h
	08/07/97		6.54	92.10	480	120	130	110	140	150	150	390	150	160	5,800	560	450	k

Table 2. Ground Water Elevation and Analytic Data for Semi-Volatile Organic Compounds (including PNAs) - Lathrop Investigation, 5813-15 Shellmound Street, Emeryville, California

Sample ID	Date Sampled	TOC Elevation (ft)	GW Depth (ft)	GW Elevation (ft)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(g,h,i)perylene	Chrysene	Fluoranthene	Fluorene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Additional Compounds Detected
					←					(Concentrations in ug/L)							→	

Abbreviations and Notes:

ug/L = Micrograms per liter

a = Dibenzofuran at 15 ug/L by EPA Method 8270

b = Benzo (b&k) fluoranthene detected at 110 ug/L by EPA Method 8270
= Dibenzofuran dectected at 25 ug/L by EPA Method 8270
= Indeno (1,2,3 - cd) pyrene dectected at 61 ug/L by EPA Method 8270

c = Benzo (b&k) fluoranthene detected at 450 ug/L by EPA Method 8270
= Ideno (1,2,3-cd) pyrene detected at 180 ug/L by EPA Method 8270

d = Benzo (b&k) fluoranthene detected at 2,300 ug/L by EPA Method 8270
= Dibenzo (a,h) anthracene detected at 260 ug/L by EPA Method 8270
= Dibenzofuran dectected at 110 ug/L by EPA Method 8270
= Indeno (1,2,3 - cd) pyrene detected at 1,200 ug/L by EPA Method 8270

e = Benzo (b&k) fluoranthene detected at 290 ug/L by EPA Method 8270
= Indeno (1,2,3-cd) pyrene detected at 230 ug/L by EPA Method 8270

f = Lab estimated value

g = Benzo (b&k) fluoranthene detected at 1,100 ug/L by EPA Method 8270
= Dibenzo (a,h) anthracene detected at 110 ug/L by EPA Method 8270
= Dibenzofuran detected at 73 ug/L by EPA Method 8270
= Indeno (1,2,3-cd) pyrene detected at 610 ug/L by EPA Method 8270

h = Benzo (b&k) fluoranthene detected at 230 ug/L by EPA Method 8270
= Dibenzo (a,h) anthracene detected at 21 ug/L by EPA Method 8270
= Indeno (1,2,3-cd) pyrene detected at 120 ug/L by EPA Method 8270

j = Benzo (b&k) fluoranthene detected at 280 ug/L by EPA Method 8270
= Indeno (1,2,3-cd) pyrene detected at 160 ug/L by EPA Method 8270

k = Benzo (b&k) fluoranthene detected at 180 ug/L by EPA Method 8270
= Indeno (1,2,3-cd) pyrene detected at 110 ug/L by EPA Method 8270

Table 5. Ground Water Elevation and Analytic Data for Hydrocarbons and Volatile Organic Compounds (VOCs)
- Lathrop Investigation, Emeryville, California

Well ID	Date	Well Elev. (ft)	GW Depth ft)	GW Elev. (ft)	TPHcr	TPHg	B	T	E	X	VC	1,1 DCE	1,1 DCA	1,2 DCE	1,2 DCA	1,1,1 TCA	TCE	CA	Notes
										(Concentration in ug/l or parts per billion)								
CROLEY AND HERRING INVESTMENT (5800Christie Street)																			
MW-1	4/25/94				--	--	nd	nd	nd	nd	nd	nd	9	9	nd	nd	nd	nd	
MW-2	4/25/89	7.42			--	--	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
	2/20/90		4.26	3.16	--	nd	nd	0.6	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
MW-3	4/25/89	6.42			--	--	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
	2/20/90		5.42	1.00	--	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
MW-4	7/13/94				--	nd	800	280	270	300	nd	nd	nd	nd	nd	nd	nd	nd	
	10/8/93				--	2,200*	290	220	120	200	nd	nd	nd	nd	55	5	nd	nd	
	1/19/94				--	350	210	25	35	37	nd	nd	nd	nd	nd	nd	nd	nd	
EW-1	5/8/89	8.62			--	--	nd	190	nd	170	nd	78	nd	nd	nd	nd	640	nd	
	11/6/89		6.15	2.47	--	740	180	39	0.8	67	29	2.3	34	350	4.8	26	740	nd	
	2/20/90		5.93	2.69	--	12,000	1,300	3,600	7.1	47	nd	14	460	2,500	34	550	1,100	29	14 MC
	5/31/90		5.86	2.76	--	24,000	56	6,100	17	140	2,600	69	1,900	110	33	1,200	830	94	40 MC
	9/7/90		6.30	2.32	--	25,000	1,100	800	nd	42	1,700	36	1,300	2,400	53	510	490	150	22 MC
	12/4/90		7.39	2.23	--	7,400	180	3,200	nd	nd	230	nd	460	1,500	nd	72	1,500	nd	
	4/6/91		6.02	2.60	--	51,000	3,000	12,000	nd	nd	900	nd	1,800	3,700	nd	2,900	1,300	nd	
	7/3/91		6.20	2.42	--	23,000	650	8,700	nd	nd	1,990	nd	2,000	2,000	nd	200	130	170	
	10/12/91		6.50	2.12	--	39,000	nd	1,300	nd	nd	170	nd	630	620	120	470	730	54	
	1/8/92		6.20	2.42	--	nd	nd	580	nd	nd	480	nd	420	1,520	250	89	1,700	nd	
	4/8/92		--	--	--	12,000	4,000	nd	nd	nd	nd	nd	1,300	nd	2,700	nd	2,800	nd	
	7/15/92		6.10	2.52	--	100,00	nd	4,700	nd	nd	150	nd	600	600	110	420	680	nd	
	10/19/92		6.10	2.52	--	26,000	nd	12,500	nd	nd	nd	4,800	nd	nd	nd	nd	270	nd	
	1/11/93		5.50	3.12	--	20,000	nd	7,500	nd	75	nd	nd	nd	nd	nd	nd	23	nd	42 PCE
	3/29/93		5.95	2.67	--	15,000	nd	12,000	nd	nd	nd	500	nd	nd	nd	nd	2,000	nd	
	7/7/93		6.20	2.42	--	40,000	nd	3,600	nd	nd	nd	nd	1,700	nd	nd	nd	nd	nd	
	10/8/93		6.25	2.37	--	12,000	nd	11,000	nd	81	nd	nd	1,600	nd	nd	210	nd	nd	

Table continues on next page

Table 5. Ground Water Elevation and Analytic Data for Hydrocarbons and Volatile Organic Compounds (VOCs)
- Lathrop Investigation, Emeryville, California

