

RO-2437



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July 12, 2002

Ms. Eva Chu
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Subject: *2nd Revised Risk-Based Corrective Action Evaluation*
Former Chevron Service Station No. 21-0208
6006 International Boulevard
Oakland, California
DG20208H.3C01

JUL 15 2002

Ms. Chu:

At the request of Chevron Products Company (Chevron), Delta Environmental Consultants, Inc. network associate Gettler-Ryan Inc. (GR) is submitting this report to document the results of implementation of the Risk-Based Corrective Action (RBCA) planning process, as described in ASTM E2081-00 "Standard Guide for Risk-Based Corrective Action". This revised version of the RBCA was prepared in response and in accordance with Ms. Eva Chu's (Alameda County Health Care Services Agency, or ACHCSA) electronic mail to GR, dated July 3, 2002. This Tier 2 RBCA was conducted with site-specific data from the former Chevron service station located at 6006 International Boulevard in Oakland, California. This RBCA was prepared to evaluate a residential use scenario. The site is currently developed and utilized for residential housing. The purpose of this work was to evaluate whether the residual hydrocarbons in the site soil and groundwater pose a risk to human health. This report describes site conditions and the RBCA model results for the site (Groundwater Services, Inc. RBCA Toolkit for Chemical Releases, version 1.3a). Two separate scenarios for the presence of groundwater were evaluated, where groundwater occurs at 6.5 and 10 feet below ground surface (bgs).

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 evaluation and/or active remediation is warranted. RBSL values are derived from standard exposure equations and reasonable maximum exposure (RME) estimates per U.S. EPA guidelines. 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 defined 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 risk "hot spots". Tier 2 analysis evaluates baseline risks both on and offsite, utilizing site specific soil, groundwater and air parameters. Additionally, Tier 2 analyses allow the use of transport models in calculating risks and cleanup standards related to offsite receptors, and utilizes 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 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 the groundwater ingestion pathway is considered incomplete. However, an industrial well is located approximately 1,700 feet southwest of the site and GR evaluated the groundwater exposure pathway related to the presence of a sensitive receptor. The following complete risk pathways were evaluated: subsurface soil and groundwater volatilization to indoor and outdoor air inhalation; and, ingestion and dermal contact from groundwater.

Where available, site specific physical data were used in this RBCA evaluation. Site specific parameters included maximum concentrations of Total Petroleum Hydrocarbons as gasoline and diesel (TPHg and TPHd), benzene, toluene, ethylbenzene, and xylenes (BTEX), and methyl tert-butyl ether (MtBE) in both soil and groundwater, depth of affected soil (6.5 and 10 ft), pH (7.67), hydraulic conductivity (0.0019 cm/d), average groundwater gradient (0.0016 ft/ft), and thickness of affected subsurface soils (6.5 and 10 ft). Also utilized were the physical parameters of the building in the southeastern portion of the site (source area), including foundation area (2822 ft²), foundation perimeter (270 ft), building volume/area ratio (28 ft), and building air exchange rate (0.000654 1/s) (H&M Mechanical Group). The first depth to groundwater value utilized (6.5 ft) was calculated as an average of the depth to water measurements collected by Delta from the temporary wells on February 27 and March 27, 2002. The second depth to groundwater value utilized (10 ft) was selected by the ACHCSA. Where appropriate and consistent with site conditions, default values were used.

Previously, GR had performed the RBCA evaluation utilizing physical soil parameters analyzed from Geoprobe soil samples collected in the saturated zone (sand). The use of sampling methods for collecting undisturbed soil samples is explained in ASTM Standards D6169-98 "Standard Guide for Selection of Soil and Rock Sampling Devices used With Drill Rigs for Environmental Investigations", and D1587-00 "Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes". Both ASTM standards indicate that the use of thick-walled, ring-lined, split barrel, drive samplers result in disturbed samples not suitable for density, porosity, and other physical parameter analyses.

