Delta
Environmental
Consultants, Inc.

3164 Gold Camp Drive
Suite 200
Rancho Cordova, California 95670-6021
916/638-2085
FAX: 916/638-8385

May 3, 2002

Mr. Don Hwang
Alameda County Health Care Services Agency
Environmental Health Department
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Subject: *Well Search/Utility Survey/Risk-Based Corrective Action Evaluation*
Former Chevron Service Station No. 9-0517
3900 Piedmont Avenue Oakland, California
DG90-517-G

Mr. Hwang:

At the request of Chevron Products Company (Chevron), Delta Environmental Consultants, Inc. network associate Gettler-Ryan Inc. (GR) has prepared this report to document the results of a well search, utility survey and a Risk Based Corrective Action analysis (RBCA) performed at the above referenced site. The Alameda County Health Care Services Agency-Environmental Health Department (ACHCSA-EHD), in a letter dated Septenber 27, 2001, requested that a well and utility survey along with a RBCA analysis for residential usage be conducted at the subject site. The purpose of this work was to evaluate whether the residual hydrocarbons in the site soils and groundwater pose a risk to human health and the environmental.

Site Description

The subject site is located on the eastern corner of Piedmont Avenue and Montell Street in Oakland, California (Figure 1). All site facilities including station building, four underground storage tanks (USTs) and associated product lines and two dispenser islands have been removed from the site. Presently, a commercial building and parking lot occupies the subject site. Pertinent site features are shown on Figure 3.

The subject site is located on the East Bay Plain approximately 2 miles east of San Francisco Bay. The local topography gently slopes to the south-southwest. As mapped by Helley and others (1979), deposits in the vicinity of the site consists of Holocene-age fine-grained alluvium of unconsolidated plastic, moderately to poorly sorted carbonaceous silt and clay overlying medium-grained alluvium of unconsolidated moderately sorted permeable fine sand, silt, and clayey silt with a few beds of coarse sand.

The nearest surface water is Glen Echo Creek located approximately 400 feet east of the subject site. Based on monitoring data, the groundwater flow direction in the vicinity of the site is toward the northwest to southwest.

Previous Environmental Investigations

1978: October – All aboveground and underground station facilities were removed from the site
1993: May – Augeas Corporation (AC) conducted a Phase I environmental investigation (AC *Phase 1 Assessment Report* dated May 1993).
October – Environmental and Science Engineering, Inc. (ESE) drilled eight soil borings. (FNBO-1 through FNBO-9; ESE *Soil and Groundwater Investigation Report* dated November 15, 1993)
1998: July – GR installed four groundwater monitoring wells (MW-1 through MW-4; GR Report# 346420.02-2, *Monitoring Well Installation Report* dated September 17, 1998)
August – Quartertly monitoring and sampling of site wells began
2000: December – GR prepared and submitted a Site Conceptual Model report. This report summarized current

site conditions, conclusions, and recommendations (GR Report# 346420.04, *Site Conceptual Model and RBCA Evaluation Report* dated December 21, 2000).

Discussion

Methyl tert-butyl ether (MtBE) has never been detected in the soil beneath the site. Historical soil chemical analytical data are presented in Table 1.

Groundwater beneath the site has been monitored and sampled since August 1998. Depth to groundwater beneath the site has fluctuated between 5.5 and 12 feet below ground surface (bgs). Groundwater flow has historically ranged from northwest to southwest at an approximately gradient of 0.02. Petroleum hydrocarbons have not been detected in on-site well MW-1 and only on one occasion in well MW-2. Petroleum hydrocarbons have consistently been detected in off-site wells MW-3 and MW-4. Quarterly monitoring analytical data shows that hydrocarbon concentrations in these wells have been stable since quarterly monitoring began in August 1998.

Based on the data collected to date, we have made the following observations regarding petroleum hydrocarbons in soil and groundwater:

- Low levels of residual hydrocarbons in soil are present near the western corner of the site
- The dissolved hydrocarbon plume appears stable
- Based upon the presence of MtBE in groundwater and the USTs being removed in 1978, an off-site secondary source of hydrocarbons appears to contribute to groundwater contamination in the western portion of the site.

Well Search

A review of Alameda County Public Work Agency (ACPWA) well logs was conducted to identify water supply wells in the vicinity of the plume. Results of the ACPWA well log review are tabulated in Table 2 and depicted on Figure 2. No water supply wells are located within or in the vicinity of the plume area. The nearest water supply well is an irrigation well located approximately 750 feet northeast (upgradient) of the site (map ID #1).

Utility Survey

An underground utility survey has been conducted. The results of the utility survey are depicted on Figure 3. Based upon elevations shown on Figure 3 and well top of casing elevation of approximately 87 feet above mean seal level, the sewer lines adjacent to the site are approximately 12 to 13 bgs. The specific burial depths of water, gas, and electrical lines were not available, however these lines are usually buried shallower than 5 feet bgs. According to the East Bay Municipal Utility District, water lines are usually buried between 3 and 5 feet bgs. Based upon the above pipe burial depths and historic groundwater levels (5.5 to 12 feet bgs), the utility trenches in the site vicinity appear not to be acting as preferential pathways

Risk-Based Corrective Action (RBCA)

Tier 1 of the RBCA process involves comparison of the site constituent concentrations to generic Risk-Based Screening Levels (RBSL) to evaluate whether further investigation and/or remediation is warranted. The RBSL values are derived from standard exposure equations and reasonable maximum exposure (RME) estimates per U.S. EPA guidelines. The RBSL concentrations are designed to be protective of human health even if exposure occurs directly within the onsite

area of impacted soil or groundwater, and inherently provides conservative estimates of potential threats to human health and the environment. According to the RBCA process, if Tier 1 limits are not exceeded, the user may proceed directly to compliance monitoring and/or no further action. However, if these conservative screening levels are exceeded, the affected media may be addressed by: 1) remediating to the generic Tier 1 limits, if practicable; 2) conducting Tier 2 evaluation to develop site-specific remediation goals; or 3) implement an interim remedial action to abate petroleum hydrocarbons in areas of concern. Tier 2 analysis evaluates baseline risks both on and offsite, utilizing site specific soil, groundwater and air parameters. Additionally, Tier 2 analyses utilize transport models in calculating Site Specific Target Levels (SSTL). The SSTL is a chemical of concern (COC) concentration limit (clean-up level) in the source medium derived by multiplying the risk-based exposure limit at the point of exposure by the natural attenuation factor for the exposure pathway.

Site Parameters

Complete exposure pathways are those that could pose a reasonable potential for contaminant contact with human or environmental receptors. Under Tier 2 RBCA, both onsite and offsite receptors apply. For the purpose of this Tier 2 evaluation, a conservative residential exposure pathway with a risk factor of 1.0E-6 was evaluated for the site. Groundwater beneath and in the site vicinity is not used for drinking water purposes, therefore, groundwater ingestion or subsurface soil leaching to groundwater (ingestion) exposure pathways are not complete. As requested by the ACHCSA-EHD in their September 27, 2001 letter, the following risk pathways were evaluated: subsurface soil and groundwater volatilization to indoor and outdoor air; and ingestion, dermal contact and inhalation from surficial and subsurface soils. Additionally, the most recent four quarters of groundwater sampling results were utilized in this RBCA, as requested by the ACHCSA-EHD.

Where available, site specific physical data were used in this RBCA evaluation. Site specific parameters included contaminated soil area (2,275 ft^2), depth to top of affected soil (5.5 ft), soil parameters for porosity, bulk density, and organic carbon fraction, length of affected soil parallel to wind (100 ft) and thickness of affected subsurface soils (1.5 ft). The depth of groundwater is estimated to be approximately 8 feet below ground surface (GR Third Quarter Event of August 23, 2001, Groundwater Monitoring and Sampling Report). Where appropriate and consistent with site conditions, default values were used. The Chemicals of Concern (COC) were evaluated with a conservative 95% Upper Control Limit (UCL) factor as well as the California adjusted oral slope factor for benzene (0.1) for this RBCA analysis. TPHg was evaluated by inputting the reported TPHg values from soil and groundwater into the aromatic fraction C8-C10 (Total Petroleum Hydrocarbon Criteria Working Group Series, Volume 5, June 1999).

Results of RBCA Analysis

Based on information from previous site investigations and groundwater monitoring and sampling data, the Tier 2 RBCA program evaluated the complete exposure pathways identified at the site. The RBCA program findings for the identified pathways are surface soil exposure with a cumulative risk factor of 1.9E-8, and subsurface soil and groundwater volatilization to outdoor and indoor air exposures with cumulative risk factors of 6.1E-10 and 4.6E-8, respectively (Appendix A, Tier 2 Baseline Risk Summary Table). Using the conservative residential risk factor of 1.0E-6 and site conditions, the SSTLs for BTEX, MtBE and TPHg were determined to be below established Tier 2 SSTLs (Appendix A, SSTL Values). According to the RBCA decision making process, no further work is warranted to protect against exposure via these pathways. Pertinent input and output data including site specific parameters used in the analysis are presented in Appendix A.

Recommendations
Given the findings presented in this report, it is GR's opinion that no further work is warranted and the site should be considered for case closure.

If you have any questions or comments on the enclosed materials please feel free to contact us at (916) 631-1300.

Sincerely,
DELTA ENVIRONMENTAL CONSULTANTS, INC.
Network Associate GETTLER-RYAN INC.