Well ID	Date	Well Elev. (ft)	GW Depth ft)	GW Elev. (ft)	TPHcr	TPHg	B	T	E	X	VC	1,1 DCE	1,1 DCA	1,2 DCE	1,2 DCA	1,1,1 TCA	TCE	CA	Notes
										(Concentration in ug/l or parts per billion)								
	1/19/94		6.30	2.32	--	5,000	22	4,300	12	70	nd	nd	nd	nd	nd	nd	nd	nd	
C-1	12/16/94	100.0	3.82	96.18	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
C-2	12/16/94	99.22	3.33	95.89	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	
C-3	12/16/94	99.24	3.82	95.42	5.1	17	1,900	120	5.1	250	nd	nd	nd	nd	nd	nd	nd	nd	
LATHROP PROPERTY																			
Sewer Water Entering Excavation																			
1,500	10/26/89				--	2,800	32	240	61	400	--	--	--	--	--	--	--	--	
Cambria Boring Grab Samples																			
SB-B	9/22/94				--	49	nd	nd	nd	nd	--	--	--	--	--	--	--	--	
SB-C	9/22/94				--	31	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	1.7 CF, a
SB-D	9/22/94				--	19	nd	2.1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0 8 CF
SB-E	9/22/94				--	38	0.78	1.2	nd	1.0	1.8	nd	nd	nd	nd	nd	nd	nd	0.7 CF
SB-G	9/22/94				--	12,000	220	6,500	78	350	190	4.0	440	22	3.6	15	640	nd	1.9 TCA, b
SB-H	9/22/94				--	40,000	230	5,200	110	300	430	1.0	1,300	24	9.7	35	82	nd	0.6 TCA, c
SB-K	9/22/94				--	13,000	1,000	nd	140	nd	--	--	--	--	--	--	--	--	d
SB-N	9/22/94				--	38,000	8,100	1,500	550	570	nd	nd	nd	nd	nd	nd	nd	nd	
SB-O	9/22/94				--	1,500	4.8	1.0	7.3	10	nd	nd	nd	nd	nd	nd	nd	nd	
SB-P	9/22/94				--	21,000	1,500	150	260	nd	nd	nd	54	nd	nd	nd	nd	nd	d
DTSC MCLs or State Action					--	NE	1	100	680	1,750	--	--	--	--	--	--	--	--	

Table continues on next page

Table 5. Ground Water Elevation and Analytic Data for Hydrocarbons and Volatile Organic Compounds (VOCs)
- Lathrop Investigation, Emeryville, California

Well ID	Date	Well Elev. (ft)	GW Depth ft)	GW Elev. (ft)	TPHcr	TPHg	B	T	E	X	VC	1,1 DCE	1,1 DCA	1,2 DCE	1,2 DCA	1,1,1 TCA	TCE	CA	Notes
											(Concentration in ug/l or parts per billion)								

Notes

Abbreviations

Well Elevation = Top of casing elevation with respect to onsite benchmark
GW = Ground water
LPH = Liquid-phase hydrocarbons; calculated ground water elevation corrected for LPH by the relation:
Ground Water Elevation = Well Elevation - Depth to Water + 0.8 LPH
TPHg = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015
B = Benzene by EPA Method 8020
E = Ethylbenzene by EPA Method 8020
T = Toluene by EPA Method 8020
X = Xylenes by EPA Method 8020
nd = Not detected, detection limit not reported by consultant
DTSC MCLs = Department of ToxicSubstances Control maximum contaminant level for drinking water
NE = Not established
VC = Vinyl chloride
1,1 DCE = 1,1 dichloroethene
1,1 DCA = 1,1 dichloroethane
1,2 DCE = Trans 1,2 dichloroethene
1,1,1 TCA = 1,1,1 trichloroethane
TCA = 1,1,2 trichloroethane
TCE = Trichloroethene
CA = Chloroethane
CF = Chloroform
PCE = Tetrachloroethene
-- = Constiuent not analyzed.

Notes

a = 0.7 ppm BDCA
b = 2, 400 cis-1,2 - dichloroethane, 0.5 tetrachlorethene, 1.9 1,1,2 - trichlorethane.
c = 830 ppm cis- 1,2 - dichlorethene.
d = the positive result has an atypical pattern for gasoline analysis.
* = BTEX do not match gasoline pattern.

Table 7. Ground Water Analytic Data for Metals
- Lathrop Investigation, Emeryville, California

Well ID	Date	Cadmium	Chromium	Lead	Nickel	Tin	Vanadium	Zinc
		(Concentration in mg/kg or parts per million)						
LATHROP (5813-5815 Shellmound)								
Cambria, December 1994								
C-1	12/16/94	nd	nd	nd	nd	nd	nd	nd
C-2	12/16/94	na	na	na	na	na	na	na
C-3	12/16/94	nd	nd	nd	0.12	nd	nd	nd

Abbreviations
nd = Not detected, or no limit given by previous consultant
na = Not analyzed

Attachment C-1

Waste Water Disposal Forms

TF NUMBER: _____

NON-HAZARDOUS WATER TRANSPORT FORM

GENERATOR INFORMATION

NAME: F. P. Lathrop Properties

ADDRESS: 2000 Powell St., Ste 1600

CITY.STATE.ZIP: Emeryville, CA 94608 PHONE #: (510) 547-7166

DESCRIPTION OF WATER: MONITORING WELL PURGE / DECON WATER

I CERTIFY THAT THIS MATERIAL IS A LIQUID, EXEMPT FROM RCRA PER 40 CFR 261.4 (B)(10) AND DOES NOT MEET THE CRITERIA OF HAZARDOUS WASTE AS DESCRIBED IN 22 CCR ARTICLE 11 OR ANY OTHER APPLICABLE STATE LAW, HAS BEEN PROPERLY DESCRIBED, CLASSIFIED AND PACKAGED AND IS IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO APPLICABLE REGULATIONS.

Ann Crum (FOR F.P. LATHROP) Ann Crum (For F.P. Lathrop) 10/1/97

GENERATOR/AUTHORIZED AGENT SIGNATURE & DATE

SITE INFORMATION

Site Operator	Address	Gals
F. P. LATHROP	Parking Lot / Stereo Installation 5800 Christie Ave. Emeryville, CA	110

TOTAL GALLONS: 110

TRANSPORTER INFORMATION

NAME: IWM, Inc.

ADDRESS: 950 Ames Avenue

CITY.STATE,ZIP: Milpitas, CA 95035 PHONE #: (408) 942-8955

TRUCK ID #: _____ (Typed or printed full name & signature) (Date)

RECEIVING FACILITY

NAME: Seaport Environmental

ADDRESS: 675 Seaport Blvd.

CITY.STATE.ZIP: Port of Redwood City, CA 94063 PHONE #: 415-364-8154

APPROVAL #: _____ (Typed or printed full name & signature) (Date)

Attachment D

Area Well Survey

Banks
Information
Solutions

21 November 1997

CAMBRIA ENVIRONMENTAL TECHNOLOGY
1144 65th St, Suite B
Oakland, CA 94608

Attn: Ms. Ann Crum

Re: Site Name: Lathrop Property
Site Address: 5813-5815 Shellmound St, Emeryville, CA
Project #:

Dear Ms. Crum:

Banks Information Solutions, Inc. (Banks) in conjunction with Vista Information Solutions, Inc. has completed your request for a water well search of all known groundwater wells located within a one-half (1/2) mile radius of the above referenced site. Banks requested access to all available records, database information, and quadrangle maps maintained by the California Department of Water Resources, Central District, located in Sacramento, CA. The department approved our request and provided a water well drillers report for wells that fall within your area of review. Banks has located any wells that fall within your area on the enclosed U.S.G.S. 7.5' topographic map. Upon review of the information provided, Banks located the following wells within your area of review.

Map #	State I.D.	Owner	Type	Total Depth	Date
1	15/4w - 15L	Griffin and Skelly	Unknown	213'	00/00/00

Following is an excerpt from the California Water Code, Section 13752:

The following opinion was released on March 30, 1970 from the office of Chief Counsel Porter A. Towner, Department of Water Resources: ".... Section 13752 (California Water Code) provides that the information in the logs and reports 'shall not be made available for inspection by the public but shall be made available to governmental agencies for use in making studies: provided, that any report shall be made available to any person who obtains a written authorization from the owner of the water well.' When a governmental agency hires you as a consultant, that agency can release the information in the log to you for use in a study, but you would be subject to the same limitations as the public agency. Publication of specific items of information from the well reports, including the well logs, without the consent of the owners, is prohibited. You may publish discussions of ground water conditions in an area described by section, township, and range, even though the conditions were established in whole or in part from studies of well reports. Reference to a specific well must be omitted if the information is derived from the report rather than an independent source. The best way for making the information available without restriction and to use it in a public report is to obtain written releases from the owners of the wells."