Since the physical parameters utilized in previous RBCA evaluations at the site appeared to be spurious, and that the primary exposure pathway of concern at the site is indoor air inhalation, the ASTM default vadose zone soil type (sandy clay) was selected for this revised RBCA. This soil type is based upon sieve analyses performed on the shallow soil samples collected on July 17, 2001. The sieve analyses performed are not affected by the sample collection method.

The COC were evaluated at the maximum reported concentrations from soil sample B-4 at 9.5 feet bgs, and the grab groundwater and temporary monitoring well samples from the site. Also utilized was the California adjusted oral slope factor for benzene (0.1) for this RBCA analysis. TPHg were evaluated by inputting the reported TPHg values from soil and groundwater into the aromatic fraction C08-C10. TPHd (weathered) were evaluated by dividing the total amount of TPHd into the following fractions for input: 20% C12-C16 aliphatic; 55% C16-C21 aliphatic; 15% C16-C21 aromatic; and 10% C21-C35 aromatic (Total Petroleum Hydrocarbon Criteria Working Group Series, Volume 5, June 1999).

Results of RBCA Analysis

Shallow Groundwater Scenario (6.5 feet bgs)

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: 1) outdoor and indoor air exposures with cumulative risk factors of $6.0E-9$ and $6.8E-7$; and 2) groundwater ingestion with a cumulative risk factor of $3.5E-105$ (Appendix A, Tier 2 Baseline Risk Summary Table). Using the residential risk factor of $1.0E-6$ and site conditions, the SSTLs for BTEX, MtBE, TPHg and TPHd were determined to be below established Tier 2 SSTLs (Appendix A, SSTL Values) for all pathways evaluated. Pertinent input and output data including site specific parameters used in the analysis are presented in Appendix A.

Deeper Groundwater Scenario (10 feet bgs)

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: 1) outdoor and indoor air exposures with cumulative risk factors of $2.9E-9$ and $6.7E-7$; and 2) groundwater ingestion with a cumulative risk factor of $3.5E-105$ (Appendix B, Tier 2 Baseline Risk Summary Table). Using the residential risk factor of $1.0E-6$ and site conditions, the SSTLs for BTEX, MtBE, TPHg and TPHd were determined to be below established Tier 2 SSTLs (Appendix B, SSTL Values) for all pathways evaluated. Pertinent input and output data including site specific parameters used in the analysis are presented in Appendix B.

Conclusions And Recommendations

GR performed the RBCA evaluation for the assessment and response to petroleum hydrocarbons in the subsurface soil and groundwater beneath the subject site. A Tier 2 evaluation was performed utilizing available site specific data. The results of these analyses confirm that current site conditions do not exceed the calculated Tier 2 SSTLs specific to the site (Appendixes A and B). Since a service station is no longer present at the site, it is anticipated that dissolved concentrations of petroleum hydrocarbons will continue to attenuate over time, thereby also lowering the associated risk over time.

According to the RBCA decision making process, no further work is warranted to protect against human exposure via the exposure pathways evaluated. Since the groundwater beneath the site is neither

Ms. Eva Chu
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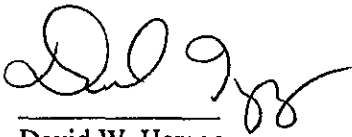
currently utilized nor expected to be utilized in the future for drinking water purposes, and the fact that the site is currently developed for residential use, GR is of the opinion that no further work is warranted at the site. Based on the RBCA program and findings presented in this report, and that the groundwater beneath and in the vicinity of the site is not used for drinking water purposes, it is GR's opinion that 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.