Geoffrey D. Risse
Project Geologist

David W. Herzog
Senior Geologist
R.G. 7211

REGISTERED GEOLOGIST
DAVID W. HERZOG
No. 7211
STATE OF CALIFORNIA

Attachments

Table 1: Historical Soil Chemical Analytical Results
Table 2: Well Search Results
Figure 1: Vicinity Map
Figure 2: Well Search Map
Figure 3: Extended Site Plan/Utility Map
Appendix A: Tier 2 RBCA Input/Output Data

CC: Mr. Tom Bauhs, Chevron Products Company, P.O. Box 6004, San Ramon, California 94583
Ms. Karen Streich, Chevron Products Company, P.O. Box 6004, San Ramon, California 94583
Mr. Jim Brownell, Delta Environmental Consultants Inc., 3164 Gold Camp Dr., Suite 200, Rancho Cordova, California 95670-6021
Mr. Neil B. Goodhue and Mrs. Diane C. Goodhue (Property Owners), 300 Hillside Avenue, Piedmont, California 94611

ATTACHMENTS

Table 1
Historical Soil Chemical Analytical Results
Former Chevron Service Station No. 9-0517
3900 Piedmont Avenue
Oakland, California

Sample ID	Sample Depth (feet)	Sample Date	TPHg (ppm)	TPHd (ppm)	TRPH (ppm)	B (ppm)	T (ppm)	E (ppm)	X (ppm)	MtBE (ppm)	VOCs (ppm)
FNBO-1	10.5	10/20/93	1.9[1]	<5.0	350	<0.005	<0.005	<0.005	<0.005	NA	ND
FNBO-2	10	10/20/93	<1.0	<5.0	86	<0.005	<0.005	<0.005	<0.005	NA	ND
FNBO-3	10.5	10/20/93	<1.0	<5.0	NA	<0.005	<0.005	<0.005	<0.005	NA	NA
FNBO-4	6.0	10/20/93	1.4	<5.0	320	<0.005	<0.005	<0.005	<0.005	NA	ND
FNBO-5	6.0	10/21/93	3400	<500	NA	<0.5	<0.5	19	7.5	NA	NA
FNBO-5	10	10/21/93	15	<5.0	160	0.03	<0.005	0.31	0.12	NA	ND
FNBO-6	5.5	10/21/93	5.0[1]	<10	NA	<0.02	<0.02	<0.02	<0.02	NA	NA
FNBO-6	10	10/21/93	3.6[2]	<5.0	10.0	<0.005	<0.005	0.034	0.041	NA	ND
FNBO-7	6.0	10/21/93	350[2]	<400	NA	<0.40	<0.40	<0.40	<0.40	NA	NA
FNBO-7	11	10/21/93	400[2]	<500	NA	1.0	1.5	5.0	13	NA	NA
FNBO-8	11	10/21/93	<1.0	<5.0	NA	<0.005	<0.005	<0.005	<0.005	NA	NA
MW1-6	6.0	7/21/98	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	NA
MW1-11	11	7/21/98	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	NA
MW1-16	16	7/21/98	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	NA
MW2-6	6.0	7/21/98	<1.0	NA	NA	0.0070	<0.0050	0.010	0.0090	<0.025	NA
MW2-11	11	7/21/93	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	NA
MW2-16	16	7/21/93	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	NA
MW3-6	6.0	7/21/93	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	NA
MW3-10.5	10.5	7/21/93	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	NA
MW3-16	16	7/21/93	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	NA
MW4-6	6.0	7/21/93	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	NA
MW4-11	11	7/21/93	80	NA	NA	2.0	1.7	4.7	5.8	<0.25	NA
MW4-16	16	7/21/93	<1.0	NA	NA	<0.0050	<0.0050	<0.0050	<0.0050	NA	NA

Table 1
Historical Chemical Analytical Results
Former Chevron Service Station No. 9-0517
3900 Piedmont Avenue
Oakland, California

Explanation:
ND = None Detected
NA = Not Analyzed
ppm = parts per million
TPHg = Total Petroleum Hydrocarbons as gasoline
TPHd = Total Petroleum Hydrocarbons as diesel
TRPH = Total Recoverable Petroleum Hydrocarbons
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
MtBE = Methyl tert-butyl ether
VOCs = Volatile Organic Compounds

[1] Quantified as light petroleum distillates
[2] Quantified as gasoline and light petroleum distillates

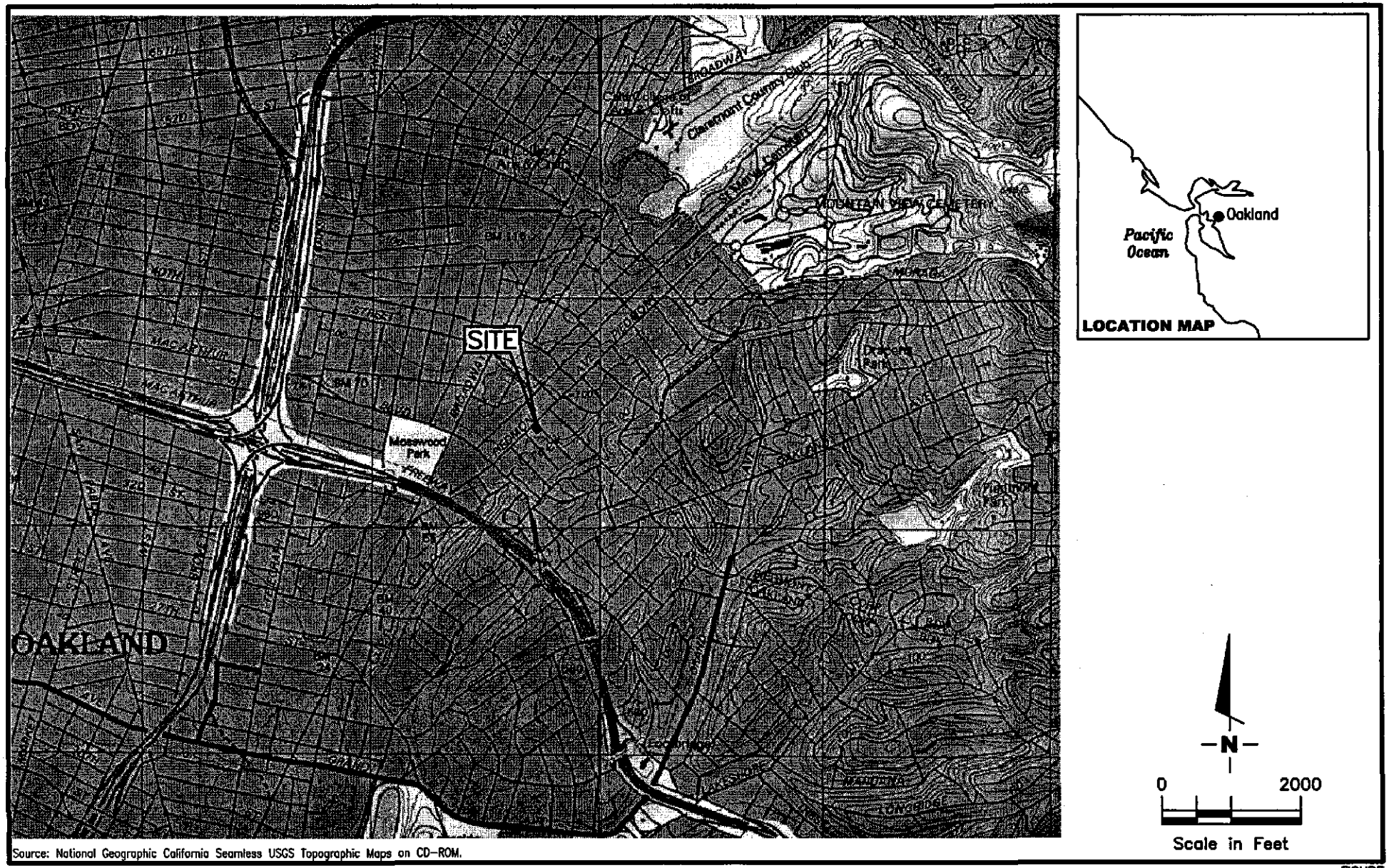
Table 2
Well Search Results
Former Chevron Service Station No. 9-0517
3900 Piedmont Avenue, Oakland, California
2000 Foot Radius Around Site

Map ID	Well Owner	Well Location	Well Use	Number of Wells On Site	State Well #	Year Installed	AVG Well Depth (feet)	AVG Well Diameter (inches)	AVG DTW (feet)
1	John Bond	4082 Piedmont Avenue	IRR	1	01S04W24L1	1978	198	8	NA
2	Chevron USA	3701 Broadway	ABD	1	01S04W24N2	1991	0	6	NA
3	Kaiser Health Foundation	3505 Broadway	ABD	2	01S04W24N15-16	1992	0	9	NA

Explanation

ABD = Abandoned Well
IRR = Irrigation Well
NA = Information Not Available

Well location data supplied by the County of Alameda Public Works Agency



Source: National Geographic California Seamless USGS Topographic Maps on CD-ROM.

