R0260

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May 26th, 2005

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1131 Harbor Bay Parkway
Alameda, CA 94502

Subject: Addendum to Site Conceptual Model
400 San Pablo Avenue
Albany, CA

Dear Bob:

Please find enclosed a copy of the Addendum to the previously submitted Site Conceptual Model prepared by Enviro Soil Tech Consultants.

I declare, under penalty of perjury, that the information and/or recommendations contained in this report are true and correct to the best of my knowledge.

Sincerely,

Murray T Stevens, President
Kamur Industries Inc.

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ADDENDUM TO HUMAN HEALTH RISK ASSESSMENT AND CONDUCTING ECOLOGICAL RISK ASSESSMENT AT 400 SAN PABLO AVENUE ALBANY, CALIFORNIA

August 2, 1999

Project 2211

Prepared for

Kamur Industries, Inc.
2351 Shoreline Drive
Alameda, CA 94501

Prepared by

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1.0 INTRODUCTION

This report has been prepared by SOMA Environmental Engineering, Inc. (SOMA) on behalf of Kamur Industries, Inc. The site is located at 400 San Pablo Avenue, Albany California (the "Site"), see Figure 1. The Site is bordered by El Camino Creek to the north, San Pablo Avenue to the east and Adams Street to the west, see Figure 2.

The Site was vacant until the late 1950s when the Plaza Car Wash and the adjacent Norge Dry Cleaner buildings were constructed. Currently, the Site is operated by Kamur Industries. Three underground fuel storage tanks were installed on the Site in 1970. Free petroleum product was observed in the adjacent El Cerrito Creek, on July 3, 1989. This prompted the Albany Fire Department to recover the free product from the Creek using absorbent materials and booms. A storm drain underneath the Adams Street, which borders the Site on the west, was found to be the source of the petroleum products discharging into the Creek. Later, inventory reconciliation records reviewed by Kamur Industries in July 1989, showed discrepancies in the unleaded gasoline inventory. A product line test conducted in mid-July 1989 confirmed a small leak in the unleaded gasoline fuel lines beneath the Pump Island, which was later repaired.

In November 1990, the three underground storage tanks were removed. During the removal of the tanks, approximately 650 cubic yards of contaminated soil were also removed from the Site. Although, the petroleum impacted soils have been removed and backfilled with clean soils, petroleum contaminants in the form of benzene, toluene, ethylbenzene and xylene (BTEX) still remain in the groundwater beneath the Site.

In August 1997, SOMA conducted a human health risk assessment and submitted to the Alameda County Health Care Services Agency (SOMA August,

1997). The result of human health risk assessment conducted by SOMA indicated an acceptable carcinogenic and non-carcinogenic health risk at the Site. The major exposure to the future site workers was due to the presence of petroleum chemicals in groundwater beneath the Site. Alameda County Health Care Agency after reviewing SOMA's report requested additional evaluation and further risk assessment using risk based corrective action methodology as well as conducting ecological risk assessment for potential impacts of petroleum hydrocarbons on the adjacent El Cerrito Creek. The purpose of this addendum is to address the Alameda County Health Care Services comments.

2.0 SCOPE OF WORK

The Alameda County Health Care Services on its letter dated July 24, 1998 requested the following changes and additions to the SOMA's risk assessment document (SOMA, August 1997):

1) Redo the indoor air inhalation pathway using RBCA methodology (without using degradation rates);
2) For site-specific concentrations, use the average concentration from the last four quarters' groundwater data;
3) If site-specific measured values are not available for porosity, fraction organic carbon content, etc., then use RBCA default values;
4) Give a rationale for not evaluating risk due to chlorinated solvents; and;
5) Perform a qualitative and quantitative ecological risk assessment for potential impacts to the nearby creek.

Based on the above items requested by the Alameda County, the scope of work will include:

- Risk Based Corrective Action (RBCA) assessment using data generated during the last four groundwater monitoring events and;

- Ecological risk assessment with respect to El Cerrito Creek

The RBCA Tier I along with ecological risk assessment will be conducted using the surface water and groundwater data generated during the last four groundwater monitoring events as requested by the County. During the last six groundwater monitoring events (except the latest monitoring event dated April 12, 1999) groundwater samples have been analyzed for volatile organic compounds (VOCs) as well as benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tertiary butyl ether (MTBE). As the results of groundwater monitoring events indicate no VOCs or MTBE have been detected in groundwater samples during the last six groundwater monitoring events. Therefore, in conducting RBCA it has been assumed that no VOCs or MTBE are present in groundwater beneath the Site.

In 1989, the Regional Water Quality Control Board (RWQCB) San Francisco Bay Region, requested the collection of surface water samples from El Cerrito Creek and the storm drain outlet. Laboratory results demonstrated high levels of dissolved petroleum hydrocarbons at the storm drain outlet and lower levels at approximately 20 feet downstream in El Cerrito Creek. A surface water sampling program was requested by the Alameda County Health Services Agency and surface water samples were collected during the winter and spring of 1990, 1991, 1992, 1996 and most recently, 1999.

This report will utilize the most recent surface water data and compare the concentrations of contaminants to conservative ecological screening criteria or benchmarks, in order to establish whether these contaminants pose a potential threat to the El Cerrito Creek environment.

3.0 RISK BASED CORRECTIVE ACTION (RBCA)

Based on the Alameda County request, the RBCA Tier I evaluation was conducted to evaluate the indoor air inhalation pathway for identification of specific-target levels of concentration of chemicals beyond which a potential adverse health effect may result from exposure to contaminants (BTEX) in groundwater beneath the Site.

As requested by the County, the arithmetic average of BTEX concentration from the last four quarters' groundwater data over the entire site was used an the exposure point concentrations.

3.1 Calculation of Risk Based Screening Levels

To evaluate the risk based screening levels (RBSL) in soil and groundwater, ASTM-RBCA model was utilized. RBCA is an Excel spreadsheet model designed to perform risk-based corrective action calculations for selected exposure pathways. SOMA compiled critical information regarding source conditions (soil and groundwater chemical data and parameters), exposure pathways, transport mechanisms and potential receptors to the RBCA spreadsheet. The evaluation was conducted in two different steps; the first step involved using default soil, groundwater and exposure parameters to evaluate RBSLs. The RBSL values were defined by RBCA-Tier I through which default groundwater and exposure parameters were used, this was performed largely due to the lack of the site-specific parameters as requested by the County.

3.1.1 Tier I Analysis

RBSLs evaluation was performed based on the inhalation pathway analysis. To evaluate the RBSLs, the ASTM-RBCA model was run using generic and default groundwater and exposure parameters. The default groundwater and exposure

parameters used in Tier I analysis are presented in Table-1. The Tier I analysis also takes into account the construction worker whom may be exposed to the Site's contaminants via inhalation, ingestion and dermal contact. In conducting Tier I analysis the groundwater RBSLs were calculated for the on-site assuming that the on-site workers will be exposed to Site's contaminants in groundwater through the inhalation of the indoor air.

All parameters used for RBSL calculations were based on the conservative assumptions. The exposure duration was assumed to be 365 days per year for the next 30 years. An accepted target risk value (defined by US EPA) of $1X10^{-6}$ was used.

4.0 Ecological Screening Evaluation

This section describes a screening evaluation of the potential ecological risks associated with benzene, ethylbenzene, toluene, xylene, methyl tertiary butyl ether, chloroform, tetrachloroethene and trichloroethene, historically detected at the storm-water out-fall of El Cerrito Creek. Potential ecological risks were evaluated by comparing the surface water concentration of each of the above contaminants to its respective aquatic and wildlife benchmark screening criteria. The benchmark screening criteria are discussed in detail in the following sections.