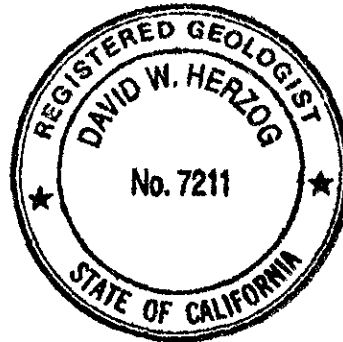
DELTA ENVIRONMENTAL CONSULTANTS, INC.
Network Associate **GETTLER-RYAN INC.**



Jed A. Douglas
Senior Geologist



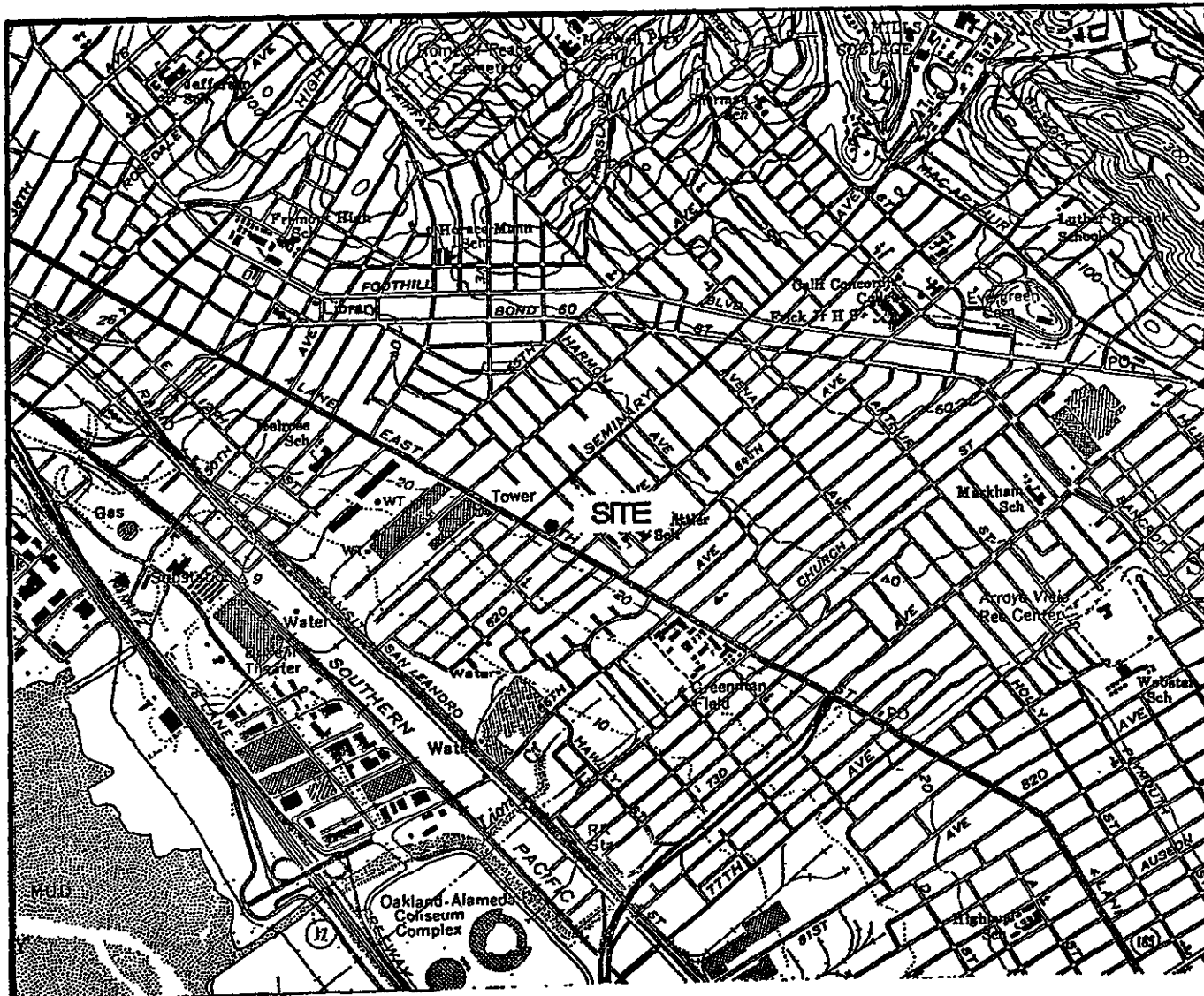
David W. Herzog
Senior Geologist
R.G. 7211