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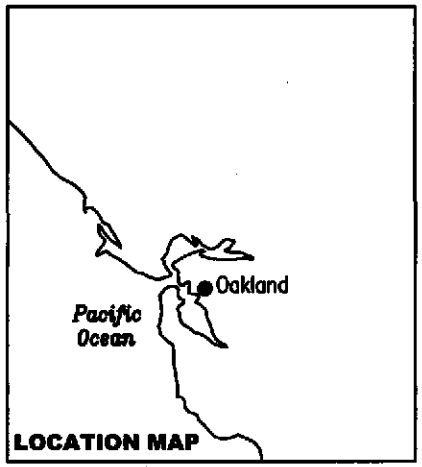
Dublin, CA 94568 (925) 551-7555

VICINITY MAP
Former Chevron Service Station No. 9-0517
3900 Piedmont Avenue
Oakland, California

FIGURE
1

PROJECT NUMBER	REVIEWED BY	DATE	REVISED DATE
DG90517G.3C99		10/01	

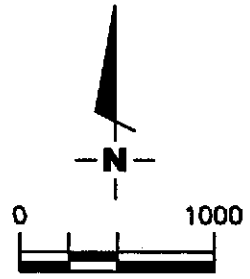
FILE NAME: P:\ENVIRO\CHEVRON\9-0517\VIC-9-0517.DWG | Layout Tab: Vic Map



EXPLANATION

△ Irrigation well

⊠ Abandoned well



Source: National Geographic California Seamless USGS Topographic Maps on CD-ROM.

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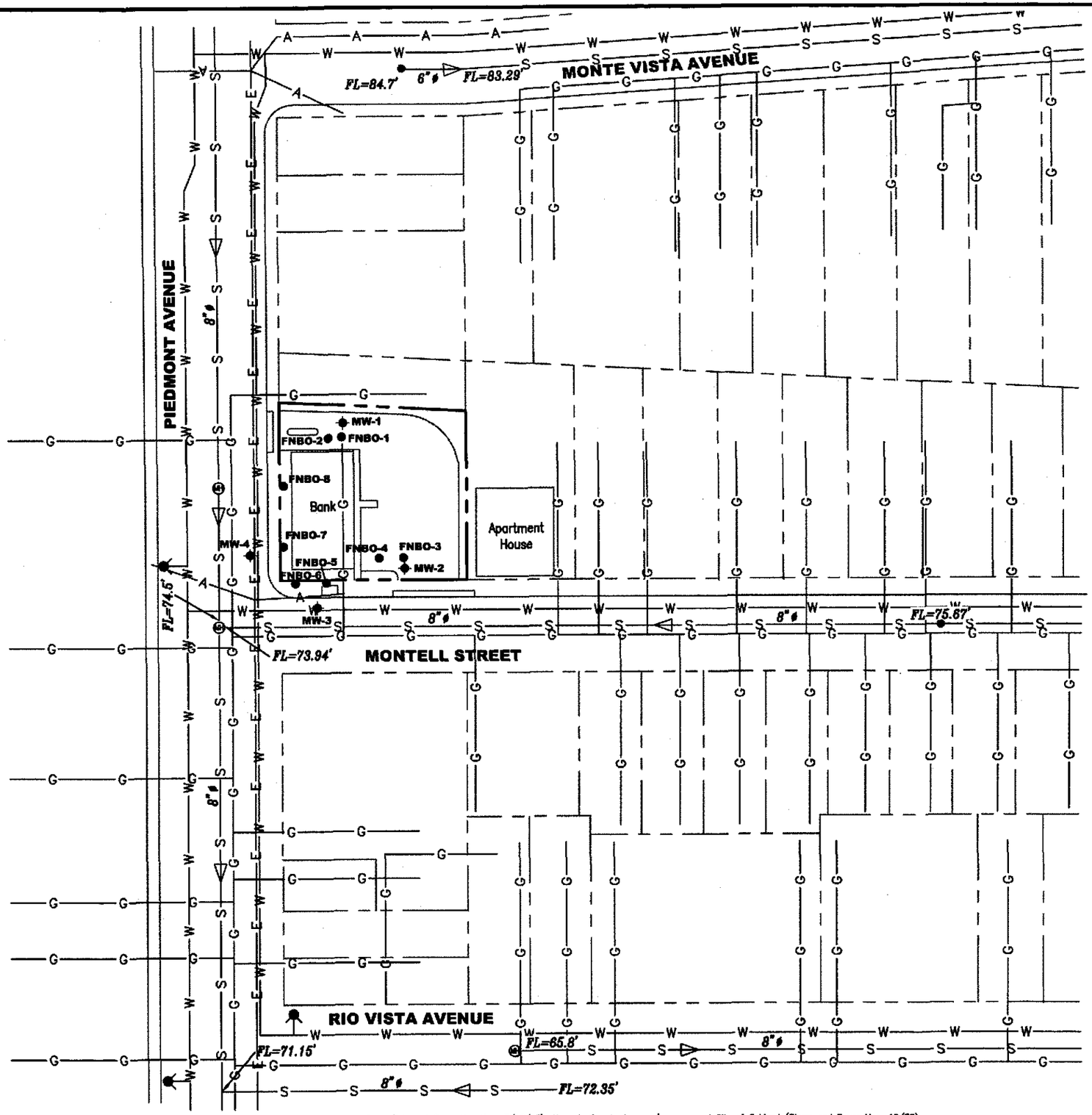
WELL SEARCH MAP
Former Chevron Service Station No. 9-0517
3900 Piedmont Avenue
Oakland, California

FIGURE
2

PROJECT NUMBER	REVIEWED BY	DATE	REVISED DATE
DG90517G.3C99		2/02	

FILE NAME: P:\ENVIRO\CHEVRON\9-0517\VIC-9-0517.DWG | Layout Tab: Well Search 2-02



EXPLANATION

- Groundwater monitoring well
- Soil boring
- Manhole
- Fire Hydrant
- Flow direction
- 8"ø Pipe diameter

UNDERGROUND UTILITIES

- S — Sanitary sewer
- SD — Storm drain
- W — Water
- G — Natural gas
- E — Electric
- A — Abandoned utility trench

0 60

Scale in Feet

Source: Figure modified from drawing provided by RRM engineering contracting firm, Augeas Corp. (Adjacent Properties Map, 3/16/93), Alameda County Assessor's maps and City of Oakland (Storm and Sewer Map, 10/78).

FIGURE 3

EXTENDED SITE PLAN/UTILITY MAP
Former Chevron Service Station No. 9-0517
3900 Piedmont Avenue
Oakland, California

DATE 2/02

REVISED DATE

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6747 Sierra Ct., Suite J
Dublin, CA 94568
(925) 551-7555

PROJECT NUMBER DG90517G.3C99

REVIEWED BY

FILE NAME: P:\ENVIRO\CHEVRON\9-0517\A01-9-0517.DWG | Layout Tab: Agency Request 2-02

Main Screen

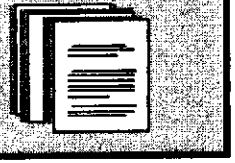
RBCA Tool Kit for Chemical Releases
Version 1.3a © 2000

1. Project Information

Site Name:	Former Chevron SS No. 9-0517		
Location:	3900 Piedmont Ave. Oakland, CA		
Compl. By:	J. Douglas		
Date:	20-Nov-01	Job ID:	DG90517G.3C99

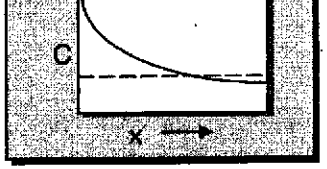
2. Which Type of RBCA Analysis? (?)

○ **Tier 1**



Generic Values
On-Site
Exposure

◉ **Tier 2**



Site-Specific Values
On- or Off-Site Exposure

3. Calculation Options (?)

Affects which input data are required

☑ ***Baseline Risks (Forward mode)***

☑ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (■= yes, ■= no)

- ■□ Exposure Pathways
- ■□ Constituents of Concern (COCs)
- ■□ Transport Models
- ■□ Soil Parameters
- ■□ GW Parameters
- ■□ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis...
- Baseline Risks...
- Cleanup Standards...

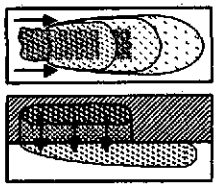
5. Commands and Options

New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

Exposure Pathway Identification

Site Name: Former Chevron SS No. 9-0517
Location: 3900 Piedmont Ave. Oakland, CA
Compl. By: J. Douglas
Job ID: DG90517G.3C99 Date: 20-Nov-01

1. Groundwater Exposure



Groundwater Ingestion/ Surface Water Impact

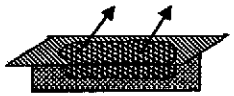
	On-site	Off-site1	Off-site2
Receptor	None		
Type:			

Distance to GW receptors

On-site	Off-site1	Off-site2	
0	0	0	(ft)
0	0	0	(ft)

Enter ALP Criteria

2. Surface Soil Exposure

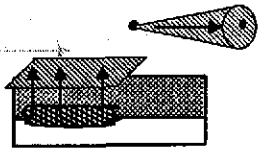


Direct Ingestion and Dermal Contact

	On-site	
Receptor	Res.	No off-site receptors
Type:		

Construction Worker ☑

3. Air Exposure

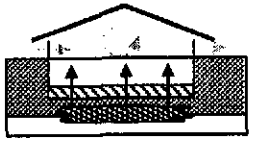


Volatilization and Particulates to Outdoor Air Inhalation

	On-site	Off-site1	Off-site2	
Receptor	Res.			
Type:				(ft)
	0			

Construction worker ☑

- ☑ Affected Soils--Volatilization to Ambient Outdoor Air
- ☑ Affected Groundwater--Volatilization to Ambient Outdoor Air
- ☑ Affected Surface Soils--Particulates to Ambient Outdoor Air



Volatilization to Indoor Air Inhalation

	On-site	
Receptor	Res.	No off-site receptors
Type:		