4.1 Data Evaluation

Analytical results for surface water samples collected in El Cerrito Creek are summarized in the January 1999 Sampling Report prepared by Enviro Soil Tech Consultants (Enviro Soil Tech Consultants, 1999). Between 1990 and 1992, and again in early 1996, surface water samples were collected from the following four locations in El Cerrito Creek (see Figure 3):

- C-1, located approximately 20 feet upstream of the storm drain outlet
- C-2, the storm drain outlet
- C-3, located at the confluence of the storm drain flow and El Cerrito Creek
- C-4, located 50 feet downstream of the storm drain outlet

The concentrations of total petroleum hydrocarbons as gasoline (TPH-g) at C-2 are summarized, over time, in Figure 4. The concentration of TPH-g has decreased steadily since 1990 and has been reported as "not detected" in the most recent sampling episode of January 12, 1999. Concentrations of TPH-g downgradient of the storm drain release point have typically been two to three orders of magnitude lower and have been reported as "not detected" since 1996. Out of 26 upgradient (location C-1) sampling events since 1990, only two events (3/6/90 and 2/29/96) reported trace levels of TPH-g (<< 1 mg/L).

The most mobile and toxic constituents of gasoline have been identified as benzene, ethylbenzene, toluene, xylene (also known as BTEX), and methyl tertiary butyl ether (MTBE). These constituents were not analyzed in samples collected from El Cerrito Creek, until 1996. At the request of the Alameda County Health Services Agency in 1996, surface water samples were analyzed for BTEX, MTBE and halogenated volatile organic compounds (HVOCs), which are common industrial solvents.

The concentrations of BTEX and HVOCs at C-2 are summarized, over time, in Figures 5 and 6, respectively. The concentrations of BTEX, chloroform, tetrachloroethene (PCE) and trichloroethene (TCE) have significantly decreased since early 1996 and the concentration of all these analytes have been reported as "not detected" in the most recent sampling event of January 12, 1999. Downstream samples collected at C-4 have always been reported as "not detected."

Even though BTEX, MTBE, chloroform, PCE and TCE were not detected in January of 1999, these contaminants may be present at concentrations that are below their respective analytical detection limits and could potentially represent a hazard for ecological receptors in or around the storm drain outlet at El Cerrito Creek. In order to perform a screening level ecological evaluation, these contaminants will be selected as chemicals of potential ecological concern (COPECs). Since they were detected at the storm drain outlet in the past, it will be conservatively assumed that these COPECs are present at concentrations equal to one-half their respective analytical detection limits. Exposure point concentrations for COPECs at the storm drain outlet (sampling location C-2) are summarized in Table-2.

4.2 Ecological Screening Evaluation

El Cerrito Creek has its greatest flow during the rainy seasons of fall, winter and spring. Since it receives drainage and runoff from numerous sources, including industrial and commercial sites, it is considered a low quality habitat. As discussed previously, concentrations of COPECs were assumed to be one-half their respective analytical detection limits. In order to address concerns raised by the Alameda County about potential ecological impacts associated with contaminants detected at the storm drain outlet (Location C-2) in El Cerrito Creek, a screening of the contaminants will be performed. The purpose of this evaluation is to determine which, if any, of the identified surface water contaminants are worthy of further consideration. Screening will be performed by comparing surface water concentrations to screening criteria or "benchmark" concentrations that are indicative of significant effects. Chemicals with surface water concentrations below the screening criteria will not be considered an environmental concern. The ecological screening evaluation will be comprised of an aquatic and wildlife screening, as described in more detail below.

4.3 Aquatic Screening

The aquatic screening evaluation compares measured surface water concentrations for each COPEC to a series of screening aquatic benchmarks of differing conservatism (DOE, 1996a). The following briefly describes each of the aquatic screening benchmarks used in this evaluation.

- Since National Ambient Water Quality Criteria (NAWQC) were not available for any the COPECs, Tier II values were used, as described in EPA's Proposed Water Quality Guidance for the Great Lakes System (EPA 1993). Tier II values are Secondary Acute Values (SAVs) and Secondary Chronic Values (SCVs) like NAWQC, can be considered applicable or relevant and appropriate requirements (ARARs) for legal enforcement. SAVs correspond to concentrations that would cause less than 50 percent mortality in 5% of exposed populations for a brief exposure. SAVs are considered upper screening benchmarks (i.e., exceedence of an upper screening benchmark indicates that the chemical in question is clearly of concern and remedial actions are likely needed). SCVs are based on chronic tests and would be considered a lower screening benchmark (i.e., exceedence of a lower screening bench mark indicates that the contaminant is of concern and further evaluation is warranted).
    - EPA's Office of Solid Waste and Emergency Response (OSWER) has developed Ecotox Thresholds which are intended to be used for screening at Comprehensive Environmental response, Compensation, and Liability Act (CERCLA) sites and are similar to the NAWQC.
    - Lowest Chronic Values for fish and invertebrates reported in the literature are presented as potential lower benchmarks. Chronic values are used by EPA to estimate chronic NAWQC.
    - The Test EC_{20} for fish and Daphnids is considered another lower benchmark for potential aquatic effects. The EC_{20} for fish is defined as

the highest tested concentration causing less than 20% reduction in 1) the weight of young fish per initial female fish in a lifecycle test; or 2) the weight of young per egg in an early life-stage test. The EC_{20} for daphnids is the highest tested concentration causing less than 20% reduction in the rate of growth, fecundity and survivorship in a chronic test. These benchmarks are intended to be indicators of population production.

- The last potential lower benchmark is the population EC_{20}, an estimate of the continuous concentration that would cause a 20% reduction in the recruit abundance of largemouth bass.

Tables 3 presents comparisons of the surface water concentrations at the storm water outlet (one-half the analytical detection limit) to the available aquatic screening benchmarks. Based on the most recent sampling data, the assumed concentrations of benzene, ethylbenzene, toluene, xylene, chloroform, tetrachloroethene (PCE) and trichloroethene (TCE) were well below their respective upper and lower screening benchmarks. No screening criteria were available for MTBE. However, MTBE was never detected in any of the 1996 sampling events. Therefore, no aquatic species or populations impacts would occur from existing BTEX, MTBE and HVOCs in surface water at El Cerrito Creek.

4.4 Wildlife Screening

In order to perform a screening evaluation for potential effects to wildlife around El Cerrito Creek, concentrations of COPECs will be compared to their respective no observed adverse effect level (NOAEL)-based toxicological benchmark. The NOAEL-based benchmarks represent values believed to be non-hazardous for the species of concern (DOE, 1996b). In practice, when contaminant concentrations in water resources are less than these toxicological benchmarks, the contaminants may be excluded from further consideration.

The general methodology used is based on the EPA method for deriving human toxicity values from animal data. Experimentally derived NOAELs were used to estimate NOAELs for wildlife species. For the purpose of this screening assessment, a white-footed mouse was chosen as the indicator wildlife species. This field mouse would be one of the most abundant species in the vicinity of El Cerrito Creek and would be the most representative of potential adverse conditions.

The NOAEL for the test species ($NOAEL_t$) is used to estimate the NOAEL for the wildlife species ($NOAEL_w$) by adjusting for difference in body size as follows:

$$NOAEL_w = NOAEL_t(bw_t/bw_w)^{1/4}$$

The concentration of the contaminant in the drinking water of an animal (C_w, mg/L) resulting in a dose equivalent to a $NOAEL_W$ can be estimated from the daily water consumption rate (W, l/day) and the average body weight (bww) for a particular species as follows:

$$C_w = (NOAEL_w * bw_w) / W$$

$$= NOAEL_w / \omega$$

Where,

ω = the rate of water consumption per unit body weight

Test and wildlife species reference values used in this evaluation are summarized in Table 4.

Potential hazards to wildlife were evaluated by directly comparing the surface water concentration of each COPEC to its respective NOAEL-based

concentration in drinking water for a white-footed mouse (C_w). Table-4 summarizes the test species NOAELs, estimated NOAELs for the white-footed mouse, NOAEL-based benchmark for surface water and the estimated hazards for each COPEC. The results from Table-5 demonstrate that the potential hazards for wildlife at El Cerrito Creek is negligible based on the chosen indicator species. Therefore, none of the COPECs were retained for further consideration. Even though no data were available for ethylbenzene, toluene was used as a surrogate due to similar toxicity. MTBE was excluded since it was never detected in any of the surface samples collected.