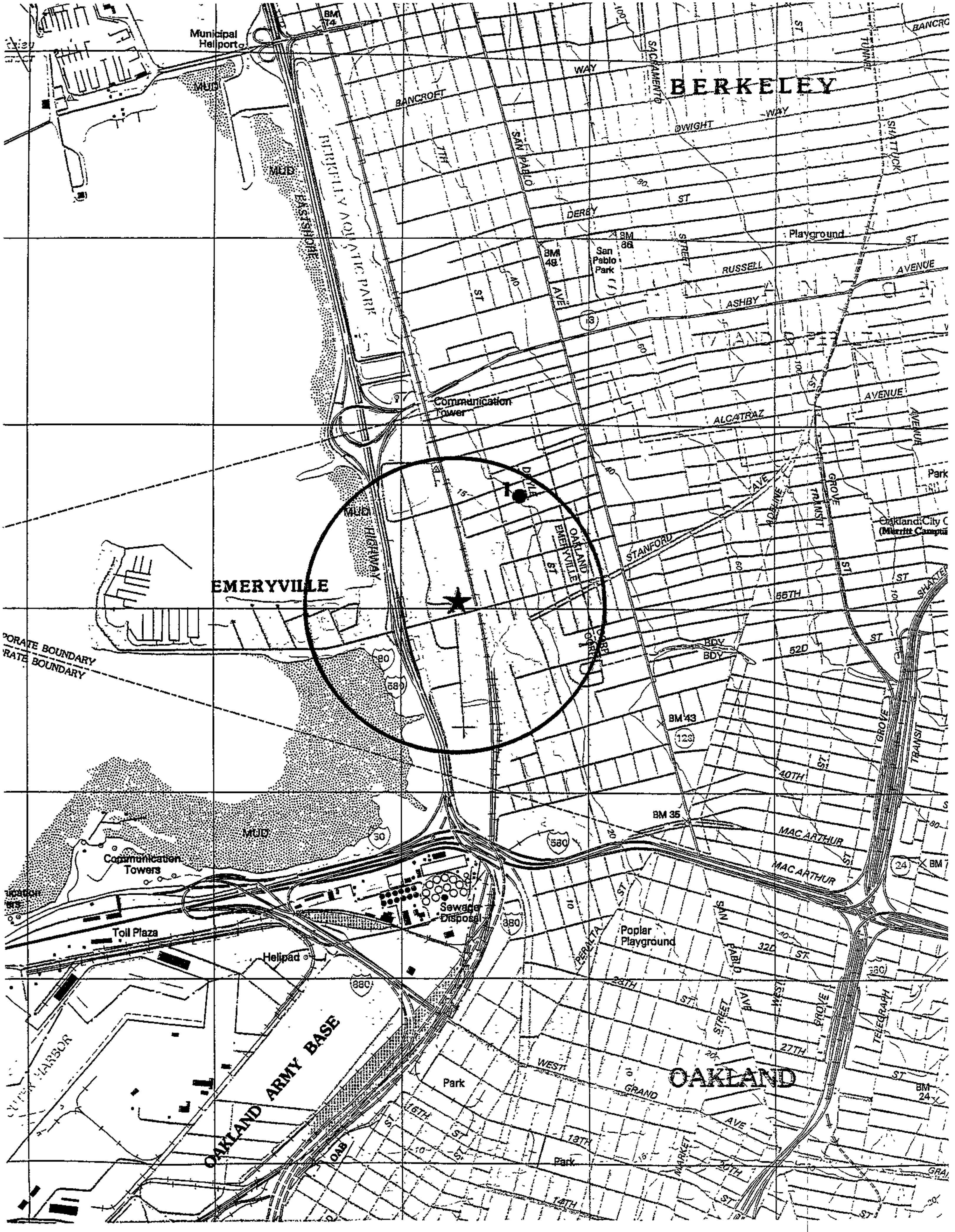
Banks Information Solutions, Inc. P.O. Box 12851, Capitol Station Austin, Texas 78711
301 Congress Avenue Suite 520 Austin, Texas 78701
512-478-0059 FAX 512-478-1433 E Mail BANKS @ BANKSINFO.COM

Banks Information Solutions, Inc. has performed a thorough and diligent search of all groundwater well information provided and recorded with the California Department of Water Resources, Central District. All mapped locations are based on information obtained from the DWR. Although Banks performs quality assurance and quality control on all research projects, we recognize that any inaccuracies of the records and mapped well locations could possibly be traced to the appropriate regulatory authority or driller. It may be possible that some water well schedules may have never been submitted to the regulatory authority by the driller and, thus, may explain the possible unaccountability of privately drilled wells. It is uncertain if the above listing provides 100% of the existing wells within the area of review. Therefore, Banks Information Solutions, Inc. cannot guarantee the accuracy of the data or well location(s) of those maps and records maintained by the California Department of Water Resources.

If you should require any further research or have any questions regarding this research request, please call me at 512/478-0059.

Sincerely,

Beth Rogers



Municipal Heliport
MUD
BERKELEY
BANCROFT
WAY
DWIGHT
SACRAMENTO
SAN PABLO
7TH
BERKELEY AQUATIC PARK
EASTSHORE
DERBY
ST
Playground
BM 86
BM 49
San Pablo Park
RUSSELL
AVENUE
ASHBY
Communication Tower
ALCATRAZ
ADELINE
GROVE
TRANSIT
SHATTUCK
Oakland City C
STANFORD
EMERYVILLE
HIGHWAY
OAKLAND
EMERYVILLE
55TH
52D
BDY
BM 43
40TH
BM 35
MAC ARTHUR
Communication Towers
Sewage Disposal
Toll Plaza
Helipad
Poplar Playground
32D
28TH
27TH
STREET
WEST
GRAND
OAKLAND
OAKLAND ARMY BASE
Park
16TH
13TH
14TH
20TH
MARKET
TELEGRAPH

BANKS INFORMATION SOLUTIONS, INC.

P.O. Box 12851 Capitol Station ■ Austin, Texas 78711 512/478-0059

WATER WELL SEARCH

MAP REFERENCE NUMBER **1**

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

REGION
COUNTY
NEAR
BASIN
STATE No. 1
OTHER Nos. 15/4W-15L

WELL LOG

LOCATION

Griffin and Skelly — Emeryville
OWNER — ADDRESS

Rogers — 110 Sutter, S. F., California, 1738 Larkin
DRILLED BY — ADDRESS

DRILLING METHOD — GRAVEL PACKED — DATE COMPLETED

SIZE OF CASING 12" DEPTH — STRUCK WATER AT

PERFORATIONS — SIZE — No.