- ☑ Affected Soils--Volatilization to Enclosed Space
- ☑ Affected Groundwater--Volatilization to Enclosed Space

4. Commands and Options

Main Screen | Print Sheet | Set Units | *Help*

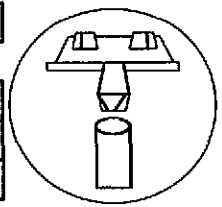
■□ Exposure Factors & Target Risks | Exposure Flowchart

Exposure Factors and Target Risk Limits

Site Name: Former Chevron SS No. 9-0517
Location: 3900 Piedmont Ave. Oakland, CA
Compl. By: J. Douglas
Job ID: DG90517G.3C99 Date: 20-Nov-01

1. Exposure Parameters

		Residential			Commercial	
Age Adjustment?		Adult	(Age 0-6)	(Age 0-16)	Chronic	Construc.
Averaging time, carcinogens (yr)		70				
Averaging time, non-carcinogens (yr)		30			25	1
Body weight (kg)		70	15	35	70	
Exposure duration (yr)		30	6	16	25	1
Exposure frequency (days/yr)		350			250	180
Dermal exposure frequency (days/yr)		350			250	
Skin surface area, soil contact (cm^2)	☐	5800		2023	5800	5800
Soil dermal adherence factor ($mg/cm^2/day$)		1				
Water ingestion rate (L/day)		2			1	
Soil ingestion rate (mg/day)	☐	100	200		50	100
Swimming exposure time (hr/event)		3				
Swimming event frequency (events/yr)		12	12	12		
Swimming water ingestion rate (L/hr)	☐	0.05	0.5			
Skin surface area, swimming (cm^2)	☐	23000		8100		
Fish consumption rate (kg/day)		0.025				
Contaminated fish fraction (unitless)		1				



2. Risk Goal Calculation Options

- ○ Individual Constituent Risk Goals Only
- ◉ Individual and Cumulative Risk Goals

3. Target Health Risk Limits

	Individual	Cumulative
Target Risk (Class A/B carcins.)	1.0E-6	1.0E-5
Target Risk (Class C carcinogens)	1.0E-5	
Target Hazard Quotient	1.0E+0	
Target Hazard Index		1.0E+0

4. Commands and Options

Return to Exposure Pathways

Use Default Values

Print Sheet

Help

RBCA Tool Kit for Chemical Releases, Version 1.3a

Site Name: Former Chevron SS No. 9-0517
Location: 3900 Piedmont Ave. Oakland, CA
Compl. By: J. Douglas

Job ID: DG90517G.3C99
Date: 20-Nov-01

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

☐ Apply Raoult's Law (?)

Selected COCs

COC Select: ***Sort List:*** (?)

Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

Representative COC Concentration (?)

Selected COCs	Groundwater Source Zone		Soil Source Zone		
	Enter Directly / ■□ Enter Site Data		Enter Directly / ■□ Enter Site Data		
	(mg/L)	note	*(mg/kg)*	note	
Benzene*	2.0E-2	oral slope changed to 0.1	3.4E-2	oral slope changed to 0.1	
Toluene	4.5E-3		3.1E-2		
Ethylbenzene	6.1E-3		1.8E-1		
Xylene (mixed isomers)	6.5E-3		1.4E-1		
Methyl t-Butyl ether	2.4E-2		1.3E-2		
TPH - Arom >C08-C10	7.3E-1		5.2E+1		

*** = Chemical with user-specified data**

Commands and Options

Return | Print Sheet | Help

Site Name: Former Chevron SS No. 9-0517; DG90517G.3C99
Location: 3900 Piedmont Ave. Oakland, CA Date: 20-Nov-01
Compl. By: J. Douglas

Groundwater Source Zone Concentration Calculator

Paste Defaults

UCL Percentile: 95%

Mean Option

Constituent	Detection Limit (mg/L)	No. of Samples	No. of Detects	Estimated Distribution of Data	Max. Conc. (mg/L)	Mean Conc. (mg/L)	UCL on Mean (mg/L)
Benzene*	5.0E-4	16	16	Lognormal	3.0E-1	5.1E-3	2.0E-2
Toluene	5.0E-4	16	16	Lognormal	4.4E-2	1.9E-3	4.5E-3
Ethylbenzene	5.0E-4	16	16	Lognormal	5.3E-2	2.2E-3	6.1E-3
Xylene (mixed isomers)	5.0E-4	16	16	Lognormal	7.2E-2	2.4E-3	6.5E-3
Methyl t-Butyl ether	2.5E-3	16	16	Lognormal	2.4E-1	9.4E-3	2.4E-2
TPH - Arom >C08-C10	5.0E-2	16	16	Lognormal	5.6E+0	2.5E-1	7.3E-1

* = Chemical with user-specified data

Enter Analytical Data from Groundwater Source Zone (up to 50 Data Points)

Analytical Data

	1	2	3	4	5	6	7	8	9	10	11	12	13
ID	MW-1	MW-1	MW-1	MW-1	MW-2	MW-2	MW-2	MW-2	MW-3	MW-3	MW-3	MW-3	MW-4
Date	15-May-01	27-Feb-01	30-Oct-00	31-Jul-00	23-Aug-01	15-May-01	27-Feb-01	30-Oct-00	23-Aug-01	15-May-01	27-Feb-01	30-Oct-00	23-Aug-01
	(mg/L)	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*
	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	4.80E-2	9.64E-2	1.55E-2	1.19E-1	2.50E-1
	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.92E-3	5.00E-3	1.26E-2	1.53E-3	2.50E-3	4.40E-2
	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	5.00E-3	1.15E-2	1.49E-2	4.00E-2	2.10E-2
	2.50E-4	2.50E-4	7.50E-4	2.50E-4	2.50E-4	2.50E-4	2.50E-4	1.88E-3	5.00E-3	1.16E-2	1.06E-3	7.50E-3	7.20E-2
	1.25E-3	1.25E-3	1.25E-3	1.25E-3	1.25E-3	1.25E-3	1.25E-3	4.89E-3	1.00E-1	1.28E-1	1.57E-2	1.25E-2	1.30E-1
	2.50E-2	2.50E-2	2.50E-2	2.50E-2	2.50E-2	2.50E-2	2.50E-2	2.50E-2	2.30E+0	3.22E+0	4.32E-1	3.30E+0	2.70E+0

Analytical Data

14	15	16	17	18	19	20	21	22	23	24	25	26
MW-4	MW-4	MW-4										
15-May-01	27-Feb-01	30-Oct-00										
(mg/L)	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*	*(mg/L)*
2.00E-1	9.51E-2	3.01E-1										
4.41E-2	1.28E-2	1.78E-2										
4.63E-2	5.34E-2	1.18E-2										
5.17E-2	4.30E-2	5.15E-2										
1.72E-1	2.35E-1	1.25E-2										
4.58E+0	2.14E+0	5.63E+0										

Commands and Options

Return | Print Sheet | *Help*

Site Name: Former Chevron SS No. 9-0057 DG90517G.3C99
Location: 3900 Piedmont Ave. Oakland, CA Date: 20-Nov-01
Compl. By: J. Douglas

Soil Source Zone Concentration Calculator

UCL Percentile: 95%

Paste Defaults | Mean Option

Constituent	Detection Limit (mg/kg)	No. of Samples	No. of Detects	Estimated Distribution of Data	Max. Conc. (mg/kg)	Mean Conc. (mg/kg)	UCL on Mean (mg/kg)
Benzene*	5.0E-3	8	8	Lognormal	2.5E-1	8.7E-3	3.4E-2
Toluene	5.0E-3	8	8	Lognormal	2.5E-1	7.7E-3	3.1E-2
Ethylbenzene	5.0E-3	8	8	Lognormal	1.9E+1	2.2E-2	1.8E-1
Xylene (mixed isomers)	5.0E-3	8	8	Lognormal	7.5E+0	2.0E-2	1.4E-1
Methyl t-Butyl ether	2.5E-2	4	4	Normal	1.3E-2	1.3E-2	1.3E-2
TPH - Arom >C08-C10	1.0E+0	8	8	Lognormal	3.4E+3	5.2E+0	5.2E+1

* = Chemical with user-specified data

Enter Analytical Data from Soil Source Zone (up to 50 Data Points)

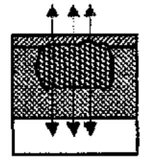
Analytical Data

	1	2	3	4	5	6	7	8	9	10	11	12	13
ID	FNBO-4	FNBO-5	FNBO-6	FNBO-7	MW1-6	MW2-6	MW3-6	MW4-6					
Date	20-Oct-93	21-Oct-93	21-Oct-93	21-Oct-93	21-Jul-98	21-Jul-98	21-Jul-98	21-Jul-98					
	(mg/kg)	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*
	2.50E-3	2.50E-1	2.50E-3	2.00E-1	2.50E-3	7.00E-3	2.50E-3	2.50E-3					
	2.50E-3	2.50E-1	2.50E-3	2.00E-1	2.50E-3	2.50E-3	2.50E-3	2.50E-3					
	2.50E-3	1.90E+1	3.40E-2	2.00E-1	2.50E-3	1.00E-2	2.50E-3	2.50E-3					
	2.50E-3	7.50E+0	4.10E-2	2.00E-1	2.50E-3	9.00E-3	2.50E-3	2.50E-3					
					1.25E-2	1.25E-2	1.25E-2	1.25E-2					
	1.40E+0	3.40E+3	5.00E+0	3.50E+2	5.00E-1	5.00E-1	5.00E-1	5.00E-1					

Transport Modeling Options

Site Name: Former Chevron SS No. 9-0517 Job ID: DG90517G.3C99
Location: 3900 Piedmont Ave. Oakland, CA Date: 20-Nov-01
Compl. By: J. Douglas

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors (?)