5.0 RESULTS AND CONCLUSIONS

The following specific conclusions were reached based on our revised evaluation of human health risk using RBCA and ecological risk assessment at the Site.

1. The calculated RBSL are higher than average groundwater concentration during the last four groundwater events. The calculated RBSL for benzene is 74 µg/l, while the average benzene concentration in groundwater is 41 µg/l. This indicates that no further groundwater remediation is warranted;

2. Benzene, ethylbenzene, toluene, xylene, MTBE, tetrachloroethene (PCE) and trichloroethene (TCE) were identified as COPECs at the storm water outfall to El Cerrito Creek;

3. The most recent sampling event (1/12/99) reported all COPECs as "not detected";

4. COPEC concentrations in surface water at the storm water discharge point were conservatively assumed to be one-half their respective analytical detection limits;

5. COPEC concentrations in surface water were well below their upper and lower benchmark screening values; therefore, all COPECs were eliminated from further consideration based on aquatic impacts.

6. COPEC concentrations in surface water were well below their wildlife benchmark screening values; therefore, all COPECs were eliminated from further consideration based on wildlife impacts.

7. Chemicals previously detected in El Cerrito Creek (BTEX, MTBE, chloroform, PCE and TCE) do not pose any threat to aquatic or wildlife species or populations at El Cerrito Creek.

6.0 REFERENCES

DOE, 1996a. Toxicological Benchmarks for screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. Risk Assessment program, Health Sciences Research Division, Oak Ridge National Laboratory. Prepared for the Department of Energy. ES/ER/TM-96/R2.

DOE, 1996b. Toxicological Benchmarks for Wildlife: 1996 Revision. Risk Assessment program, Health Sciences Research Division, Oak Ridge National Laboratory. Prepared for the Department of Energy. ES/ER/TM-86/R3.

Enviro Soil Tech Consultants 1999. January 1999 Sampling of El Cerrito Creek Adjacent to Plaza Car Wash Located at 400 San Pablo Avenue, Albany, California. March 19, 1999.

EPA 1993. Water Quality guidance for the Great Lakes System and correction; Proposed rules. Federal Register. 58(72):20802-21047.

FIGURES

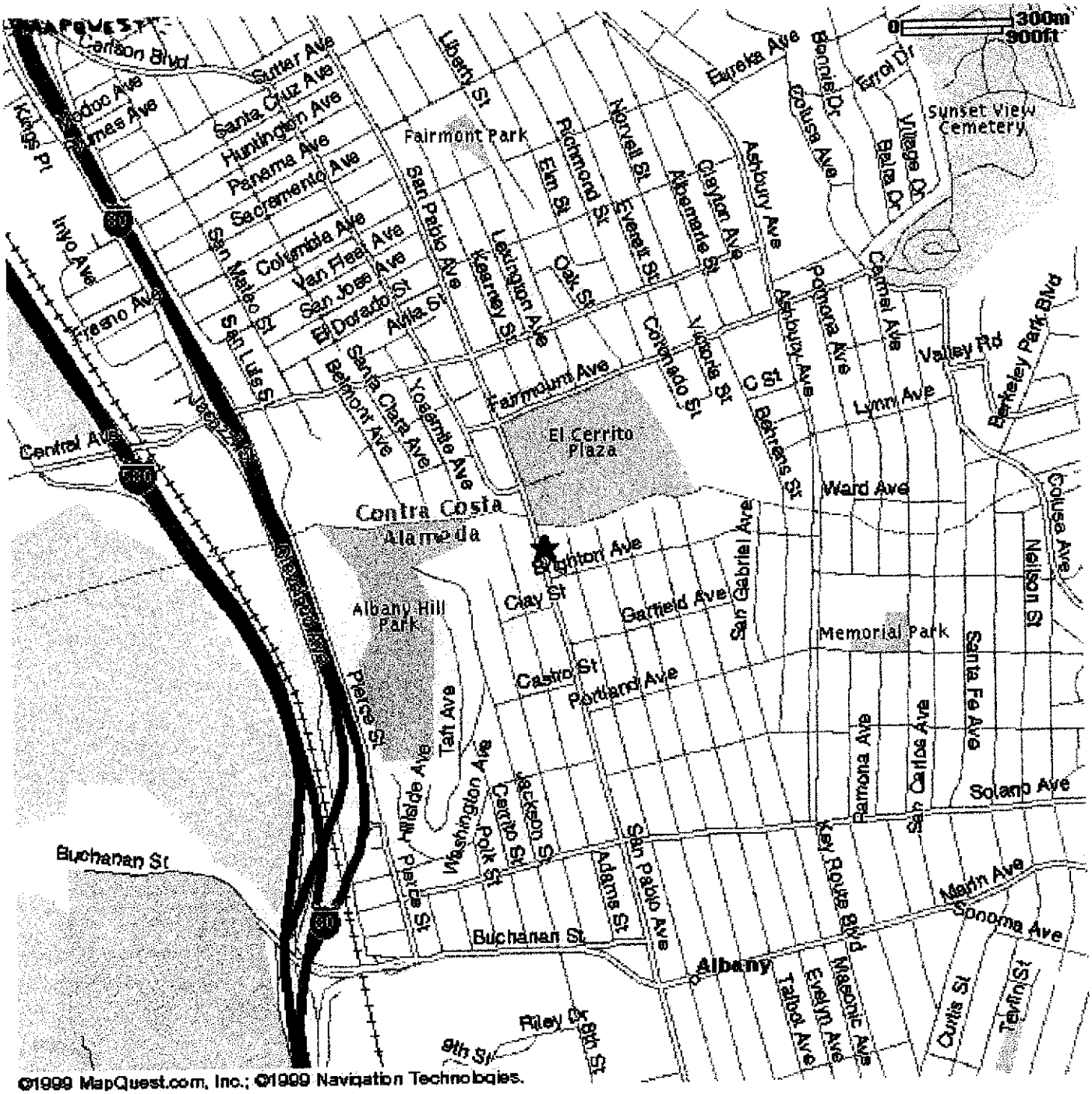

Figure 1: Site Location Map

SOMA
ENVIRONMENTAL ENGINEERING, INC.