WATER LEVEL BEFORE PERFORATING — AFTER

TEST DATA: DISCHARGE G. P. M. — DRAWDOWN FT. — HOURS RUN

OTHER DATA AVAILABLE: WATER LEVEL RECORD — ANALYSIS

SURFACE ELEV. — DATUM — SOURCE OF INFORMATION Drillers' Log

DEPTH	ELEV. OF BOTTOM OF STRATUM	MATERIAL	THICKNESS	SP. YIELD %	
0 - 4		fill			
8		adobe			
12		yellow clay			
14		gray clay			
17		yellow clay			
25		stone clay			
36		sandy clay			
45		gray clay			
49		yellow clay			
53		cement coarse sand			
57		gray clay			
75		cement clay			
88		gray clay			
100		yellow clay			
108		cement			
123		had yellow clay			
127		dirty gravel			
139		gray clay			
149		coarse sand			
152		sandy clay			
156		cement gravel			
166		sandy clay			
180		yellow clay			
194		coarse sandy clay			
200		sandy yellow clay			
210		gravel			
213		yellow clay			

FOR FIELD COPIES USE ALTERNATE LINES

LOG OBTAINED BY — DATE — SHEET 1 OF

FORM 233

Attachment E

Tier 1 RBSLs

RBCA TIER 1: Volatilization from Subsurface Soil and Ground Water to Outdoor Air — Input Summary Table

Site Name: Lathrop Property | Job Identification: 190-122 | Software: GSI RBCA Spreadsheet
Site Location: 5813-15 Shellmound Street, Eme | Date Completed: 10/28/97 | Version: 1.0.1
Completed By: Sam Rangarajan, Cambria Env. Tech. Inc

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF.Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing. rate (mg-yr/kg-d)	1.1E+02			9.4E+01	
IRa.in	Inhalation rate indoor (m^3/day)	15			20	
IRa.out	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5 8E+03		2.0E+03	5 8E+03	5.8E+03
SAadj	Adjusted dermal area (cm^2-yr/kg)	2 1E+03			1.7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	Use EPA tox data for air (or PEL based)?	TRUE				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways		Residential	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
Outdoor Air Pathways:				
SS.v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S.v	Volatilization from Subsurface Soils	FALSE	**TRUE**	
GW.v	Volatilization from Groundwater	FALSE	**TRUE**	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	FALSE	FALSE	
GW.b	Vapors from Groundwater	FALSE	FALSE	
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
Groundwater Pathways:				
GW.i	Groundwater Ingestion	FALSE	FALSE	
S.l	Leaching to Groundwater from all Soils	FALSE	FALSE	

Matrix of Receptor Distance and Location On- or Off-Site		Residential Distance	Residential On-Site	Commercial/Industrial Distance	Commercial/Industrial On-Site
GW	Groundwater receptor (cm)		TRUE		TRUE
S	Inhalation receptor (cm)		TRUE		TRUE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***1.0E-05***	
TRc	Target Risk (class C carcinogens)	1.0E-05	
THQ	Target Hazard Quotient	1 0E+00	
Opt	Calculation Option (1, 2, or 3)	1	
Tier	RBCA Tier	1	

Surface Parameters	Definition (Units)	Residential	Constrctn
A	Contaminated soil area (cm^2)	2 2E+06	1.0E+06
W	Length of affect. soil parallel to wind (cm)	1 5E+03	1.0E+03
W.gw	Length of affect. soil parallel to groundwater (cm)	1 5E+03	
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02	
delta	Air mixing zone height (cm)	2.0E+02	
Lss	Thickness of affected surface soils (cm)	1.0E+02	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	2.5E+03
Ugw.tr	Groundwater seepage velocity (cm/yr)	6.6E+03
Ks	Saturated hydraulic conductivity(cm/s)	
grad	Groundwater gradient (cm/cm)	
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
phi.eff	Effective porosity in water-bearing unit	3 8E-01
foc.sat	Fraction organic carbon in water-bearing unit	1 0E-03
BIO?	Is bioattenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value	capillary	vadose	foundation
hc	Capillary zone thickness (cm)	5.0E+00			
hv	Vadose zone thickness (cm)	3.0E+02			
rho	Soil density (g/cm^3)	1.7			
foc	Fraction of organic carbon in vadose zone	0.01			
phi	Soil porosity in vadose zone	0.38			
Lgw	Depth to groundwater (cm)	3.0E+02			
Ls	Depth to top of affected subsurface soil (cm)	1 0E+02			
Lsubs	Thickness of affected subsurface soils (cm)	2 0E+02			
pH	Soil/groundwater pH	6.5			
phi.w	Volumetric water content		0 342	***0.12***	***0.24***
phi.a	Volumetric air content		0.038	0.26	***0.14***

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2 0E+02	3 0E+02
ER	Building air exchange rate (s^-1)	***4.2E-04***	2 3E-04
Lcrk	Foundation crack thickness (cm)	1 5E+01	
eta	Foundation crack fraction	***0.001***	

Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersivity (cm)		
ay	Transverse dispersivity (cm)		
az	Vertical dispersivity (cm)		
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

RBCA SITE ASSESSMENT

Tier 1 Worksheet 6.2

Site Name: Lathrop Property
Site Location: 5813-15 Shellmound Street, Emeryville, CA

Completed By: Sam Rangarajan, Cambna Env. Tech. Inc
Date Completed: 10/28/1997

SUBSURFACE SOIL RBSL VALUES (> 3.3 FT BGS)

Target Risk (Class A & B) 1.0E-5
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1 0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option. 1

RBSL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater			Soil Volatilization to Indoor Air		X Soil Volatilization to Outdoor Air		Applicable RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/kg)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	8.0E-2	NA	NA	NA	NA	NA	NA	3.4E+2	3.4E+2	☐	<1
56-55-3	Benzo(a)Anthracene	1.9E+2	NA	NA	NA	NA	NA	NA	>Res	>Res	☐	<1
50-32-8	Benzo(a)Pyrene	2.2E+2	NA	NA	NA	NA	NA	NA	>Res	>Res	☐	<1
218-01-9	Chrysene	2.4E+2	NA	NA	NA	NA	NA	NA	>Res	>Res	☐	<1
100-41-4	Ethylbenzene	1.3E-1	NA	NA	NA	NA	NA	NA	>Res	>Res	☐	<1

>Res indicates risk-based target concentration greater than constituent residual saturation value

Software: GSI RBCA Spreadsheet
Version: 1 0.1

Serial: G-273-IBX-894

RBCA SITE ASSESSMENT

Tier 1 Worksheet 6.3

Site Name: Lathrop Property
Site Location: 5813-15 Shellmound Street, Emeryville, CA

Completed By: Sam Rangarajan, Cambria Env. Tech. Inc
Date Completed: 10/28/1997

GROUNDWATER RBSL VALUES

Target Risk (Class A & B) 1.0E-5
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option 1

RBSL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Groundwater Ingestion			Groundwater Volatilization to Indoor Air		X Groundwater Volatilization to Outdoor Air		Applicable RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL) (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	1.5E+0	NA	NA	NA	NA	NA	NA	1.8E+2	1.8E+2	☐	<1
56-55-3	Benzo(a)Anthracene	1.8E-1	NA	NA	NA	NA	NA	NA	>Sol	>Sol	☐	<1
50-32-8	Benzo(a)Pyrene	3.1E-1	NA	NA	NA	NA	NA	NA	>Sol	>Sol	☐	<1
218-01-9	Chrysene	4.1E-1	NA	NA	NA	NA	NA	NA	>Sol	>Sol	☐	<1
100-41-4	Ethylbenzene	2.1E-1	NA	NA	NA	NA	NA	NA	>Sol	>Sol	☐	<1

>Sol indicates risk-based target concentration greater than constituent solubility

Software: GSI RBCA Spreadsheet Serial: G-273-IBX-894
Version: 1.0.1

RBCA TIER 1: Volatilization from Subsurface Soil and Ground Water to Indoor Air — Input Summary Table

Site Name: Lathrop Property | Job Identification: 190-122 | Software: GSI RBCA Spreadsheet
Site Location: 5813-15 Shellmound Street, Emeryville | Date Completed: 10/28/97 | Version: 1.0.1
Completed By: Sam Rangarajan, Cambria Env. Tech. Inc

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined.