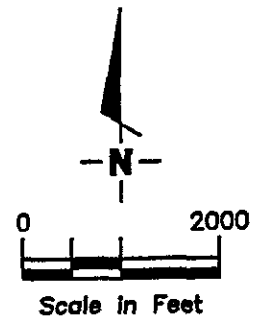
Attachments: Figure 1. Site Location Map
 Figure 2. Site Plan
 Appendix A. Tier 2 RBCA Input/Output Data Shallow (6.5 feet bgs) Groundwater Scenario
 Appendix B. Tier 2 RBCA Input/Output Data Deeper (10 feet bgs) Groundwater Scenario

Cc: Ms. Karen Streich, Chevron Products Company, P.O. Box 6004, San Ramon, CA 94583
 Mr. Mike Berrington, Delta Environmental Consultants, Inc.

FIGURES



Source: USGS Quad Map



Gettler - Ryan Inc.

1384 North McDowell Boulevard Suite B2
 Petaluma, CA 94954 (707) 789-3255

VICINITY MAP
 Former Chevron Service Station #21-0208
 6006 International Blvd.
 Oakland, California

FIGURE

1

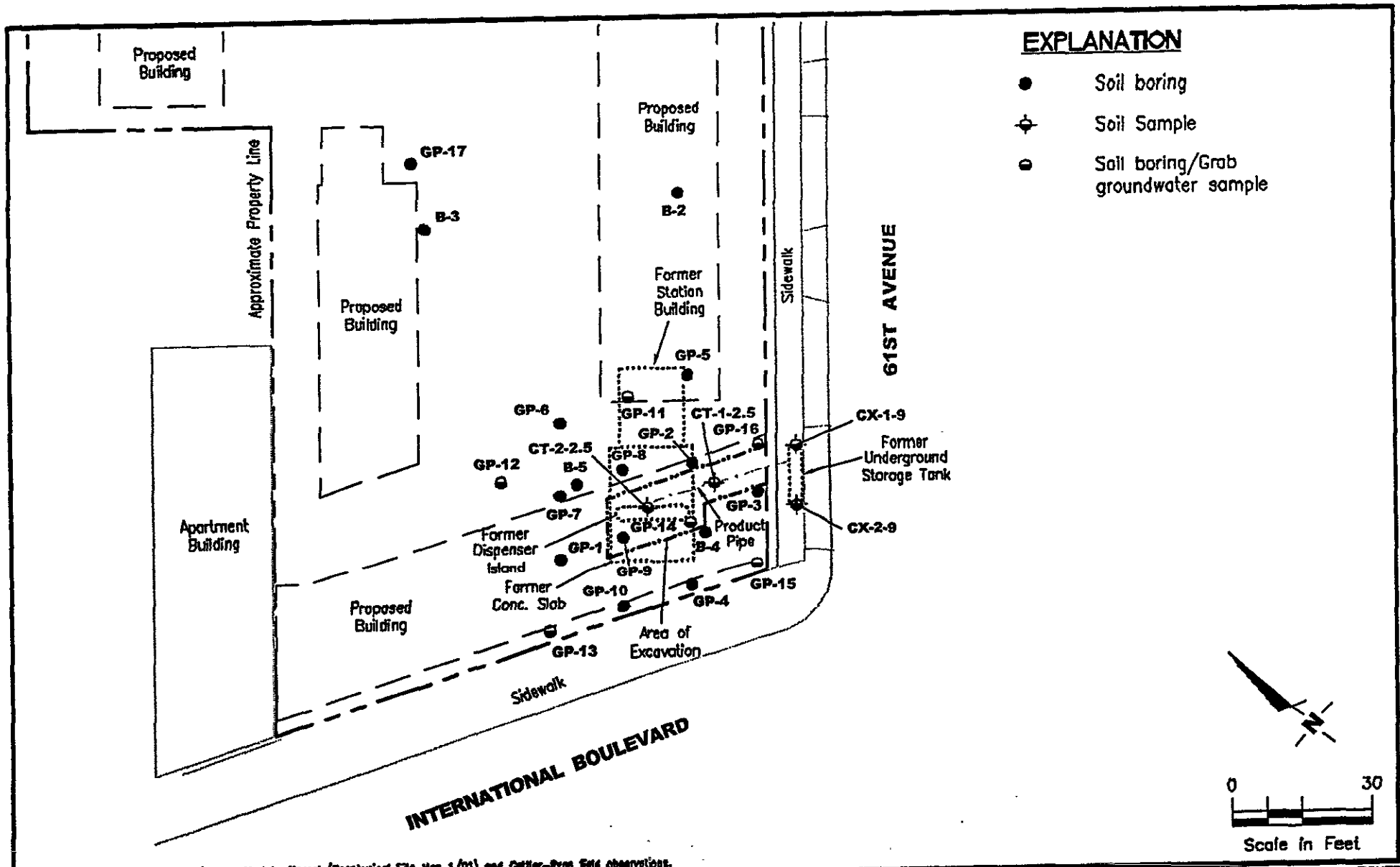
JOB NUMBER
 DG20208C.4C01

REVIEWED BY

DATE
 6/01

REVISED DATE

FILE NAME: E:\Enviro\Chevron\401-210208.dwg | Layout Tab: Vic Map



Source: Figure modified from drawing provided by Norcost (Geophysical Site Map 1/01) and Gettler-Ryan field observations.

FIGURE

GETTLER - RYAN INC.