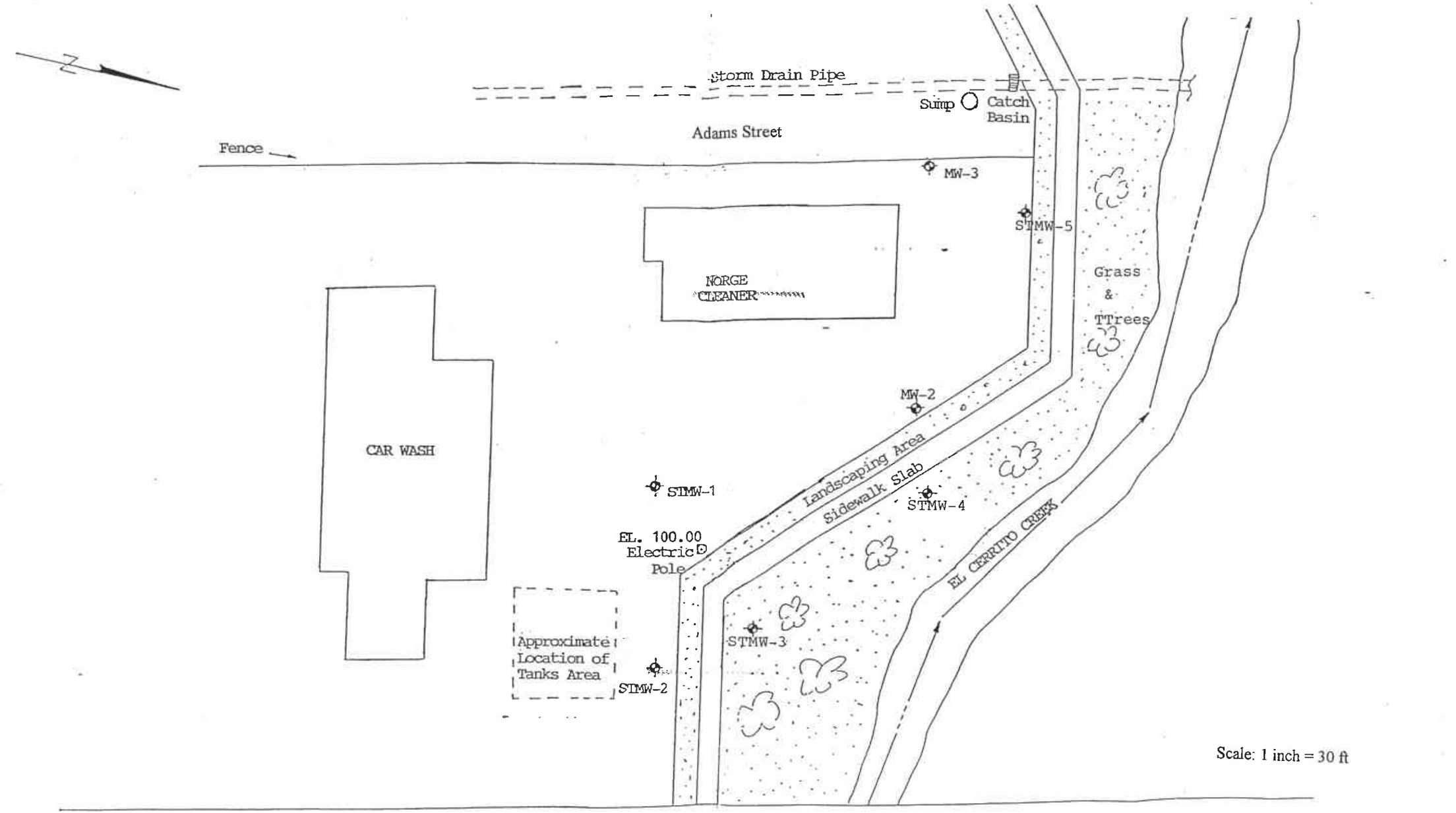

Figure 2: Site Map

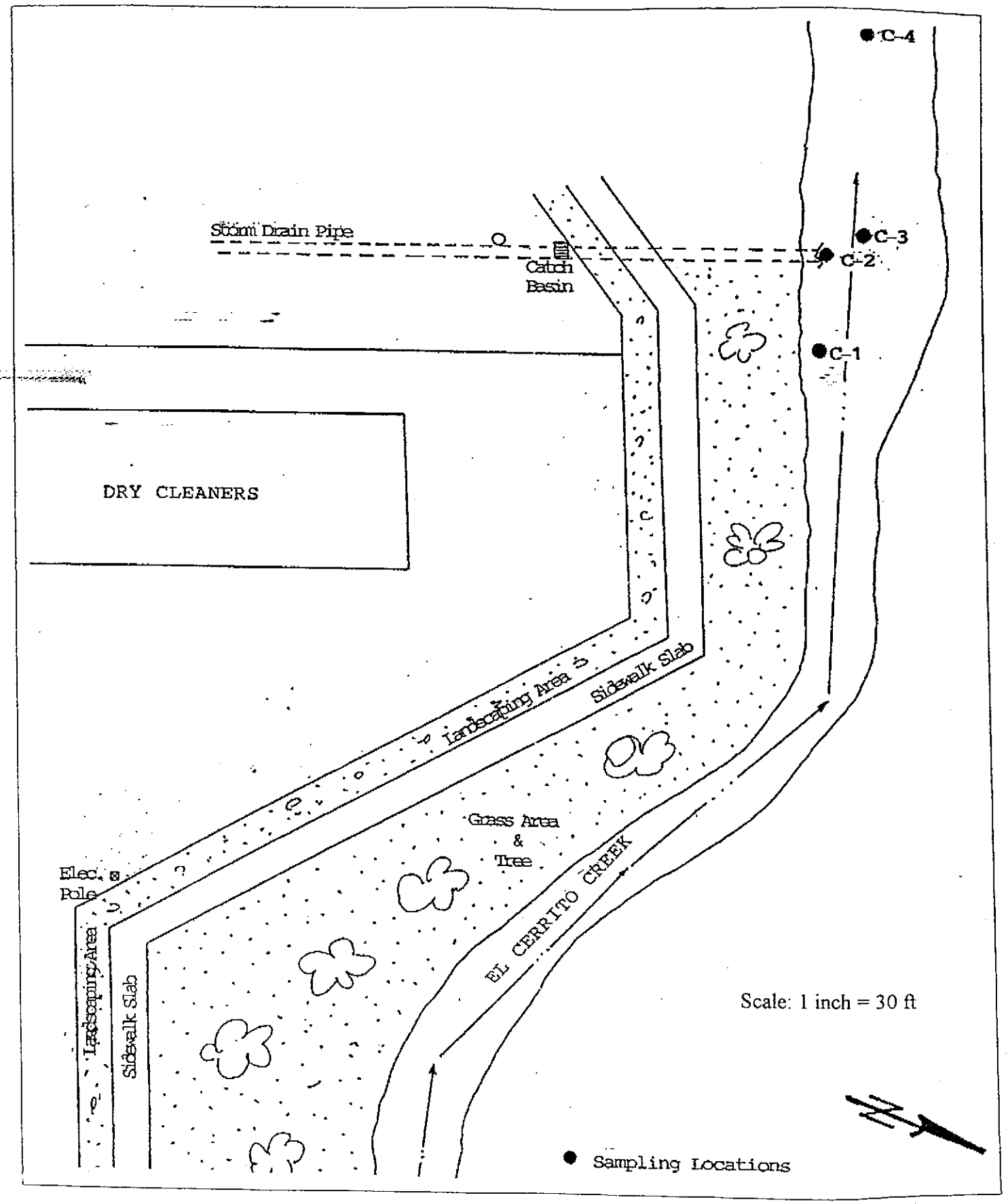

Figure 3: Surface Water Sampling Locations

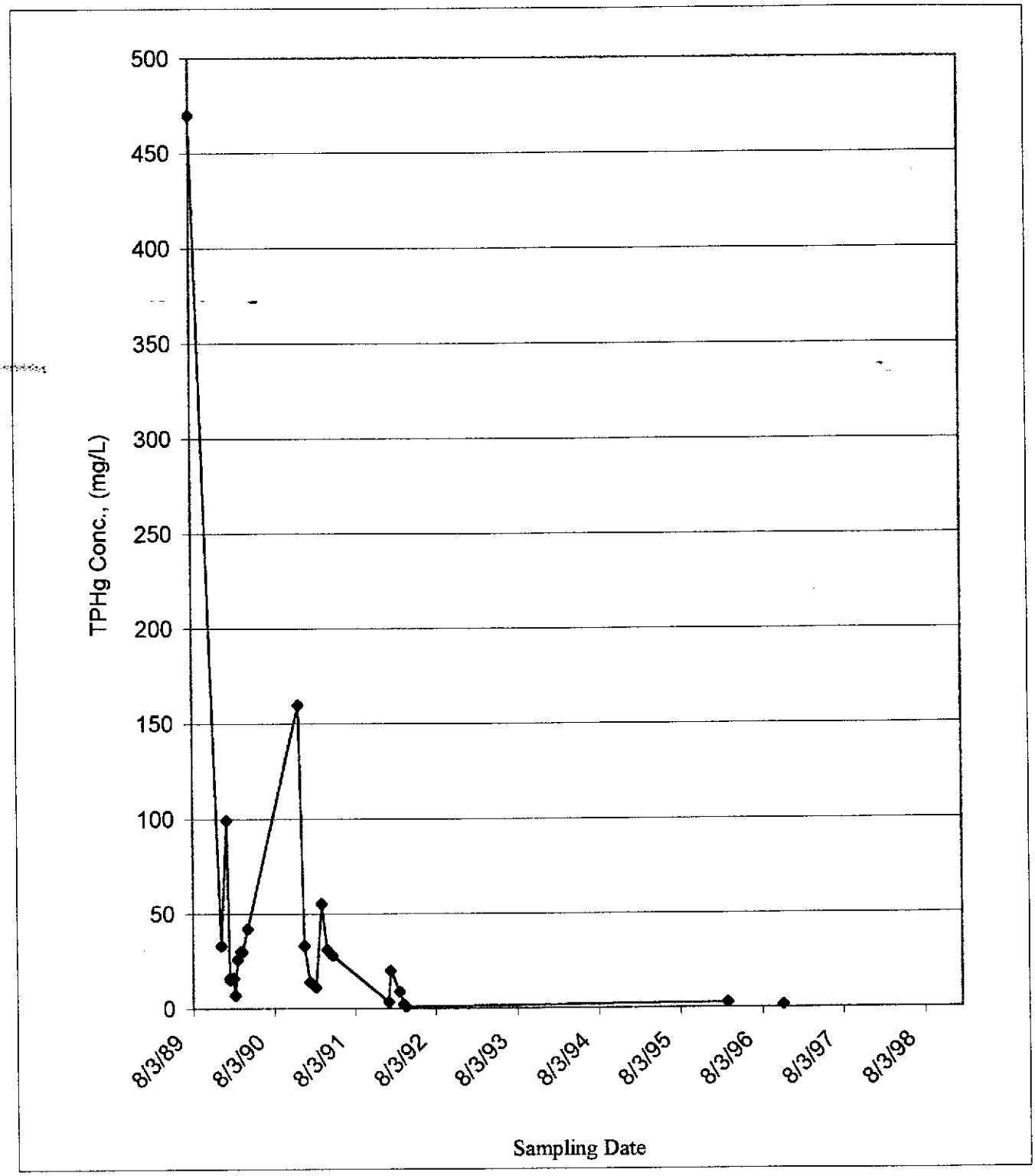

Figure 4: Concentration of TPH-g at C-2 Sampling Location

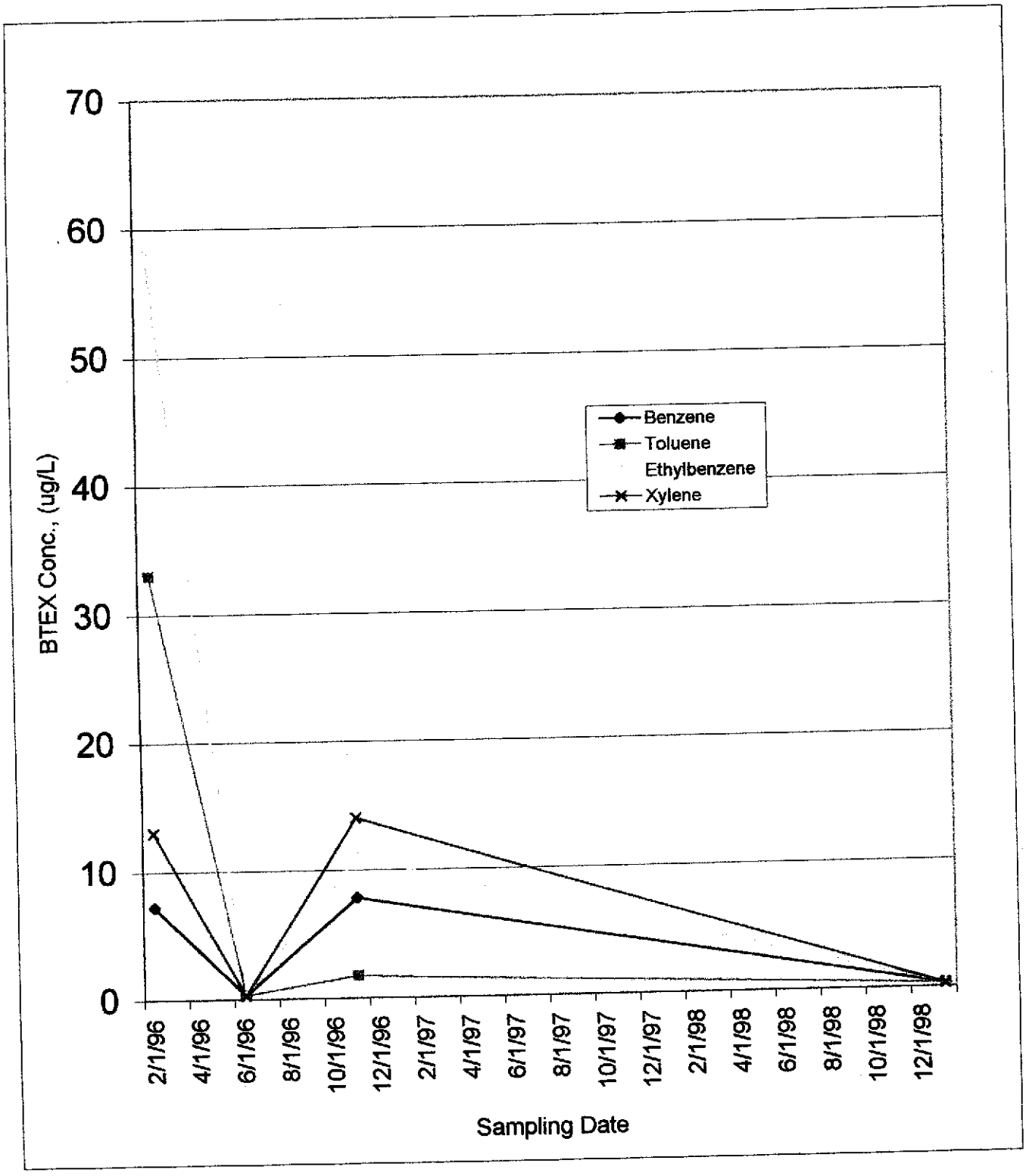

Figure 5: Historical Concentration of BTEX at C-2

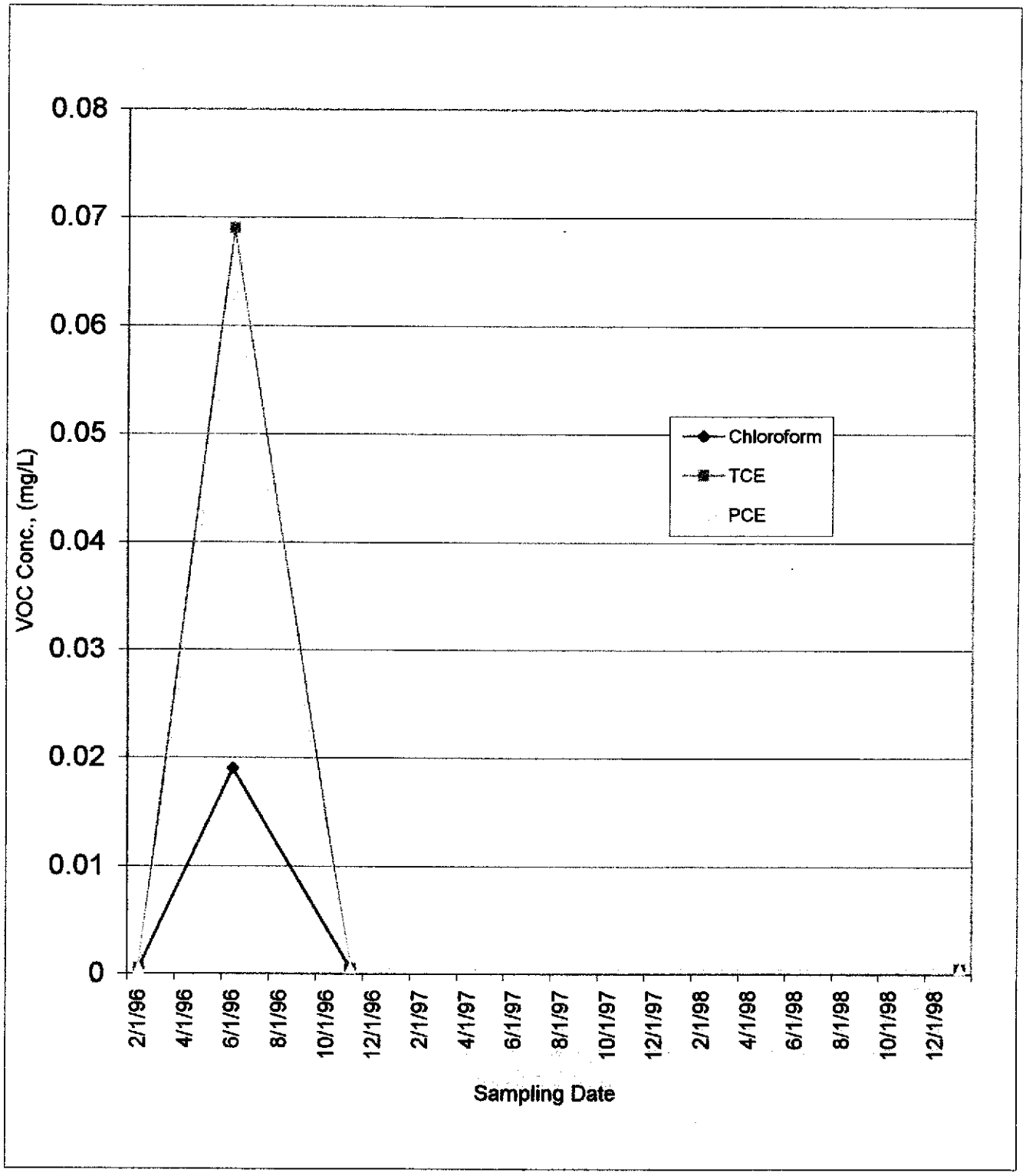

Figure 6: Historical Concentration of HVOCs at C-2

TABLES

Table-1

Soil and Groundwater Parameters Used in Conducting ASTM-RBCA

400 San Pablo Avenue, Albany, California

Soil/Groundwater Parameters	Tier 1	
	9.68	
Capillary Zone Thickness (ft.)	0.164	50 cm ✓
Depth to Groundwater (ft.)	9.844	300 cm ✓
Thickness of Affected Surface Soils (ft.)	3.28	100 cm
Depth to Top of Affected Subsurface Soils (ft.)	3.28	100 cm
Depth to Base of Affected Subsurface Soils (ft.)	9.844	300
Contaminated Soil Area ($ft.^2$)	2420	2,248,044 cm^2
Length of Affected Soil Parallel to Wind Direction (ft.)	49.2	1500 cm
Length of Affected Soil Parallel to Groundwater Flow Direction (ft.)	49.2	1500 cm
Soil Density (g/cm^3)	1.7	✓
Soil pH	6.5	
Fraction Organic Carbon	0.01	✓
Porosity	0.38	✓
Volumetric Water Content (capillary fringe)	0.34	✓
Volumetric Water Content (vadose zone)	0.12	✓
Volumetric Air Content (capillary fringe)	0.04	✓
Volumetric Air Content (vadose zone)	0.26	✓

Table-1
Building Parameters Used in Conducting ASTM-RBCA
400 San Pablo Avenue, California

Building Parameters	Tier 1	
	Residential	Commercial
Building Volume/Area Ratio (cm)	200	300
Building Air Exchange Rate (1/s)	0.00014	0.00023
Foundation Crack Thickness (cm)	15	15
Foundation Crack Fraction	0.01	0.01