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF.Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing. rate (mg-yr/kg-d)	1.1E+02			9.4E+01	
IRa in	Inhalation rate indoor (m^3/day)	15			20	
IRa out	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5.8E+03		2.0E+03	5.8E+03	5.8E+03
SAadj	Adjusted dermal area (cm^2-yr/kg)	2.1E+03			1.7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	***TRUE***			***TRUE***	
AAFd	Age adjustment on skin surface area	***TRUE***			***TRUE***	
tox	Use EPA tox data for air (or PEL based)?	TRUE				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways		Residential	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
Outdoor Air Pathways:				
SS v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S.v	Volatilization from Subsurface Soils	FALSE	FALSE	
GW.v	Volatilization from Groundwater	FALSE	FALSE	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	FALSE	**TRUE**	
GW.b	Vapors from Groundwater	FALSE	**TRUE**	
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
Groundwater Pathways:				
GW.i	Groundwater Ingestion	FALSE	FALSE	
S.l	Leaching to Groundwater from all Soils	FALSE	FALSE	

Matrix of Receptor Distance and Location On- or Off-Site		Residential Distance	Residential On-Site	Commercial/Industrial Distance	Commercial/Industrial On-Site
GW	Groundwater receptor (cm)		TRUE		TRUE
S	Inhalation receptor (cm)		TRUE		TRUE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***1.0E-05***	
TRc	Target Risk (class C carcinogens)	1.0E-05	
THQ	Target Hazard Quotient	1.0E+00	
Opt	Calculation Option (1, 2, or 3)	1	
Tier	RBCA Tier	1	

Surface Parameters	Definition (Units)	Residential	Constrctn
A	Contaminated soil area (cm^2)	2.2E+06	1.0E+06
W	Length of affect. soil parallel to wind (cm)	1.5E+03	1.0E+03
W.gw	Length of affect. soil parallel to groundwater (cm)	1.5E+03	
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02	
delta	Air mixing zone height (cm)	2.0E+02	
Lss	Thickness of affected surface soils (cm)	1.0E+02	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	2.5E+03
Ugw.tr	Groundwater seepage velocity (cm/yr)	6.6E+03
Ks	Saturated hydraulic conductivity(cm/s)	
grad	Groundwater gradient (cm/cm)	
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
phi eff	Effective porosity in water-bearing unit	3.8E-01
foc sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value	capillary	vadose	foundation
hc	Capillary zone thickness (cm)	5.0E+00			
hv	Vadose zone thickness (cm)	3.0E+02			
rho	Soil density (g/cm^3)	1.7			
foc	Fraction of organic carbon in vadose zone	0.01			
phi	Soil porosity in vadose zone	0.38			
Lgw	Depth to groundwater (cm)	3.0E+02			
Ls	Depth to top of affected subsurface soil (cm)	1.0E+02			
Lsubs	Thickness of affected subsurface soils (cm)	2.0E+02			
pH	Soil/groundwater pH	6.5			
phi.w	Volumetric water content		0.342	0.12	0.12
phi.a	Volumetric air content		0.038	0.26	0.26

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	0.01	

Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersivity (cm)		
ay	Transverse dispersivity (cm)		
az	Vertical dispersivity (cm)		
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

Site Name: Lathrop Property
Site Location: 5813-15 Shellmound Street, Emeryville, CA

Completed By: Sam Rangarajan, Cambria Env. Tech. Inc
Date Completed: 10/28/1997

SUBSURFACE SOIL RBSL VALUES (> 3.3 FT BGS)

Target Risk (Class A & B) 1.0E-5
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 1

RBSL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater			X Soil Volatilization to Indoor Air		Soil Volatilization to Outdoor Air		Applicable RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/kg)	Residential: (on-site)	Commercial. (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial (on-site)	Residential: (on-site)	Commercial (on-site)	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	8.0E-2	NA	NA	NA	NA	7.9E-1	NA	NA	7.9E-1	☐	<1
56-55-3	Benzo(a)Anthracene	1.9E+2	NA	NA	NA	NA	>Res	NA	NA	>Res	☐	<1
50-32-8	Benzo(a)Pyrene	2.2E+2	NA	NA	NA	NA	>Res	NA	NA	>Res	☐	<1
218-01-9	Chrysene	2.4E+2	NA	NA	NA	NA	>Res	NA	NA	>Res	☐	<1
100-41-4	Ethylbenzene	1.3E-1	NA	NA	NA	NA	>Res	NA	NA	>Res	☐	<1

>Res indicates risk-based target concentration greater than constituent residual saturation value

Software: GSI RBCA Spreadsheet Serial: G-273-IBX-894
Version: 1.0.1

RBCA SITE ASSESSMENT

Tier 1 Worksheet 6.3

Site Name: Lathrop Property
Site Location: 5813-15 Shellmound Street, Emeryville, CA

Completed By: Sam Rangarajan, Cambria Env. Tech. Inc
Date Completed: 10/28/1997

GROUNDWATER RBSL VALUES

Target Risk (Class A & B) 1.0E-5
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 1

RBSL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Groundwater Ingestion			X Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial (on-site)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	1.5E+0	NA	NA	NA	NA	7.4E-1	NA	NA	7.4E-1	■	2.0E+00
56-55-3	Benzo(a)Anthracene	1.8E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1
50-32-8	Benzo(a)Pyrene	3.1E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1
218-01-9	Chrysene	4.1E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1
100-41-4	Ethylbenzene	2.1E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1

>Sol indicates risk-based target concentration greater than constituent solubility

Software: GSI RBCA Spreadsheet Serial: G-273-IBX-894
Version: 1.0.1

RBCA TIER 1: Volatilization from Subsurface Soil and Ground Water to Indoor Air — Input Summary Table

Site Name: Lathrop Property | Job Identification: 190-122 | Software: GSI RBCA Spreadsheet
Site Location: 5813-15 Shellmound Street, Em | Date Completed: 10/28/97 | Version: 1.0.1
Completed By: Sam Rangarajan, Cambria Env Tech Inc

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined.

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF.Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing rate (mg-yr/kg-d)	1.1E+02			9 4E+01	
IRa.in	Inhalation rate indoor (m^3/day)	15			20	
IRa.out	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5 8E+03		2.0E+03	5.8E+03	5 8E+03
SAadj	Adjusted dermal area (cm^2-yr/kg)	2.1E+03			1 7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	*Use EPA tox data for air (or PEL based)?*	*TRUE*				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways		Residential	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
Outdoor Air Pathways:				
SS.v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S.v	Volatilization from Subsurface Soils	FALSE	FALSE	
GW.v	Volatilization from Groundwater	FALSE	FALSE	
Indoor Air Pathways:				
S b	Vapors from Subsurface Soils	FALSE	**TRUE**	
GW b	Vapors from Groundwater	FALSE	**TRUE**	
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
Groundwater Pathways:				
GW.I	Groundwater Ingestion	*FALSE*	*FALSE*	
S.l	Leaching to Groundwater from all Soils	FALSE	FALSE	

Matrix of Receptor Distance and Location On- or Off-Site		Residential Distance	Residential On-Site	Commercial/Industrial Distance	Commercial/Industrial On-Site
GW	Groundwater receptor (cm)		TRUE		TRUE
S	Inhalation receptor (cm)		TRUE		TRUE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***1.0E-05***	
TRc	Target Risk (class C carcinogens)	1 0E-05	
THQ	Target Hazard Quotient	1.0E+00	
Opt	Calculation Option (1, 2, or 3)	1	
Tier	RBCA Tier	1	