 8747 Sierra Ct., Suite J
 Dublin, CA 94568 (925) 551-7555

SOIL BORING LOCATION MAP
 Former Chevron Service Station No. 21-0208
 6006 International Boulevard
 Oakland, California

2

PROJECT NUMBER
 DG20208G.4C01

REVIEWED BY

DATE
 8/01

REVISED DATE

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APPENDIX A

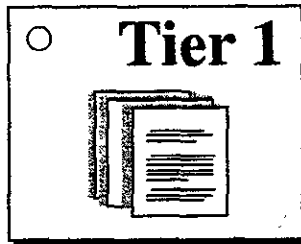
Main Screen

RBCA Tool Kit for Chemical Releases
Version 1.3a © 2000

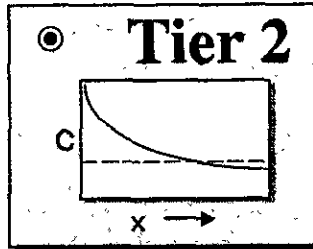
1. Project Information

Site Name:	Former Chevron Service Station No. 21-0208		
Location:	6006 International Blvd., Oakland, CA		
Compl. By:	J. Douglas		
Date:	8-Jul-02	Job ID:	DG20208H.3C01

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 ?

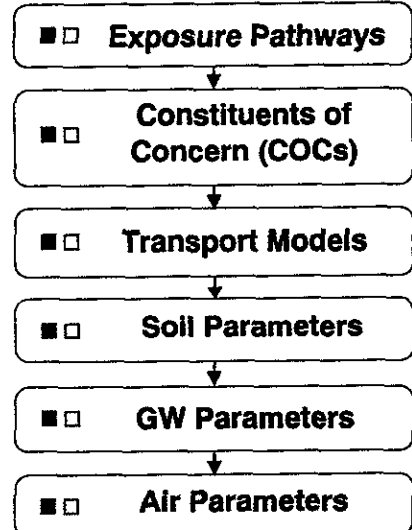
Affects which input data are required

- Baseline Risks (Forward mode)**
- RBCA Cleanup Standards (Backward mode)**

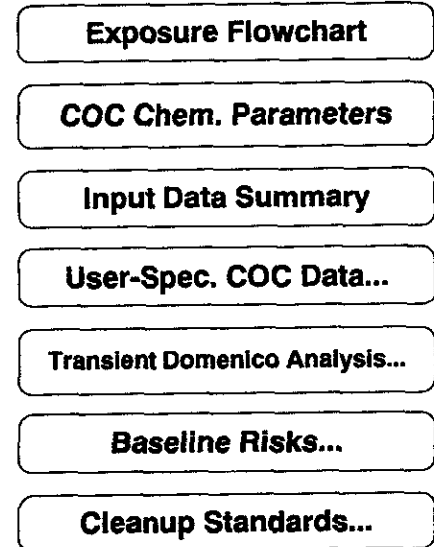
4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (= yes, = no)