Volumetric Water Content of Crack	0.12	0.12
Volumetric Air Content of Crack	0.26	0.26

Table-1
Exposure Parameters Used in Conducting ASTM-RBCA
400 San Pablo Avenue, California

Exposure Parameters	Residential		Commercial
	Adult	Child (1-6 yrs)	Chronic
Averaging Time for Carcinogens (yr.)	70	70	70
Averaging Time for Non-Carcinogens (yr.)	30	6	25
Body Weight (kg)	70	15	70
Exposure Duration (yr)	30	6	25
Exposure Frequency (d/yr)	350	350	250
Dermal Exposure Frequency (d/yr)	350	350	250
Skin Surface Area (cm^2)	5800	2023	5800
Ingestion Rate of Water (L/d)	2	2	1
Ingestion Rate of Soil (mg/d)	100	200	50
Inhalation rate indoor (m^3/d)	15	10	20
Inhalation rate outdoor (m^3/d)	20	20	20

Table-2
Surface Water Exposure Point Concentrations at the Storm Drain Outlet (Location C-2)

Chemical of Potential Ecological Concern (COPEC)	Reported Surface Water Concentration (µg/L)	Analytical Detection Limit (µg/L)	Assumed Surface Water Concentration (µg/L)
Benzene	ND	0.5	0.25
Ethylbenzene	ND	0.5	0.25
Toluene	ND	0.5	0.25
Xylene	ND	0.5	0.25
MTBE	ND	0.5	0.25
Chloroform	ND	0.5	0.25
Tetrachloroethene (PCE)	ND	0.5	0.25
Trichloroethene (TCE)	ND	0.5	0.25

Table 3
Comparison of Surface Water Concentrations to Available Aquatic Screening Benchmarks, Continued

Chemical of Potential Ecological Concern (COPEC)	Reported Surface Water Concentration (µg/L)	Analytical Detection Limit (µg/L)	Assumed Surface Water Concentration (µg/L)	Lowest Test EC_{20} for:		Population EC_{20} (µg/L)	Does Concentration Exceed Upper Benchmarks?	Does Concentration Exceed Lower Benchmarks?
				Fish (µg/L)	Daphnids (µg/L)			
Benzene	ND	0.5	0.25	21	NA	229	NO	NO