Surface Parameters	Definition (Units)	Residential	Constrctn
A	Contaminated soil area (cm^2)	2 2E+06	1.0E+06
W	Length of affect soil parallel to wind (cm)	1 5E+03	1.0E+03
W.gw	Length of affect soil parallel to groundwater (cm)	1.5E+03	
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02	
delta	Air mixing zone height (cm)	2.0E+02	
Lss	Thickness of affected surface soils (cm)	1 0E+02	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2 0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	2.5E+03
Ugw.tr	Groundwater seepage velocity (cm/yr)	6.6E+03
Ks	Saturated hydraulic conductivity(cm/s)	
grad	Groundwater gradient (cm/cm)	
Sw	Width of groundwater source zone (cm)	
Sd	*Depth of groundwater source zone (cm)*	
phi eff	Effective porosity in water-bearing unit	3.8E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value	capillary	vadose	foundation
hc	Capillary zone thickness (cm)	5.0E+00			
hv	Vadose zone thickness (cm)	3 0E+02			
rho	Soil density (g/cm^3)	1.7			
foc	Fraction of organic carbon in vadose zone	0.01			
phi	Soil porosity in vadose zone	0.38			
Lgw	Depth to groundwater (cm)	3.0E+02			
Ls	Depth to top of affected subsurface soil (cm)	1 0E+02			
Lsubs	Thickness of affected subsurface soils (cm)	2.0E+02			
pH	Soil/groundwater pH	6 5			
phi.w	*Volumetric water content*		*0.342*	*0.12*	*0 12*
phi.a	Volumetric air content		0.038	0.26	0 26

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	0.01	

Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersivity (cm)		
ay	Transverse dispersivity (cm)		
az	Vertical dispersivity (cm)		
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

RBCA SITE ASSESSMENT

Tier 1 Worksheet 6.2

Site Name: Lathrop Property
Site Location: 5813-15 Shellmound Street, Emeryville, CA

Completed By: Sam Rangarajan, Cambna Env. Tech. Inc
Date Completed: 10/28/1997

SUBSURFACE SOIL RBSL VALUES (> 3.3 FT BGS)

Target Risk (Class A & B) 1.0E-5
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 1

RBSL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater			X	Soil Volatilization to Indoor Air		Soil Volatilization to Outdoor Air		Applicable RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/kg)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)		Residential: (on-site)	Commercial: (on-site)	Residential: (on-site)	Commercial. (on-site)	(mg/kg)	"■" If yes	Only if "yes" left
120-12-7	Anthracene	2.2E+2	NA	NA	NA		NA	NA	NA	NA	>Res	☐	<1
53-70-3	Dibenzo(a,h) Anthracene	0.0E+0	NA	NA	NA		NA	>Res	NA	NA	>Res	☐	<1
206-44-0	Fluoranthene	7.3E+2	NA	NA	NA		NA	NA	NA	NA	>Res	☐	<1
193-39-5	Indeno(1,2,3,c,d)Pyrene	1.4E+2	NA	NA	NA		NA	>Res	NA	NA	>Res	☐	<1
91-20-3	Naphthalene	1.4E+3	NA	NA	NA		NA	NA	NA	NA	>Res	☐	<1
129-00-0	Pyrene	8.9E+1	NA	NA	NA		NA	NA	NA	NA	>Res	☐	<1
108-88-3	Toluene	1.4E-1	NA	NA	NA		NA	9.3E+1	NA	NA	9.3E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	1.5E-1	NA	NA	NA		NA	>Res	NA	NA	>Res	☐	<1

>Res indicates risk-based target concentration greater than constituent residual saturation value

Software: GSI RBCA Spreadsheet Serial: G-273-IBX-894
Version: 1.0.1

RBCA SITE ASSESSMENT | **Tier 1 Worksheet 6.3**

Site Name: Lathrop Property | *Completed By: Sam Rangarajan, Cambria Env. Tech. Inc*

Site Location: 5813-15 Shellmound Street, Emeryville, CA | Date Completed: 10/28/1997

GROUNDWATER RBSL VALUES

Target Risk (Class A & B) 1 0E-5 ☐ MCL exposure limit?

Target Risk (Class C) 1 0E-5 ☐ PEL exposure limit?

Target Hazard Quotient 1.0E+0

Calculation Option: 1

RBSL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Groundwater Ingestion			X Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential (on-site)	Commercial (on-site)	Regulatory(MCL): (on-site)	Residential (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	"■" If yes	Only if "yes" left
120-12-7	Anthracene	0.0E+0	NA	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
53-70-3	Dibenzo(a,h) Anthracene	1.1E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1
206-44-0	Fluoranthene	0.0E+0	NA	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
193-39-5	Indeno(1,2,3,c,d)Pyrene	2.5E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1
91-20-3	Naphthalene	0.0E+0	NA	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
129-00-0	Pyrene	0.0E+0	NA	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
108-88-3	Toluene	0.0E+0	NA	NA	NA	NA	8.5E+1	NA	NA	8.5E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	0.0E+0	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1

>Sol indicates risk-based target concentration greater than constituent solubility

Software: GSI RBCA Spreadsheet Serial: G-273-IBX-894

Version: 1.0.1

RBCA TIER 1: Ground Water Ingestion (on site)

Input Summary Table

Site Name: Lathrop Property | Job Identification: 190-122 | Software: GSI RBCA Spreadsheet
Site Location: 5813-15 Shellmound Street, Emeryville | Date Completed: 10/28/97 | Version 1 0 1
Completed By: Sam Rangarajan, Cambria Env. Tech. Inc

NOTE values which differ from Tier 1 default values are shown in bold italics and underlined

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF.Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing. rate (mg-yr/kg-d)	1.1E+02			9.4E+01	
IRa.in	Inhalation rate indoor (m^3/day)	15			20	
IRa.out	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5 8E+03		2.0E+03	5 8E+03	5 8E+03
SAadj	Adjusted dermal area (cm^2-yr/kg)	2.1E+03			1 7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	Use EPA tox data for air (or PEL based)?	TRUE				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways		Residential	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
Outdoor Air Pathways:				
SS.v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S v	Volatilization from Subsurface Soils	FALSE	FALSE	
GW.v	Volatilization from Groundwater	FALSE	FALSE	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	FALSE	FALSE	
GW b	Vapors from Groundwater	FALSE	FALSE	
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
Groundwater Pathways:				
GW i	Groundwater Ingestion	**TRUE**	FALSE	
S.l	Leaching to Groundwater from all Soils	**TRUE**	FALSE	

Matrix of Receptor Distance and Location On- or Off-Site		Residential Distance	Residential On-Site	Commercial/Industrial Distance	Commercial/Industrial On-Site
GW	Groundwater receptor (cm)		TRUE		TRUE
S	Inhalation receptor (cm)		TRUE		TRUE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	1.0E-06	
TRc	Target Risk (class C carcinogens)	***1.0E-06***	
THQ	Target Hazard Quotient	1.0E+00	
Opt	Calculation Option (1, 2, or 3)	1	
Tier	RBCA Tier	1	