Review Output



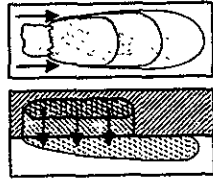
5. Commands and Options

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

Shallow
water
6-5 ft

Exposure Pathway Identification

1. Groundwater Exposure (?)



**Groundwater Ingestion/
Surface Water Impact**

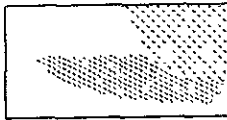
Receptor: None ▼ Com. ▼ None ▼
 Type: On-site Off-site1 Off-site2

Source Media:

- Affected Groundwater
- Affected Soils Leaching to Groundwater

Distance to GW receptors

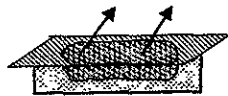
	1700	(ft)
On-site	Off-site1	Off-site2
		(ft)



-
-
-

Enter ALP Criteria

2. Surface Soil Exposure (?)



**Direct Ingestion
and Dermal Contact**

Receptor: None ▼
 Type: On-site
 No off-site receptors

Site Name: Former Chevron Service Station No. 21-0208

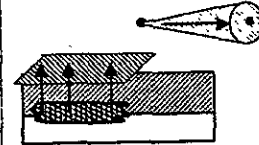
Location: 6006 International Blvd., Oakland, CA

Compl. By: J. Douglas

Job ID: DG20208H.3C01

Date: 8-Jul-02

3. Air Exposure (?)



**Volatilization and Particulates
to Outdoor Air Inhalation**

Receptor: Res. ▼ None ▼ None ▼
 Type: On-site Off-site1 Off-site2
 0 (ft)

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**

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

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

4. Commands and Options

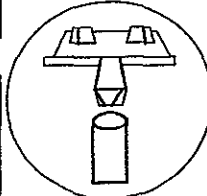
Exposure Factors & Target Risks
 Exposure Flowchart

Exposure Factors and Target Risk Limits

Site Name: Former Chevron Service Station No. 21-0208
 Location: 6006 International Blvd., Oakland, CA
 Compl. By: J. Douglas
 Job ID: DG20208H.3C01 Date: 8-Jul-02

1. Exposure Parameters

Age Adjustment?	Residential		Commercial	
	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)	<input type="checkbox"/> 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)	<input type="checkbox"/> 100	200	50	100
Swimming exposure time (hr/event)	3			
Swimming event frequency (events/yr)	12	12 12		
Swimming water ingestion rate (L/hr)	<input type="checkbox"/> 0.05	0.5		
Skin surface area, swimming (cm ²)	<input type="checkbox"/> 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](#)

Site Name: Former Chevron Service Station No. 21-0: Job ID: DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

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

Benzene*
 Toluene
 Ethylbenzene
 Xylene (mixed isomers)
 Methyl t-Butyl ether
 TPH - Arom >C08-C10
 TPH - Aliph >C12-C16
 TPH - Aliph >C16-C21
 TPH - Arom >C16-C21
 TPH - Arom >C21-C35

Representative COC Concentration ?

Groundwater Source Zone

Enter Directly

Enter Site Data

(mg/L)

note

1.0E-1	
1.3E-2	
1.8E-1	
5.7E-2	
1.4E-1	
1.3E+1	
1.7E+0	
4.6E+0	
1.3E+0	
8.4E-1	

Soil Source Zone

Calculate

Enter Site Data

(mg/kg)