Ethylbenzene	ND	0.5	0.25	NA	NA	398	NO	NO
Toluene	ND	0.5	0.25	<26	NA	200	NO	NO
Xylene	ND	0.5	0.25	2680	NA	NA	NO	NO
MTBE	ND	0.5	0.25	NA	NA	NA		
Chloroform	ND	0.5	0.25	8,400	NA	562	NO	NO
Tetrachloroethene (PCE)	ND	0.5	0.25	500	510	50	NO	NO
Trichloroethene (TCE)	ND	0.5	0.25	5758	NA	232	NO	NO

ND Not detected

NA No data available

Data Source: (DOE 1996a) Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota. DOE ES/ER/TM-96/R2

Table 3

Comparison of Surface Water Concentrations to Available Aquatic Screening Benchmarks

Chemical of Potential Ecological Concern (COPEC)	Reported Surface Water Concentration (µg/L)	Analytical Detection Limit (µg/L)	Assumed Surface Water Concentration (µg/L)	NAWQ Criteria		EPA Tier II Values		OSWER Screening Value (µg/L)	Lowest Chronic Value for:				
				Acute (µg/L)	Chronic (µg/L)	Acute (µg/L)	Chronic (µg/L)		Fish (µg/L)	Daphnids (µg/L)	Non-Daphnid Invertebrates (µg/L)	Aquatic Plants (µg/L)	All Organisms (µg/L)
Benzene	ND	0.5	0.25	NA	NA	2300	130	46	NA	>98,000	NA	525,000	525,000
Ethylbenzene	ND	0.5	0.25	NA	NA	130	7.3	290	>440	12,992	NA	>438,000	>440
Toluene	ND	0.5	0.25	NA	NA	120	9.8	130	1,269	25,229	NA	245,000	1,269
Xylene	ND	0.5	0.25	NA	NA	230	13	1.8	62,308	NA	NA	NA	62,308
MTBE	ND	0.5	0.25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	ND	0.5	0.25	NA	NA	490	28	NA	1,240	4,483	NA	NA	1,240
Tetrachloroethene (PCE)	ND	0.5	0.25	NA	NA	830	98	120	840	750	NA	>816,000	750
Trichloroethene (TCE)	ND	0.5	0.25	NA	NA	440	47	350	11,100	7,257	NA	NA	7,257

ND Not detected

NA No data available

Data Source: (DOE 1996a)Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota. DOE ES/ER/TM-96/R2.