Surface Parameters	Definition (Units)	Residential	Constrctn
A	Contaminated soil area (cm^2)	2.2E+06	1.0E+06
W	Length of affect soil parallel to wind (cm)	1 5E+03	1.0E+03
W gw	Length of affect. soil parallel to groundwater (cm)	1 5E+03	
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02	
delta	Air mixing zone height (cm)	2 0E+02	
Lss	Thickness of affected surface soils (cm)	1 0E+02	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2 0E+02
I	Groundwater infiltration rate (cm/yr)	3 0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	2.5E+03
Ugw.tr	Groundwater seepage velocity (cm/yr)	6.6E+03
Ks	Saturated hydraulic conductivity(cm/s)	
grad	Groundwater gradient (cm/cm)	
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
phi.eff	Effective porosity in water-bearing unit	3 8E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	TRUE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value		
hc	Capillary zone thickness (cm)	5.0E+00		
hv	Vadose zone thickness (cm)	3.0E+02		
rho	Soil density (g/cm^3)	1.7		
foc	Fraction of organic carbon in vadose zone	0 01		
phi	Soil porosity in vadose zone	0 38		
Lgw	Depth to groundwater (cm)	3.0E+02		
Ls	Depth to top of affected subsurface soil (cm)	1.0E+02		
Lsubs	Thickness of affected subsurface soils (cm)	2.0E+02		
pH	Soil/groundwater pH	6.5		
		capillary	**vadose**	**foundation**
phi.w	Volumetric water content	0 342	***0.12***	***0.24***
phi.a	Volumetric air content	0 038	0.26	***0.14***

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	***4.2E-04***	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	***0.001***	

Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersivity (cm)		
ay	Transverse dispersivity (cm)		
az	Vertical dispersivity (cm)		
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

RBCA SITE ASSESSMENT

Tier 1 Worksheet 6.3

Site Name: Lathrop Property
Completed By: Sam Rangarajan, Cambria Env. Tech. Inc

Site Location: 5813-15 Shellmound Street, Emeryville, CA
Date Completed: 10/28/1997

GROUNDWATER RBSL VALUES

Target Risk (Class A & B) 1.0E-6 ☐ MCL exposure limit?
Target Risk (Class C) 1.0E-6 ☐ PEL exposure limit?
Target Hazard Quotient 1.0E+0

Calculation Option: 1
(Two-directional vert. dispersion)

RBSL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	4.6E-1	2.9E-3	NA	NA	NA	NA	NA	NA	2.9E-3	■	1.6E+02
56-55-3	Benzo(a)Anthracene	4.0E-1	1.2E-4	NA	NA	NA	NA	NA	NA	1.2E-4	■	3.4E+03
50-32-8	Benzo(a)Pyrene	6.3E-1	1.2E-5	NA	NA	NA	NA	NA	NA	1.2E-5	■	5.4E+04
218-01-9	Chrysene	6.9E-1	7.4E-5	NA	NA	NA	NA	NA	NA	7.4E-5	■	9.3E+03
53-70-3	Dibenzo(a,h) Anthracene	1.4E-1	1.2E-5	NA	NA	NA	NA	NA	NA	1.2E-5	■	1.2E+04
100-41-4	Ethylbenzene	1.2E-1	3.7E+0	NA	NA	NA	NA	NA	NA	3.7E+0	☐	<1
193-39-5	Indeno(1,2,3,c,d)Pyrene	4.2E-1	1.2E-4	NA	NA	NA	NA	NA	NA	1.2E-4	■	3.6E+03

>Sol indicates risk-based target concentration greater than constituent solubility

Software: GSI RBCA Spreadsheet Serial: G-273-IBX-894
Version: 1 0 1

Attachment F

Tier 2 RBCA Tables

RBCA TIER 2: Volatilization from Subsurface Soil and Ground Water to Indoor Air — Input Summary Table

Site Name: Lathrop Property | Job Identification: 190-122 | Software: GSI RBCA Spreadsheet
Site Location: 5813-15 Shellmound Street, Emeryville | Date Completed: 10/28/97 | Version: 1.0.1
Completed By: Sam Rangarajan, Cambria Env Tech. Inc

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing. rate (mg-yr/kg-d)	1 1E+02			9.4E+01	
IRa.in	Inhalation rate indoor (m^3/day)	15			20	
IRa out	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5 8E+03		2.0E+03	5.8E+03	5 8E+03
SAadj	Adjusted dermal area (cm^2-yr/kg)	2 1E+03			1.7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	Use EPA tox data for air (or PEL based)?	TRUE				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways		Residential	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
Outdoor Air Pathways:				
SS v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S.v	Volatilization from Subsurface Soils	FALSE	FALSE	
GW.v	Volatilization from Groundwater	FALSE	FALSE	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	FALSE	**TRUE**	
GW.b	Vapors from Groundwater	FALSE	**TRUE**	
Soil Pathways:				
SS d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
Groundwater Pathways:				
GW.i	Groundwater Ingestion	FALSE	FALSE	
S.l	Leaching to Groundwater from all Soils	FALSE	FALSE	

Matrix of Receptor Distance and Location On- or Off-Site		Residential Distance	Residential On-Site	Commercial/Industrial Distance	Commercial/Industrial On-Site
GW	Groundwater receptor (cm)		FALSE		FALSE
S	Inhalation receptor (cm)		FALSE		FALSE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***1.0E-05***	
TRc	Target Risk (class C carcinogens)	1.0E-05	
THQ	Target Hazard Quotient	1.0E+00	
Opt	Calculation Option (1, 2, or 3)	2	
Tier	RBCA Tier	2	

Surface Parameters	Definition (Units)	Residential	Constrctn
A	Contaminated soil area (cm^2)	2.2E+06	1.0E+06
W	Length of affect. soil parallel to wind (cm)	1.5E+03	1.0E+03
W.gw	Length of affect. soil parallel to groundwater (cm)	***3.0E+03***	
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02	
delta	Air mixing zone height (cm)	2.0E+02	
Lss	Thickness of affected surface soils (cm)	1.0E+02	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	***9.4E+02***
Ugw tr	Groundwater seepage velocity (cm/yr)	***2.5E+03***
Ks	Saturated hydraulic conductivity(cm/s)	3 0E-03
grad	Groundwater gradient (cm/cm)	1 0E-02
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
phi eff	Effective porosity in water-bearing unit	3.8E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value		
hc	Capillary zone thickness (cm)	***3.0E+01***		
hv	Vadose zone thickness (cm)	***1.7E+02***		
rho	Soil density (g/cm^3)	***1.5***		
foc	Fraction of organic carbon in vadose zone	***0.033***		
phi	Soil porosity in vadose zone	***0.36***		
Lgw	Depth to groundwater (cm)	***2.0E+02***		
Ls	Depth to top of affected subsurface soil (cm)	1.0E+02		
Lsubs	Thickness of affected subsurface soils (cm)	***9.8E+01***		
pH	Soil/groundwater pH	6 5		
		capillary	vadose	foundation
phi w	Volumetric water content	***0.3***	***0.14***	***0.14***
phi a	Volumetric air content	***0.06***	***0.22***	***0.22***

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	***4.2E-04***	2 3E-04
Lcrk	Foundation crack thickness (cm)	1 5E+01	
eta	Foundation crack fraction	***0.001***	

Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersivity (cm)		
ay	Transverse dispersivity (cm)		
az	Vertical dispersivity (cm)		
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.2

Site Name: Lathrop Property

Completed By: Sam Rangarajan, Cambna Env. Tech. Inc

Site Location: 5813-15 Shellmound Street, Emeryville, CA

Date Completed: 10/28/1997

SUBSURFACE SOIL SSTL VALUES (> 3.3 FT BGS)

Target Risk (Class A & B) 1.0E-5 ☐ MCL exposure limit?