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  - Thickness of surface soil zone: 4.92126 *(ft)*
- ○ User-specified VF from other model [Enter VF Values]

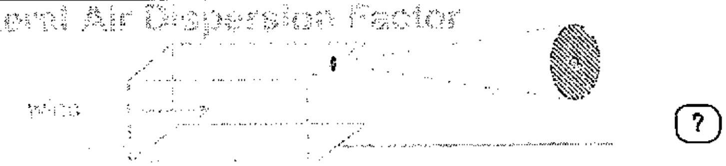
Indoor Air Volatilization Factors (?)

- ◉ Johnson & Ettinger model
- ○ User-specified VF from other model [Enter VF Values]

Soil-to-Groundwater Leaching Factor (?)

- ○ ASTM Model
  - ☐
  - ☐
  - [Enter Decay Rates]
- ○ [Enter LF Values]

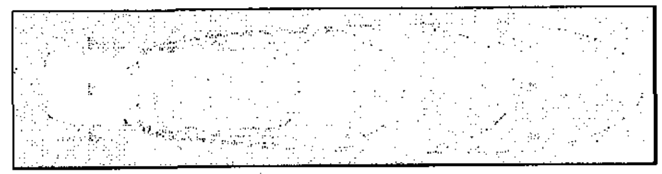
2. Lateral Air Dispersion Factor



(?)

	Off-site 1	Off-site 2	
○			
○	1.00E+0	1.00E+0	(-)

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model (?)

- ○
- ○ [Enter Decay Rates]
- ○ [Enter Site Data]
- [Enter Directly]

User-Specified DAF Values

- ○ DAF values from other model [Enter DAF Values]

4. Commands and Options

[Main Screen] [Print Sheet] [*Help*]

RBCA Tool Kit for Chemical Releases, Version 1.3a

Site Name: Former Chevron SS No. 9-0517 | Job ID: DG90517G.3C99
Location: 3900 Piedmont Ave. Oakland, CA | Date: 20-Nov-01
Compl. By: J. Douglas

Site-Specific Soil Parameters

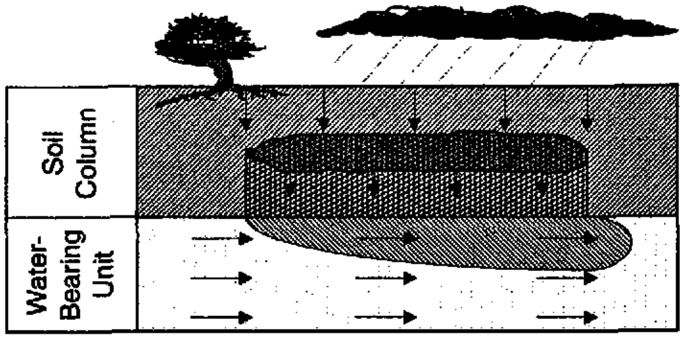
1. Soil Source Zone Characteristics (?)

Hydrogeology

	General Case	Construction	
Depth to water-bearing unit	8		*(ft)*
Capillary zone thickness	0.164041995		*(ft)*
Soil column thickness	7.835958005		*(ft)*

Affected Soil Zone

Depth to top of affected soils	5.5		*(ft)*
Depth to base of affected soils	7		*(ft)*
Affected soil area	2275	1076.4	*(ft^2)*
Length of affected soil parallel to assumed wind direction	100	33	*(ft)*
Length of affected soil parallel to assumed GW flow direction	0		*(ft)*



2. Surface Soil Column

Predominant USCS Soil Type (?)

		Vadose Zone	Capillary Fringe	
or	Calculate	or		
Total porosity		0.331		(-)
Volumetric water content		0.19	0.342	(-)
Volumetric air content		0.141	-0.011	(-)
Dry bulk density		1.6		*(kg/L)*
Vertical hydraulic conductivity		8.6E+2		*(cm/d)*
Vapor permeability		1.1E-11		*(ft^2)*
Capillary zone thickness		1.6E-1		*(ft)*

Net Rainfall Infiltration

Net infiltration estimate			
or	NA	or	
Average annual precipitation			

Partitioning Parameters

Fraction organic carbon	0.15	(-)
Soil/water pH	6.8	(-)

3. Commands and Options

Main Screen | Use Default Values | **Print Sheet**

Set Units | | ***Help***

Site-Specific Groundwater Parameters

Site Name: Former Chevron SS No. 9-0517 Job ID: DG90517G.3C99
Location: 3900 Piedmont Ave. Oakland, CA Date: 20-Nov-01
Compl. By: J. Douglas

1. Water-Bearing Unit

2. Groundwater Source Zone

Groundwater plume width at source: 147.6377953 (ft)

NA or

3. Groundwater Dispersion

NA or

4. Groundwater Discharge to Surface Water

5. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | Help

Site-Specific Air Parameters

Site Name: Former Chevron SS No. 9-0517 Job ID: DG90517G.3C99
Location: 3900 Piedmont Ave. Oakland, CA Date: 20-Nov-01
Compl. By: J. Douglas

1. Outdoor Air Pathway

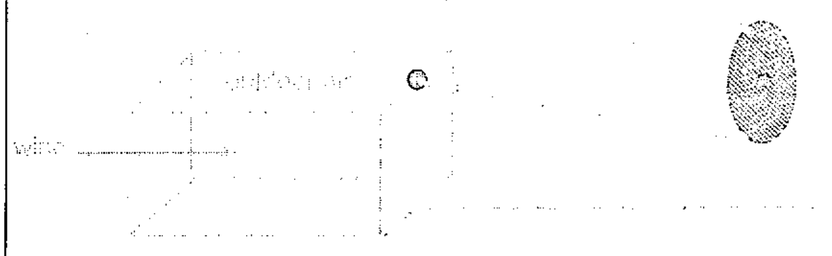
(?)

NA

or

Air Source Zone

Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)

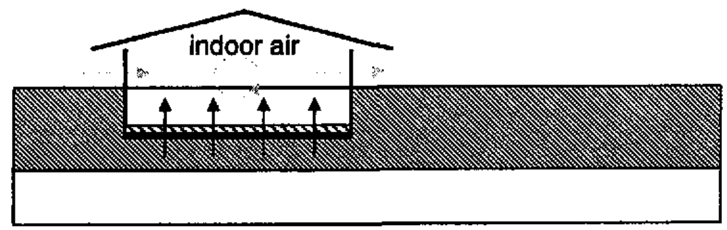


2. Indoor Air Pathway

(?)

Building Parameters

	Residential	Commercial	
Building volume/area ratio	6.56168		(ft)
Foundation area	753.474		(ft^2)
Foundation perimeter	111.549		(ft)
Building air exchange rate	1.4E-4		(1/s)
Depth to bottom of foundation slab	0.49213		(ft)
Convective air flow through cracks	0.0E+0		(ft^3/s)
Foundation thickness	0.492125984		(ft)
Foundation crack fraction	0.001		(-)
Volumetric water content of cracks	0.12		(-)
Volumetric air content of cracks	0.26		(-)
Indoor/Outdoor differential pressure	0		(g/cm/s^2)

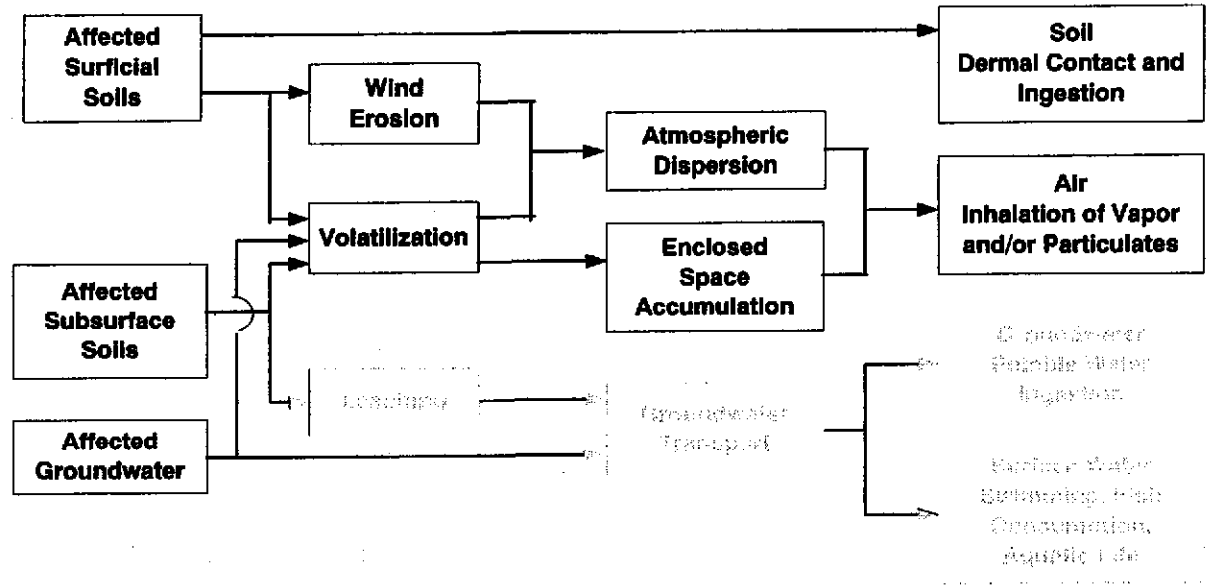


3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | Help

Exposure Pathway Flowchart

Site Name: Former Chevron SS No. 9-0517 Job ID: DG90517G.3C99
Location: 3900 Piedmont Ave. Oakland, CA Date: 20-Nov-01
Compl. By: J. Douglas