note

1.9E-1	
5.0E-2	
1.3E+0	
4.5E-1	
4.3E-1	
3.4E+2	
2.2E+1	
6.1E+1	
1.7E+1	
1.1E+1	

* = Chemical with user-specified data

Commands and Options				Site Name: Former Chevron Service Station ID: NDC20208H.3C01			
				Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02			
				Compl. By: J. Douglas			
<input type="button" value="Return"/> <input type="button" value="Print Sheet"/> <input type="button" value="Help"/>							
Groundwater Source Zone Concentration Calculator				UCL Percentile <input type="text" value="95%"/>			
				<input type="button" value="Paste Defaults"/>			
				<input type="button" value="Mean Option"/>			
<i>Constituent</i>	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	10	10	Lognormal	1.0E-1	2.8E-3	9.2E-3
Toluene	5.0E-4	10	10	Lognormal	1.3E-2	1.2E-3	3.1E-3
Ethylbenzene	5.0E-4	10	10	Lognormal	1.8E-1	7.5E-3	2.5E-2
Xylene (mixed isomers)	5.0E-4	10	10	Lognormal	5.7E-2	6.7E-3	1.6E-2
Methyl t-Butyl ether	2.5E-3	10	10	Lognormal	1.4E-1	5.6E-3	1.5E-2
TPH - Arom >C08-C10	5.0E-2	10	10	Lognormal	1.3E+1	1.3E+0	4.0E+0
TPH - Aliph >C12-C16	5.0E-2	6	6	Lognormal	1.7E+0	3.1E-1	7.2E-1
TPH - Aliph >C16-C21	5.0E-2	6	6	Lognormal	4.6E+0	8.4E-1	2.0E+0
TPH - Arom >C16-C21	5.0E-2	6	6	Lognormal	1.3E+0	2.3E-1	5.4E-1
TPH - Arom >C21-C35	5.0E-2	6	6	Lognormal	8.4E-1	1.5E-1	3.6E-1
* = Chemical with user-specified data							

RBCA Tool Kit for Chemical Releases, Version 1.3a

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

Analytical Data

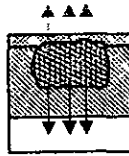
	1	2	3	4	5	6	7	8	9	10	11	12	13
ID	gp11-w	gp14-w	gp15-w	gp16-w	TC-1	TC-1	TC-2	TC-2	TC-3	TC-3			
Date	17-Jul-01	18-Jul-01	18-Jul-01	18-Jul-01	27-Feb-02	27-Mar-02	27-Feb-02	27-Mar-02	27-Feb-02	27-Mar-02			
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
	2.80E-2	1.00E-1	1.25E-2	2.50E-4	2.50E-4	2.50E-4	1.25E-3	4.10E-3	5.00E-3	1.80E-3			
	5.00E-3	1.25E-3	1.25E-2	2.50E-4	2.50E-4	2.50E-4	8.00E-3	2.50E-4	6.80E-3	2.50E-4			
	1.10E-1	1.80E-1	4.30E-2	4.70E-3	2.50E-4	1.20E-3	1.25E-3	3.60E-3	1.30E-2	8.00E-3			
	5.70E-2	2.40E-2	4.80E-2	6.00E-3	7.50E-4	7.50E-4	3.75E-3	5.50E-3	7.50E-3	5.00E-3			
	2.50E-3	1.40E-1	6.00E-2	1.25E-3	1.25E-3	7.00E-3	6.50E-3	1.25E-3	1.25E-2	1.25E-3			
	1.30E+1	8.10E+0	1.10E+1	9.70E-1	2.50E-2	2.10E-1	4.80E-1	8.00E-1	3.10E+0	1.80E+0			
					6.60E-2	2.60E-1	1.68E+0	3.20E-1	2.40E-1	3.80E-1			
					1.82E-1	7.15E-1	4.62E+0	8.80E-1	6.60E-1	1.05E+0			
					4.95E-2	1.95E-1	1.26E+0	2.40E-1	1.80E-1	2.85E-1			
					3.30E-2	1.30E-1	8.40E-1	1.60E-1	1.20E-1	1.90E-1			

Transport Modeling Options

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 (ft)
- User-specified VF from other model



Indoor Air Volatilization Factors ?