Target Risk (Class C) 1.0E-5 ☐ PEL exposure limit?

Target Hazard Quotient 1.0E+0

Calculation Option 2

SSTL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration		Soil Leaching to Groundwater			X	Soil Volatilization to Indoor Air			Soil Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/kg)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)		Residential. (on-site)	Commercial (on-site)		Residential. (on-site)	Commercial: (on-site)	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	8.0E-2	NA	NA	NA		NA	7.0E+0		NA	NA	7.0E+0	☐	<1
56-55-3	Benzo(a)Anthracene	1.9E+2	NA	NA	NA		NA	>Res		NA	NA	>Res	☐	<1
50-32-8	Benzo(a)Pyrene	2.2E+2	NA	NA	NA		NA	>Res		NA	NA	>Res	☐	<1
218-01-9	Chrysene	2.4E+2	NA	NA	NA		NA	>Res		NA	NA	>Res	☐	<1
100-41-4	Ethylbenzene	1.3E-1	NA	NA	NA		NA	>Res		NA	NA	>Res	☐	<1

>Res indicates risk-based target concentration greater than constituent residual saturation value

Software: GSI RBCA Spreadsheet Serial: G-273-IBX-894

Version: 1.0.1

Site Name: Lathrop Property
Site Location: 5813-15 Shellmound Street, Emeryville, CA

Completed By: Sam Rangarajan, Cambna Env. Tech. Inc
Date Completed: 10/28/1997

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1 0E-5
Target Risk (Class C) 1 0E-5
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option 2

SSTL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Groundwater Ingestion			X Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential (on-site)	Commercial: (on-site)	Regulatory(MCL)' (on-site)	Residential: (on-site)	Commercial (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	1.5E+0	NA	NA	NA	NA	5.8E+0	NA	NA	5.8E+0	☐	<1
56-55-3	Benzo(a)Anthracene	1.8E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1
50-32-8	Benzo(a)Pyrene	3.1E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1
218-01-9	Chrysene	4.1E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1
100-41-4	Ethylbenzene	2.1E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1

>Sol indicates risk-based target concentration greater than constituent solubility

Software: GSI RBCA Spreadsheet Serial: G-273-IBX-894
Version: 1.0.1

RBCA TIER 2: Ground Water Ingestion Off-Site

Input Summary Table

Site Name: Lathrop Property | Job Identification: 190-122 | Software: GSI RBCA Spreadsheet
Site Location: 5813-15 Shellmound Street, Em | Date Completed: 10/28/97 | Version: 1.0.1
Completed By: Sam Rangarajan, Cambria Env Tech Inc

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF.Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing rate (mg-yr/kg-d)	1.1E+02			9.4E+01	
IRa.in	Inhalation rate indoor (m^3/day)	15			20	
IRa.out	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5.8E+03		2.0E+03	5.8E+03	5.8E+03
SAadj	Adjusted dermal area (cm^2-yr/kg)	2.1E+03			1.7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	Use EPA tox data for air (or PEL based)?	TRUE				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways		Residential	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
Outdoor Air Pathways:				
SS.v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S.v	Volatilization from Subsurface Soils	FALSE	FALSE	
GW.v	Volatilization from Groundwater	FALSE	FALSE	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	FALSE	FALSE	
GW.b	Vapors from Groundwater	FALSE	FALSE	
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
Groundwater Pathways:				
GW.I	Groundwater Ingestion	**TRUE**	FALSE	
S.I	Leaching to Groundwater from all Soils	**TRUE**	FALSE	

Matrix of Receptor Distance and Location On- or Off-Site		Residential Distance	Residential On-Site	Commercial/Industrial Distance	Commercial/Industrial On-Site
GW	Groundwater receptor (cm)	1.8E+03	FALSE	1.8E+03	FALSE
S	Inhalation receptor (cm)		FALSE		FALSE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	1.0E-06	
TRc	Target Risk (class C carcinogens)	***1.0E-06***	
THQ	Target Hazard Quotient	1.0E+00	
Opt	Calculation Option (1, 2, or 3)	2	
Tier	RBCA Tier	2	

Surface Parameters	Definition (Units)	Residential	Constrctn
A	Contaminated soil area (cm^2)	2.2E+06	1.0E+06
W	Length of affect. soil parallel to wind (cm)	1.5E+03	1.0E+03
W.gw	Length of affect. soil parallel to groundwater (cm)	***3.0E+03***	
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02	
delta	Air mixing zone height (cm)	2.0E+02	
Lss	Thickness of affected surface soils (cm)	1.0E+02	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	***1.4E+01***
Ugw.tr	Groundwater seepage velocity (cm/yr)	***3.9E+01***
Ks	Saturated hydraulic conductivity(cm/s)	2.5E-05
grad	Groundwater gradient (cm/cm)	1.8E-02
Sw	Width of groundwater source zone (cm)	2.1E+03
Sd	Depth of groundwater source zone (cm)	1.5E+02
phi.eff	Effective porosity in water-bearing unit	3.6E-01
foc sat	Fraction organic carbon in water-bearing unit	***3.3E-02***
BIO?	Is bioattenuation considered?	TRUE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value	capillary	vadose	foundation
hc	Capillary zone thickness (cm)	***3.0E+01***			
hv	Vadose zone thickness (cm)	***1.7E+02***			
rho	Soil density (g/cm^3)	***1.5***			
foc	Fraction of organic carbon in vadose zone	***0.033***			
phi	Soil porosity in vadose zone	***0.36***			
Lgw	Depth to groundwater (cm)	***2.0E+02***			
Ls	Depth to top of affected subsurface soil (cm)	1.0E+02			
Lsubs	Thickness of affected subsurface soils (cm)	***9.8E+01***			
pH	Soil/groundwater pH	6.5			
phi.w	Volumetric water content		***0.3***	***0.14***	***0.24***
phi.a	Volumetric air content		***0.06***	***0.22***	***0.14***

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	***4.2E-04***	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	***0.001***	

Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersivity (cm)	1.5E+02	
ay	Transverse dispersivity (cm)	1.5E+01	
az	Vertical dispersivity (cm)	1.5E+00	
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 9.3**

Site Name: Lathrop Property
Completed By: Sam Rangarajan, Cambria Env. Tech. Inc

Site Location: 5813-15 Shellmound Street, Emeryville, CA
Date Completed: 10/28/1997

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6 ☐ MCL exposure limit? Calculation Option 2
Target Risk (Class C) 1.0E-6 ☐ PEL exposure limit? Groundwater DAF Option. Domenico - First Order (Two-directional vert. dispersion)
Target Hazard Quotient 1.0E+0

SSTL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential 60 feet	Commercial: (on-site)	Regulatory(MCL): 60 feet	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	4.6E-1	>Sol	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
56-55-3	Benzo(a)Anthracene	4.0E-1	>Sol	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
50-32-8	Benzo(a)Pyrene	6.3E-1	>Sol	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
218-01-9	Chrysene	6.9E-1	>Sol	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
53-70-3	Dibenzo(a,h) Anthracene	1.4E-1	>Sol	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
100-41-4	Ethylbenzene	1.2E-1	>Sol	NA	NA	NA	NA	NA	NA	>Sol	☐	<1
193-39-5	Indeno(1,2,3,c,d)Pyrene	4.2E-1	>Sol	NA	NA	NA	NA	NA	NA	>Sol	☐	<1

>Sol indicates risk-based target concentration greater than constituent solubility

Software: GSI RBCA Spreadsheet Serial: G-273-IBX-894
Version: 1.0.1