Receptors	On-site	Off-site1	Off-site2
	Res./Constr.	*NA*	*NA*
Outdoor Air:	*Res./Constr.*	*#VALUE!*	*#VALUE!*
Indoor Air:	*Residential*	*NA*	*NA*
	None	None	None
	NA	NA	NA

SOURCE → TRANSPORT → RECEPTOR

Commands and Options

Main Screen | Print Sheet | Help

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	Diffusion Coefficients in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg)	partition	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Benzene*	71-43-2	A	78.1	PS	8.80E-02	PS	9.80E-06	PS	1.77	Koc	PS	5.55E-03	2.29E-01	PS	9.52E+01	PS	1.75E+03	PS	-	-	-
Toluene	108-88-3	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	Koc	A	6.30E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29	-	-	-
Ethylbenzene	100-41-4	A	106.2	PS	7.50E-02	PS	7.80E-06	PS	2.56	Koc	PS	7.88E-03	3.25E-01	PS	1.00E+01	PS	1.69E+02	PS	-	-	-
Xylene (mixed isomers)	1330-20-7	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	Koc	A	7.03E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5	-	-	-
Methyl t-Butyl ether	1634-04-4	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	Koc	A	5.77E-04	2.38E-02	-	2.49E+02	-	4.80E+04	A	-	-	-
TPH - Arom >C08-C10	0-00-0	T	120	T	1.00E-01	T	1.00E-05	T	3.20	Koc	T	1.16E-02	4.80E-01	T	4.79E+00	-	6.50E+01	T	-	-	-

* = Chemical with user-specified data

Site Name: Former Chevron SS No. 9-0517

Completed By: J. Douglas

Job ID: DG90517G.3C99

Site Location: 3900 Piedmont Ave. Oakland, CA

Date Completed: 20-Nov-01

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Dermal RfD_dermal	ref	Reference Conc. (mg/m3) Inhalation RfC_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	1/(mg/kg/day) Dermal SF_dermal	ref	Unit Risk Factor 1/(µg/m3) Inhalation URF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Benzene*	3.00E-03	R	-	-	5.95E-03	R	1.00E-01	PS	2.99E-02	TX	8.29E-06	PS	A	TRUE
Toluene	2.00E-01	A,R	1.60E-01	TX	4.00E-01	A,R	-	-	-	-	-	-	D	FALSE
Ethylbenzene	1.00E-01	PS	9.70E-02	TX	1.00E+00	PS	-	-	-	-	-	-	D	FALSE
Xylene (mixed isomers)	2.00E+00	A,R	1.84E+00	TX	7.00E+00	A	-	-	-	-	-	-	D	FALSE
Methyl t-Butyl ether	1.00E-02	31	8.00E-03	TX	3.00E+00	R	-	-	-	-	-	-	-	FALSE
TPH - Arom >C08-C10	4.00E-02	T	-	-	2.00E-01	T	-	-	-	-	-	-	D	FALSE

* = Chemical with user-specifiec

Site Name: Former Chevron SS

Site Location: 3900 Piedmont

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Biocon-centration Factor (L-wat/kg-fish)
Benzene*	5.00E-04	-	3.25E+00	-	-	-	12.6
Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	-	-	70
Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.35E+02	PS	-	-	1
Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	-	-	1
Methyl t-Butyl ether	-	-	6.00E+01	NIOSH	-	-	1
TPH - Arom >C08-C10	-	-	-	-	-	-	1

* = Chemical with user-specifiec

Site Name: Former Chevron SS

Site Location: 3900 Piedmont

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Benzene*	0.5	0.021	0.26	0.63	0.013	7.3E-2	D	0.002	S	0.005	S	720	720	H
Toluene	0.5	0.045	0.32	0.77	0.054	1.6E-1	D	0.002	S	0.005	S	28	28	H
Ethylbenzene	0.5	0.074	0.39	1.3	0.14	2.7E-1	D	0.002	S	0.005	S	228	228	H
Xylene (mixed isomers)	0.5	0.08	0.39	1.4	0.16	2.9E-1	D	0.005	S	0.005	S	360	360	H
Methyl t-Butyl ether	0.5	-	-	-	-	-	-	-	-	-	-	360	180	H
TPH - Arom >C08-C10	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-

* = Chemical with user-specifiec

Site Name: Former Chevron SS

Site Location: 3900 Piedmont

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA

Completed By: J. Douglas
Date Completed: 20-Nov-01

Job ID: DG90517G.3C99

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-18 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater ingestion	None	None	None
Soil Leaching to Groundwater ingestion	None	None	None
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	Res./Constr.		
Outdoor Air:			
Particulates from Surface Soils	Res./Constr.	#VALUE!	#VALUE!
Volatilization from Soils	Res./Constr.	#VALUE!	#VALUE!
Volatilization from Groundwater	Residential	#VALUE!	#VALUE!
Indoor Air:			
Volatilization from Subsurface Soils	Residential	NA	NA
Volatilization from Groundwater	Residential	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	Surface & subsurface models
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	NA
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	2.3E+3	1.1E+3	(ft^2)
W	Length of source-zone area parallel to wind	1.0E+2	3.3E+1	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_e	Areal particulate emission rate	6.9E-14		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	4.9E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	1.6E-1			(ft)
h_v	Vadose zone thickness	7.8E+0			(ft)
ρ_b	Soil bulk density	1.6E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.5E-1			(-)
θ_T	Soil total porosity	3.3E-1			(-)
K_{sat}	Vertical hydraulic conductivity	8.6E+2			(cm/d)
k_v	Vapor permeability	1.1E-11			(ft^2)
L_{gw}	Depth to groundwater	6.0E+0			(ft)
L_s	Depth to top of affected soils	5.5E+0			(ft)
L_{base}	Depth to base of affected soils	7.0E+0			(ft)
L_{soils}	Thickness of affected soils	1.5E+0			(ft)
pH	Soil/groundwater pH	6.8E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.342	0.19	0.12	(-)
θ_a	Volumetric air content	-0.011	0.141	0.26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	6.56E+0	NA	(ft)
A_b	Foundation area	7.53E+2	NA	(ft^2)
X_{crk}	Foundation perimeter	1.12E+2	NA	(ft)
ER	Building air exchange rate	1.40E-4	NA	(1/s)
L_{crk}	Foundation thickness	4.92E-1	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	4.92E-1	NA	(ft)
η	Foundation crack fraction	1.00E-3	NA	(-)
dP	Indoor/outdoor differential pressure	0.00E+0	NA	(g/cm/s^2)
Q_s	Convective air flow through slab	0.00E+0	NA	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	NA	(ft)
I_f	Net groundwater infiltration rate	NA	(cm/yr)
U_{gw}	Groundwater Darcy velocity	NA	(cm/d)
V_{gw}	Groundwater seepage velocity	NA	(cm/d)
K_s	Saturated hydraulic conductivity	NA	(cm/d)
i	Groundwater gradient	NA	(-)
S_w	Width of groundwater source zone	NA	(ft)
S_d	Depth of groundwater source zone	NA	(ft)
θ_{ae}	Effective porosity in water-bearing unit	NA	(-)
f_{oc-aq}	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{aq}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
	Lateral Groundwater Transport	Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(ft)
α_y	Transverse dispersivity	NA	NA	NA	NA	(ft)
α_z	Vertical dispersivity	NA	NA	NA	NA	(ft)
	Lateral Outdoor Air Transport	Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	Surface water flowrate	NA	(ft^3/s)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
δ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{gw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS:
VAPOR AND DUST INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor				3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)			
	Soil Conc. (mg/kg)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
		Residential	Construction Worker	#VALUE!	#VALUE!	Residential	Construction Worker	#VALUE!	#VALUE!
Benzene*	3.4E-2								
Toluene	3.1E-2								
Ethylbenzene	1.8E-1								
Xylene (mixed isomers)	1.4E-1								
Methyl t-Butyl ether	1.3E-2								
TPH - Arom >C08-C10	5.2E+1								

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SURFACE SOILS:
VAPOR AND DUST INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)				5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)			
	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Residential	Construction Worker	#VALUE!	#VALUE!	Residential	Construction Worker	#VALUE!	#VALUE!
Benzene*								
Toluene								
Ethylbenzene								
Xylene (mixed isomers)								
Methyl t-Butyl ether								
TPH - Arom >C08-C10								

* = Chemical with user-specified data

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS (5.5 - 7 ft):
VAPOR INHALATION

Constituents of Concern	1) Source Medium	2) NAF Value (m^3/kg) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		
	Soil Conc. (mg/kg)	On-site (0 ft) Residential	Off-site 1 (0 ft) #VALUE!	Off-site 2 (0 ft) #VALUE!	On-site (0 ft) Residential	Off-site 1 (0 ft) #VALUE!	Off-site 2 (0 ft) #VALUE!
Benzene*	3.4E-2	1.9E+5			1.8E-7		
Toluene	3.1E-2	1.9E+5			1.6E-7		
Ethylbenzene	1.8E-1	4.1E+5			4.4E-7		
Xylene (mixed isomers)	1.4E-1	3.2E+5			4.3E-7		
Methyl t-Butyl ether	1.3E-2	1.9E+5			6.5E-8		
TPH - Arom >C08-C10	5.2E+1	9.2E+5			5.7E-5		