Table 4
Species Reference Values

Species	Body Weight (kg)	Water Intake (L/day)	Water Factor ω
rat	0.35	0.046	0.13
mouse	0.03	0.0075	0.25
white-footed mouse	0.022	0.0066	0.3

Table 5
Evaluation of Potential Wildlife Hazards

Chemical of Potential Ecological Concern (COPEC)	Test Species	Test Species NOAEL (mg/kg-d)	Endpoint Species	Estimated Wildlife NOAEL (mg/kg-d)	NOAEL-Based Benchmark for Surface Water (mg/L)	Reported Surface Water Concentration (mg/L)	Analytical Detection Limit (mg/L)	Assumed Surface Water Concentration (mg/L)	Hazard Quotient (HQ)	Retain Analyte as a COPEC ?
Benzene	mouse	26.36	White-footed Mouse	28.5	95	ND	0.0005	0.00025	2.63E-06	NO
Ethylbenzene		NA				ND	0.0005	0.00025		NO [1]
Toluene	mouse	26	White-footed Mouse	28.1	93.65	ND	0.0005	0.00025	2.67E-06	NO
Xylene	mouse	2.1	White-footed Mouse	2.27	7.56	ND	0.0005	0.00025	3.31E-05	NO
MTBE		NA				ND	0.0005	0.00025		NO [2]
Chloroform	rat	15	White-footed Mouse	30	100	ND	0.0005	0.00025	2.50E-06	NO
Tetrachloroethene (PCE)	mouse	1.4	White-footed Mouse	1.51	5.04	ND	0.0005	0.00025	4.96E-05	NO
Trichloroethene (TCE)	mouse	0.7	White-footed Mouse	0.76	2.53	ND	0.0005	0.00025	9.88E-05	NO

NA No data available

ND Not detected

1 Since no data were available for ethylbenzene, toluene was used as a surrogate due to similar toxicity

2 MTBE was never detected in any of the sampling events where it was analyzed for.

Data Source: (DOE 1996b)Toxicological Benchmarks for Wildlife. DOE ES/ER/TM-86/R3.

APPENDIX A

Historical Reported Concentration of BTEX at Groundwater Monitoring Well Location

Groundwater Analytical Results at Well STMW-1

Date	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	TPH-g (ppm)
12/10/92	0.054	0.079	0.083	0.22		35
3/18/93	0.049	0.052	0.055	0.18		19
7/13/93	0.034	0.043	0.017			17
10/11/93	2.1	2.4	0.53	2.6		51
1/7/94	1.5	1.6	0.5	2.5		29
4/6/94	1.1	0.56	0.3	1.6		20
8/3/94	1	1.7	0.64	4.7		43
11/8/94	9	12	1.6	9.1		92
2/16/95	0.85	0.54	0.4	1.2		150
5/19/95	0.4	0.33	0.17	0.61		59
8/18/95	0.88	0.78	0.54	1.7		300
11/30/95	0.8	0.91	0.39	1.5		67
2/29/96	0.12	0.095	0.018	0.26		71
6/7/96	0.21	0.14	0.081	0.21		36
11/14/96	0.48	0.49	0.42	1.2	0.00025	140
2/12/97	0.21	0.19	0.06	0.19	0.00025	42
5/15/97	0.083	0.027	0.045	0.13		15
8/27/97	0.11	0.052	0.066	0.4	0.00025	82
12/24/97	0.043	0.018	0.0091	0.025	0.00025	3.7
3/24/98	0.065	0.068	0.009	0.12	0.00025	10
6/25/98	0.0019	0.0006	0.0013	0.0071	0.00025	0.57
10/12/98	0.0024	0.0021	0.0032	0.0069	0.00025	1

Average for Last Four Quarters

12/24/97	0.043	0.018	0.0091	0.025	0.00025	3.7
3/24/98	0.065	0.068	0.009	0.12	0.00025	10
6/25/98	0.0019	0.0006	0.0013	0.0071	0.00025	0.57
10/12/98	0.0024	0.0021	0.0032	0.0069	0.00025	1
Average	0.028	0.022	0.006	0.040	0.000	3.818

* Numbers in blue indicate that they were Not-Detectable (ND) and were estimated at 1/2 the detection limit

Groundwater Analytical Results at Well STMW-2

Date	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	TPH-g (ppb)
12/10/92	0.084	0.096	0.12	0.35		44
3/18/93	0.022	0.031	0.04	0.11		9.2
7/13/93	0.018	0.024	0.026	0.089		9.3
10/11/93	2.8	3.9	0.67	0.44		62
1/7/94	1.1	1	0.28	1.8		22
4/6/94	0.49	0.14	0.33	0.062		6.6
8/3/94	0.25	0.052	0.055	0.24		4
11/8/94	0.73	0.79	0.2	13		10
2/16/95	0.23	0.088	0.092	0.32		37
5/19/95	0.04	0.016	0.022	0.068		9.3
8/18/95	0.72	0.55	0.52	1.4		210
11/30/95	0.66	0.51	0.37	1.5		66
2/29/96	0.075	0.055	0.052	0.15		33
6/7/96	0.25	0.075	0.018	0.47		92
11/14/96	0.38	0.23	0.27	0.72	0.00025	39
2/12/97	0.11	0.028	0.048	0.14	0.00025	23
5/15/97	0.32	0.048	0.094	0.2		30
8/27/97	0.082	0.0091	0.018	0.027	0.00025	19
12/24/97	0.077	0.0089	0.015	0.034	0.00025	4.1
3/24/98	0.031	0.0042	0.016	0.026	0.00025	3.3
6/25/98	0.02	0.0054	0.012	0.021	0.00025	2.2
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0

Average for Last Four Quarters

12/24/97	0.077	0.0089	0.015	0.034	0.00025	4.1
3/24/98	0.031	0.0042	0.016	0.026	0.00025	3.3
6/25/98	0.02	0.0054	0.012	0.021	0.00025	2.2
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0
Average	0.038	0.005	0.011	0.020	0.000	2.400

* Numbers in blue indicate that they were Not-Detectable (ND) and were estimated at 1/2 the detection limit

Groundwater Analytical Results at Well STMW-3

Date	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	TPH-g (ppb)
11/18/96	0.0091	0.0028	0.0047	0.013	0.00025	0.24
2/12/97	0.025	0.00025	0.00025	0.00025	0.00025	0
5/15/97	0.025	0.00025	0.00025	0.00025	0.00025	0
8/27/97	0.025	0.00025	0.00025	0.00025	0.00025	0
12/24/97	0.025	0.00025	0.00025	0.00025	0.00025	0
3/24/98	0.087	0.023	0.08	0.13	0.00025	13
6/25/98	0.025	0.00025	0.00025	0.00025	0.00025	0
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0

Average for Last Four Quarters

12/24/97	0.025	0.00025	0.00025	0.00025	0.00025	0
3/24/98	0.087	0.023	0.08	0.13	0.00025	13
6/25/98	0.025	0.00025	0.00025	0.00025	0.00025	0
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0
Average	0.041	0.006	0.020	0.033	0.000	3.250

* Numbers in blue indicate that they were Not-Detectable (ND) and were estimated at 1/2 the detection limit