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Chevron SS No. 9-0517
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SUBSURFACE SOILS (5.5 - 7 ft):

VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Residential	#VALUE!	#VALUE!	Residential	#VALUE!	#VALUE!
Benzene*	4.1E-1			7.3E-8		
Toluene	9.6E-1			1.6E-7		
Ethylbenzene	9.6E-1			4.2E-7		
Xylene (mixed isomers)	9.6E-1			4.1E-7		
Methyl t-Butyl ether	9.6E-1			6.3E-8		
TPH - Arom >C08-C10	9.6E-1			5.5E-5		

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Former Chevron SS No. 9-0517
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RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INHALATION

Constituents of Concern	Exposure Concentration: 1) Source Medium — Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor — On-site (0 ft) Residential	Off-site 1 (0 ft) #VALUE!	Off-site 2 (0 ft) #VALUE!	3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2) — On-site (0 ft) Residential	Off-site 1 (0 ft) #VALUE!	Off-site 2 (0 ft) #VALUE!
Benzene*	2.0E-2	NA					
Toluene	4.5E-3	NA					
Ethylbenzene	6.1E-3	NA					
Xylene (mixed isomers)	6.5E-3	NA					
Methyl t-Butyl ether	2.4E-2	NA					
TPH - Arom >C08-C10	7.3E-1	NA					

NOTE: NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Chevron SS No. 9-0517
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Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

GROUNDWATER: VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)			5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4)		
	On-site (0 ft) Residential	Off-site 1 (0 ft) #VALUE!	Off-site 2 (0 ft) #VALUE!	On-site (0 ft) Residential	Off-site 1 (0 ft) #VALUE!	Off-site 2 (0 ft) #VALUE!
Benzene*	4.1E-1					
Toluene	9.6E-1					
Ethylbenzene	9.6E-1					
Xylene (mixed isomers)	9.6E-1					
Methyl t-Butyl ether	9.6E-1					
TPH - Arom >C08-C10	9.6E-1					

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr)

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m^3)

(Sum average exposure concentrations from soil and groundwater routes.)

Constituents of Concern	On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (0 ft) #VALUE!	Off-site 2 (0 ft) #VALUE!
Benzene*	7.3E-8			
Toluene	1.6E-7			
Ethylbenzene	4.2E-7			
Xylene (mixed isomers)	4.1E-7			
Methyl t-Butyl ether	6.3E-8			
TPH - Arom >C08-C10	5.5E-5			

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RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m^3) On-site (0 ft) Residential	(2) Total Carcinogenic Exposure (mg/m^3) On-site (0 ft) Construction Worker	(2) Total Carcinogenic Exposure (mg/m^3) Off-site 1 (0 ft)	(2) Total Carcinogenic Exposure (mg/m^3) Off-site 2 (0 ft)	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 On-site (0 ft) Residential	(4) Individual COC Risk (2) x (3) x 1000 On-site (0 ft) Construction Worker	(4) Individual COC Risk (2) x (3) x 1000 Off-site 1 (0 ft)	(4) Individual COC Risk (2) x (3) x 1000 Off-site 2 (0 ft)
				#VALUE!	#VALUE!				#VALUE!	#VALUE!
Benzene*	A	7.3E-8				8.3E-6	6.1E-10			
Toluene	D									
Ethylbenzene	D									
Xylene (mixed isomers)	D									
Methyl t-Butyl ether	-									
TPH - Arom >C08-C10	D									
Total Pathway Carcinogenic Risk =							**6.1E-10**			

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA

Completed By: J. Douglas
Date Completed: 20-Nov-01

Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

TOXIC EFFECTS

Constituents of Concern	(5) Total Toxicant Exposure (mg/m^3) On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (0 ft)	Off-site 2 (0 ft)	(6) Inhalation Reference Conc. (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6) On-site (0 ft) Residential	On-site (0 ft) Construction Worker	Off-site 1 (0 ft)	Off-site 2 (0 ft)
			#VALUE!	#VALUE!				#VALUE!	#VALUE!
Benzene*	1.7E-7				6.0E-3	2.9E-5			
Toluene	1.6E-7				4.0E-1	3.9E-7			
Ethylbenzene	4.2E-7				1.0E+0	4.2E-7			
Xylene (mixed isomers)	4.1E-7				7.0E+0	5.9E-8			
Methyl t-Butyl ether	6.3E-8				3.0E+0	2.1E-8			
TPH - Arom >C08-C10	5.5E-5				2.0E-1	2.7E-4			
Total Pathway Hazard Index =						**3.0E-4**			

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA

Completed By: J. Douglas
Date Completed: 20-Nov-01

Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (5.5 - 7 ft): VAPOR INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	1) Source Medium Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor Residential	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Residential	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Residential	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Residential
Benzene*	3.4E-2	2.6E+3	1.3E-5	4.1E-1	5.5E-6
Toluene	3.1E-2	5.3E+3	5.9E-6	9.6E-1	5.6E-6
Ethylbenzene	1.8E-1	1.3E+4	1.4E-5	9.6E-1	1.4E-5
Xylene (mixed isomers)	1.4E-1	9.9E+3	1.4E-5	9.6E-1	1.3E-5
Methyl t-Butyl ether	1.3E-2	5.8E+3	2.2E-6	9.6E-1	2.1E-6
TPH - Arom >C08-C10	5.2E+1	2.8E+4	1.8E-3	9.6E-1	1.8E-3

* = Chemical with user-specified data

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	Exposure Concentration 1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor Residential	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) Residential	4) Exposure Multiplier (EFxED)/(ATx365) (unitless) Residential	5) Average Inhalation Exposure Concentration (mg/m^3) (3) X (4) Residential
Benzene*	2.0E-2	NA		4.1E-1	
Toluene	4.5E-3	NA		9.6E-1	
Ethylbenzene	6.1E-3	NA		9.6E-1	
Xylene (mixed isomers)	6.5E-3	NA		9.6E-1	
Methyl t-Butyl ether	2.4E-2	NA		9.6E-1	
TPH - Arom >C08-C10	7.3E-1	NA		9.6E-1	

NOTE: AT = Averaging time (days) EF = Exposure frequency (days/yr) ED = Exposure duration (yr) NAF = Natural attenuation factor POE = Point of exposure

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

Constituents of Concern	TOTAL PATHWAY EXPOSURE (mg/m^3) *(Sum average expsosure concentrations from soil and groundwater routes.)* Residential
Benzene*	5.5E-6
Toluene	5.6E-6
Ethylbenzene	1.4E-5
Xylene (mixed isomers)	1.3E-5
Methyl t-Butyl ether	2.1E-6
TPH - Arom >C08-C10	1.8E-3

Site Name: Former Chevron SS No. 9-0517 Date Completed: 20-Nov-01
Site Location: 3900 Piedmont Ave. Oakland, CA Job ID: DG90517G.3C99
Completed By: J. Douglas

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

Constituents of Concern	(1) EPA Carcinogenic Classification	CARCINOGENIC RISK (2) Total Carcinogenic Exposure (mg/m^3) Residential	(3) Inhalation Unit Risk Factor (µg/m^3)^-1	(4) Individual COC Risk (2) x (3) x 1000 Residential
Benzene*	A	5.5E-6	8.3E-6	4.6E-8
Toluene	D			
Ethylbenzene	D			
Xylene (mixed isomers)	D			
Methyl t-Butyl ether	-			
TPH - Arom >C08-C10	D			

Total Pathway Carcinogenic Risk = **4.6E-8**

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

	TOXIC EFFECTS		
	(5) Total Toxicant Exposure (mg/m^3)	(6) Inhalation Reference Concentration (mg/m^3)	(7) Individual COC Hazard Quotient (5) / (6)
Constituents of Concern	Residential		Residential
Benzene*	1.3E-5	6.0E-3	2.2E-3
Toluene	5.6E-6	4.0E-1	1.4E-5
Ethylbenzene	1.4E-5	1.0E+0	1.4E-5
Xylene (mixed isomers)	1.3E-5	7.0E+0	1.9E-6
Methyl t-Butyl ether	2.1E-6	3.0E+0	6.9E-7
TPH - Arom >C08-C10	1.8E-3	2.0E-1	8.8E-3

Total Pathway Hazard Index = **1.1E-2**

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

Site Name: Former Chevron SS No. 9-0517 Site Location: 3900 Piedmont Ave. Oakland Completed By: J. Douglas Date Completed: 20-Nov-01 *1 OF 1*

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SOIL EXPOSURE PATHWAY ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SURFACE SOILS OR SEDIMENTS: ON-SITE INGESTION AND DERMAL CONTACT

Constituents of Concern	1) Source/Exposure Medium	2) Exposure Multiplier (IR+SAxMxRAF)xEFxED/(BWxAT) (kg/kg/day)		3) Average Daily Intake Rate (mg/kg/day) (1) x (2)	
	Surface Soil Conc. (mg/kg)	Residential	Construction Worker	Residential	Construction Worker
Benzene*	3.4E-2	1.8E-5	4.2E-7	6.0E-7	1.4E-8
Toluene	3.1E-2	4.1E-5	2.9E-5	1.3E-6	9.0E-7
Ethylbenzene	1.8E-1	4.1E-5	2.9E-5	7.5E-6	5.3E-6
Xylene (mixed isomers)	1.4E-1	4.1E-5	2.9E-5	5.6E-6	4.0E-6
Methyl t-Butyl ether	1.3E-2	4.1E-5	2.9E-5	5.1E-7	3.6E-7
TPH - Arom >C08-C10	5.2E+1	4.1E-5	2.9E-5	2.2E-3	1.5E-3

NOTE: RAF = Relative absorption factor (-) AT = Averaging time (days) ED = Exposure duration (yrs) IR = Soil ingestion rate (mg/day)
M = Adherence factor (mg/cm^2) BW = Body weight (kg) EF = Exposure frequencey (days/yr) SA = Skin exposure area (cm^2/day)

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

SOIL EXPOSURE PATHWAY ■ (CHECKED IF PATHWAY IS ACTIVE)

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Intake Rate (mg/kg/day) Residential (a) via Ingestion	Residential (b) via Dermal Contact	Construction Worker (c) via Ingestion	Construction Worker (d) via Dermal Contact	(3) Slope Factor (mg/kg/day)^-1 (a) Oral	(3) Slope Factor (mg/kg/day)^-1 (b) Dermal	(4) Individual COC Risk (2a)x(3a) + (2b)x(3b) Residential	(4) Individual COC Risk (2c)x(3a) + (2d)x(3b) Construction Worker
Benzene*	A	2.0E-8	5.8E-7	3.4E-10	1.4E-8	1.0E-1	3.0E-2	1.9E-8	4.5E-10
Toluene	D								
Ethylbenzene	D								
Xylene (mixed isomers)	D								
Methyl t-Butyl ether	-								
TPH - Arom >C08-C10	D								

* No dermal slope factor available--oral slope factor used.

Total Pathway Carcinogenic Risk = **1.9E-8** **4.5E-10**

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

SOIL EXPOSURE PATHWAY ■ (CHECKED IF PATHWAY IS ACTIVE)

TOXIC EFFECTS

Constituents of Concern	(5) Total Toxicant Intake Rate (mg/kg/day)				(6) Oral Reference Dose (mg/kg-day)		(7) Individual COC Hazard Quotient	
	(a) via Ingestion	(b) via Dermal Contact	(c) via Ingestion	(d) via Dermal Contact	(a) Oral	(b) Dermal	(5a)/(6a) + (5b)/(6b)	(5c)/(6a) + (5d)/(6b)
	Residential		Construction Worker				Residential	Construction Worker
Benzene*	4.7E-8	1.4E-6	2.4E-8	9.7E-7	3.0E-3	3.0E-3*	4.7E-4	3.3E-4
Toluene	4.2E-8	1.2E-6	2.2E-8	8.8E-7	2.0E-1	1.6E-1	7.9E-6	5.6E-6
Ethylbenzene	2.5E-7	7.2E-6	1.3E-7	5.2E-6	1.0E-1	9.7E-2	7.7E-5	5.4E-5
Xylene (mixed isomers)	1.9E-7	5.4E-6	9.6E-8	3.9E-6	2.0E+0	1.8E+0	3.0E-6	2.2E-6
Methyl t-Butyl ether	1.7E-8	5.0E-7	8.8E-9	3.5E-7	1.0E-2	8.0E-3	6.4E-5	4.5E-5
TPH - Arom >C08-C10	7.2E-5	2.1E-3	3.7E-5	1.5E-3	4.0E-2	4.0E-2*	5.4E-2	3.8E-2

* No dermal reference dose available--oral reference dose used.

Total Pathway Hazard Index = **5.4E-2** | **3.8E-2**

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA
Completed By: J. Douglas

Date Completed: 20-Nov-01
Job ID: DG90517G.3C99

RBCA SITE ASSESSMENT | **Baseline Risk Summary-All Pathways**

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA

Completed By: J. Douglas
Date Completed: 20-Nov-01

TIER 2 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	6.1E-10	1.0E-6	6.1E-10	1.0E-5	☐	2.7E-4	1.0E+0	3.0E-4	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	4.6E-8	1.0E-6	4.6E-8	1.0E-5	☐	8.8E-3	1.0E+0	1.1E-2	1.0E+0	☐
SOIL EXPOSURE PATHWAYS										
Complete:	1.9E-8	1.0E-6	1.9E-8	1.0E-5	☐	5.4E-2	1.0E+0	5.4E-2	1.0E+0	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	4.6E-8	***1.0E-6***	***4.6E-8***	***1.0E-5***	☐	***5.4E-2***	***1.0E+0***	***5.4E-2***	***1.0E+0***	☐
	Indoor Air		***Indoor Air***			***Soil***		***Soil***		

RBCA SITE ASSESSMENT | TPH Criteria SSTL Worksheet

Site Name: Former Chevron SS No. 9-0517 | Completed By: J. Douglas | Job ID: DG90517G.3C99

Site Location: 3900 Piedmont Ave. Oakland, CA | Date Completed: 20-Nov-01

CALCULATION OF SSTL VALUES FOR TPH

CONSTITUENTS OF CONCERN		Mass Fractions		Representative Concentrations		Calculated Concentration Limits		Applicable SSTL Values	
		Soil	Groundwater	Soil	Groundwater	Residual Soil Concentration	Solubility	Soils (5.5 - 7 ft)	Groundwater
CAS No.	Name	(-)	(-)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)
0-00-0	TPH - Arom >C08-C10	1.0E+0	1.0E+0	5.2E+1	7.3E-1	1.5E+4	6.5E+1	9.7E+2	#NUM!
Total		1.0E+0	1.0E+0	5.2E+1	7.3E-1				

* = Chemical with user-specified data

Total TPH SSTL value 9.7E+2 | >Sol

">" indicates risk-based target concentration greater than constituent residual saturation value. NC = Not calculated.

RBCA SITE ASSESSMENT

Site Name: Former Chevron SS No. 9-0517
Site Location: 3900 Piedmont Ave. Oakland, CA

Completed By: J. Douglas
Date Completed: 20-Nov-01

Job ID: DG90517G.3C99

SOIL (5.5 - 7 ft) SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option:

SSTL Results For Complete Exposure Pathways ("X" If Complete)

				Soil Leaching to Groundwater Ingestion / Discharge to Surface Water			X	Soil Vol. to Indoor Air	X	Soil Volatilization and Surface Soil Particulates to Outdoor Air				X	Surface Soil Inhalation, Ingestion,Dermal Contact		Applicable SSTL	SSTL Exceeded ?	Required CRF
CONSTITUENTS OF CONCERN		Representative Concentration	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)				On-site (0 ft)				Only if "yes" left
CAS No.	Name	(mg/kg)	None	None	None	Residential	Residential	Construction Worker	#VALUE!	#VALUE!				Residential	Construction Worker	(mg/kg)	"If" If yes	
71-43-2	Benzene*	3.4E-2	NA	NA	NA	7.5E-1	5.6E+1	>1.6E+4	NA	NA				1.8E+0	7.6E+1	7.5E-1	☐	<1
108-88-3	Toluene	3.1E-2	NA	NA	NA	2.2E+3	>1.0E+4	>1.0E+4	NA	NA				3.9E+3	5.5E+3	2.2E+3	☐	<1
100-41-4	Ethylbenzene	1.8E-1	NA	NA	NA	>9.2E+3	>9.2E+3	>9.2E+3	NA	NA				2.4E+3	3.3E+3	2.4E+3	☐	<1
1330-20-7	Xylene (mixed isomers)	1.4E-1	NA	NA	NA	>7.2E+3	>7.2E+3	>7.2E+3	NA	NA				4.5E+4	6.3E+4	4.5E+4	☐	<1
1634-04-4	Methyl t-Butyl ether	1.3E-2	NA	NA	NA	1.8E+4	>9.2E+4	>9.2E+4	NA	NA				2.0E+2	2.8E+2	2.0E+2	☐	<1
0-00-0	TPH - Arom >C08-C10	5.2E+1	NA	NA	NA	5.9E+3	>1.5E+4	>1.5E+4	NA	NA				9.7E+2	1.4E+3	9.7E+2	☐	<1

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent residual saturation value. NA = Not applicable. NC = Not calculated.

RBCA SITE ASSESSMENT

Site Name: Former Chevron SS No. 9-0517 | Completed By: J. Douglas | Job ID: DG90517G.3C99

Site Location: 3900 Piedmont Ave. Oakland, CA | Date Completed: 20-Nov-01

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option:

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

CONSTITUENTS OF CONCERN		Representative Concentration	Groundwater Ingestion / Discharge to Surface Water			X GW Vol. to Indoor Air	X Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)			Only if "yes" left
CAS No.	Name	(mg/L)	None	None	None	Residential	Residential	#VALUE!	#VALUE!	(mg/L)	"#" if yes	
71-43-2	Benzene*	2.0E-2	NA	NA	NA	#NUM!	#NUM!	NA	NA	#NUM!	☐	NA
108-88-3	Toluene	4.5E-3	NA	NA	NA	#NUM!	#NUM!	NA	NA	#NUM!	☐	NA
100-41-4	Ethylbenzene	6.1E-3	NA	NA	NA	#NUM!	#NUM!	NA	NA	#NUM!	☐	NA
1330-20-7	Xylene (mixed isomers)	6.5E-3	NA	NA	NA	#NUM!	#NUM!	NA	NA	#NUM!	☐	NA
1634-04-4	Methyl t-Butyl ether	2.4E-2	NA	NA	NA	#NUM!	#NUM!	NA	NA	#NUM!	☐	NA
0-00-0	TPH - Arom >C08-C10	7.3E-1	NA	NA	NA	#NUM!	#NUM!	NA	NA	#NUM!	☐	NA

* = Chemical with user-specified data

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.