Groundwater Analytical Results at Well STMW-4

Date	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	TPH-g (ppb)
11/18/96	0.025	0.00025	0.00025	0.00025	0.00025	0
2/12/97	0.025	0.00025	0.00025	0.00025	0.00025	0
5/15/97	0.025	0.00025	0.00025	0.00025		0
8/27/97	0.025	0.00025	0.00025	0.00025	0.00025	0
12/24/97	0.025	0.00025	0.00025	0.00025	0.00025	0
3/24/98	0.025	0.00025	0.00025	0.00025	0.00025	0
6/25/98	0.025	0.00025	0.00025	0.00025	0.00025	0
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0

Average for Last Four Quarters

12/24/97	0.025	0.00025	0.00025	0.00025	0.00025	0
3/24/98	0.025	0.00025	0.00025	0.00025	0.00025	0
6/25/98	0.025	0.00025	0.00025	0.00025	0.00025	0
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0
Average	0.025	0.000	0.000	0.000	0.000	0.000

* Numbers in blue indicate that they were Not-Detectable (ND) and were estimated at 1/2 the detection limit

Groundwater Analytical Results at Well STMW-5

Date	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	TPH-g (ppb)
11/18/96	0.025	0.00025	0.00025	0.00025	0.00025	0
2/12/97	0.025	0.00025	0.00025	0.00025	0.00025	0
5/15/97	0.025	0.00025	0.00025	0.00025		0
8/27/97	0.025	0.00025	0.00025	0.00025		0
12/24/97	0.025	0.00025	0.00025	0.00025	0.00025	0
3/24/98	0.025	0.00025	0.00025	0.00025	0.00025	0
6/25/98	0.025	0.00025	0.00025	0.00025	0.00025	0
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0

Average for Last Four Quarters

12/24/97	0.025	0.00025	0.00025	0.00025	0.00025	0
3/24/98	0.025	0.00025	0.00025	0.00025	0.00025	0
6/25/98	0.025	0.00025	0.00025	0.00025	0.00025	0
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0
Average	0.025	0.000	0.000	0.000	0.000	0.000

* Numbers in blue indicate that they were Not-Detectable (ND) and were estimated at 1/2 the detection limit

Groundwater Analytical Results at Well MW-2

Date	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	TPH-g (ppb)
12/10/92	0.015	0.023	0.032	0.082		7.2
3/18/93	0.0083	0.011	0.013	0.048		1.4
7/13/93	0.0047	0.0062	0.0068	0.025		2.4
10/11/93	0.043	0.0026	0.0045	0.012		0.41
1/7/94	0.025	0.0031	0.00025	0.02		0.24
4/6/94	0.12	0.023	0.022	0.19		3
8/3/94	0.057	0.001	0.017	0.025		0.5
11/8/94	0.65	0.085	0.5	1		8
2/16/95	0.0064	0.001	0.0056	0.0089		0.66
5/19/95	0.011	0.01	0.023	0.026		1.9
8/18/95	0.015	0.0016	0.015	0.02		1.8
11/30/95	0.0093	0.00025	0.0005	0.0035		0.12
2/29/96	0.0061	0.0012	0.0062	0.0087		1.2
6/7/96	0.025	0.00025	0.00025	0.00025		0
11/14/96	0.025	0.00025	0.00025	0.00025	0.00025	0
2/12/97	0.025	0.00025	0.00025	0.00025	0.00025	0
5/15/97	0.025	0.00025	0.00025	0.00025	0.00025	0
8/27/97	0.025	0.00025	0.00025	0.00025	0.00025	0
12/24/97	0.025	0.00025	0.00025	0.00025	0.00025	0
3/24/98	0.025	0.00025	0.00025	0.00025	0.00025	0
6/25/98	0.025	0.00025	0.00025	0.00025	0.00025	0
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0

Average for Last Four Quarters

12/24/97	0.025	0.00025	0.00025	0.00025	0.00025	0
3/24/98	0.025	0.00025	0.00025	0.00025	0.00025	0
6/25/98	0.025	0.00025	0.00025	0.00025	0.00025	0
10/12/98	0.025	0.00025	0.00025	0.00025	0.00025	0
Average	0.025	0.000	0.000	0.000	0.000	0.000

* Numbers in blue indicate that they were Not-Detectable (ND) and were estimated at 1/2 the detection limit

Groundwater Analytical Results at Well MW-3

Date	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	TPH-g (ppb)
12/10/92	0.4	0.41	0.43	1.1		94
3/18/93	0.092	0.13	0.16	0.59		51
7/13/93	0.16	0.21	0.23	0.82		80
10/11/93	14	8.8	0.32	9.4		180
1/7/94	9.5	4.6	7.8	0.23		120
4/6/94	0.12	0.023	0.022	0.19		3
8/3/94	6.5	5.7	1.5	18		0.2
11/8/94	7.4	8.5	2.2	12		86
2/16/95	0.28	0.12	0.12	0.57		59
5/19/95	0.15	0.068	0.069	0.16		12
8/18/95	0.074	0.028	0.038	0.1		33
11/30/95	1.3	0.51	0.25	2.4		100
2/29/96	0.012	0.0038	0.01	0.024		15
6/7/96	0.023	0.0069	0.014	0.034		5.2
11/14/96	0.32	0.13	0.25	0.62	0.00025	33
2/12/97	0.043	0.009	0.02	0.041	0.00025	15
5/15/97	0.068	0.03	0.06	0.11	0.00025	15
8/27/97	0.022	0.0052	0.0097	0.018	0.00025	15
12/24/97	0.15	0.01	0.081	0.11	0.00025	15
3/24/98	0.15	0.01	0.081	0.11	0.00025	15
6/25/98	0.1	0.022	0.086	0.13	0.00025	23
10/12/98	0.026	0.021	0.048	0.1	0.00025	23

Average for Last Four Quarters

12/24/97	0.15	0.01	0.081	0.11	0.00025	15
3/24/98	0.15	0.01	0.081	0.11	0.00025	15
6/25/98	0.1	0.022	0.086	0.13	0.00025	23
10/12/98	0.026	0.021	0.048	0.1	0.00025	23
Average	0.107	0.016	0.074	0.113	0.000	19.000

* Numbers in blue indicate that they were Not-Detectable (ND) and were estimated at 1/2 the detection limit

Average for Last Four Quarters

Date	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	TPH-g (ppb)
STMW-1	0.028	0.022	0.006	0.04	0.00025	3.82
STMW-2	0.038	0.005	0.011	0.02	0.00025	2.4
STMW-3	0.041	0.006	0.02	0.033	0.00025	3.25
STMW-4	0.025	0.00025	0.00025	0.00025	0.00025	0
STMW-5	0.025	0.00025	0.00025	0.00025	0.00025	0
MW-2	0.025	0.00025	0.00025	0.00025	0.00025	0
MW-3	0.107	0.016	0.074	0.113	0.00025	19
Site Average	**0.041**	**0.007**	**0.016**	**0.030**	**0.00025**	**4.067**

APPENDIX B

Output of RBCA-Tier I Assessment

RBCA SITE ASSESSMENT

Tier 1 Worksheet 6.3

Site Name: Kamur Industries Property
Site Location: 400 San Pablo Avenue, CA

Completed By: Mansour Sepehr
Date Completed: 7/26/1999

GROUNDWATER RBSL VALUES

Target Risk (Class A & B) 1.0E-6
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		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	4.1E-2	NA	NA	NA	NA	7.4E-2	NA	1.8E+1	7.4E-2	☐	<1
100-41-4	Ethylbenzene	1.6E-2	NA	NA	NA	NA	>Sol	NA	>Sol	>Sol	☐	<1
108-88-3	Toluene	7.0E-3	NA	NA	NA	NA	8.5E+1	NA	>Sol	8.5E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	3.0E-2	NA	NA	NA	NA	>Sol	NA	>Sol	>Sol	☐	<1

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

Software: GSI RBCA Spreadsheet
Version: 1.0.1

Serial: G-335-FXX-770