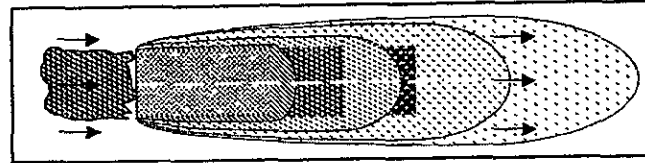
- Johnson & Ettinger model
- User-specified VF from other model
- ?
-



- Off-site 1
- Off-site 2 (-)

Site Name: Former Chevron Service Station No. 1020BG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model ?

- Domenico equation with dispersion only (no biodegradation)
- Domenico equation first-order decay Enter Decay Rates
- Modified Domenico equation using electron acceptor superposition
-

— or —

User-Specified DAF Values

- DAF values from other model or site data

4. Commands and Options

Site Name: Former Chevron Service Station No. 21b0208DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

Commands and Options

Return

Print Sheet

Paste Default Values

Help

Constituent Half-Life Values

<i>Constituent</i>	Saturated Zone		Unsaturated Zone	
	First-Order Decay		First-Order Decay	
	Half-Life <i>(day)</i>	Coefficient <i>(1/day)</i>	Half-Life <i>(day)</i>	Coefficient <i>(1/day)</i>
Benzene*	7.2E+2	9.6E-4	7.2E+2	9.6E-4
Toluene	2.8E+1	2.5E-2	2.8E+1	2.5E-2
Ethylbenzene	2.3E+2	3.0E-3	2.3E+2	3.0E-3
Xylene (mixed isomers)	3.6E+2	1.9E-3	3.6E+2	1.9E-3
Methyl t-Butyl ether	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Arom >C08-C10	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Aliph >C12-C16	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Aliph >C16-C21	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Arom >C16-C21	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Arom >C21-C35	3.6E+2	1.9E-3	1.8E+2	3.9E-3

Site-Specific Soil Parameters

1. Soil Source Zone Characteristics (?)

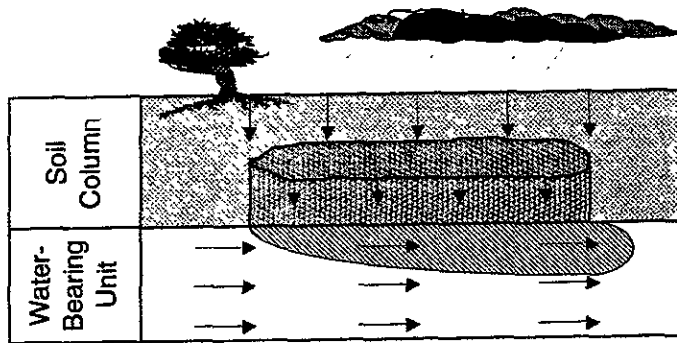
Hydrogeology

General Case Construction

Depth to water-bearing unit	6.5	(ft)
Capillary zone thickness	0.787401575	(ft)
Soil column thickness	5.712598425	(ft)

Affected Soil Zone

Depth to top of affected soils	0	(ft)	
Depth to base of affected soils	10	(ft)	
Affected soil area	100	100	(ft ²)
Length of affected soil parallel to assumed wind direction	10	10	(ft)



Site Name: Former Chevron Service Station No. 21-0308D: DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

2. Surface Soil Column (?)

Vadose Zone Capillary Fringe

Predominant USCS Soil Type

CL: Sandy Clay

or Enter Directly

Total porosity	0.38	(-)	
Volumetric water content	0.31	0.342	(-)
Volumetric air content	0.07	0.038	(-)
Dry bulk density	1.7	(kg/L)	
Vertical hydraulic conductivity	8.6E-2	(cm/d)	
Vapor permeability	1.1E-15	(ft ²)	
Capillary zone thickness	7.9E-1	(ft)	

NA

Partitioning Parameters

Fraction organic carbon	0.01	(-)
Soil/water pH	7.67	(-)

3. Commands and Options

Main Screen

Use Default Values

Print Sheet

Set Units

Help

Site-Specific Groundwater Parameters

1. Water-Bearing Unit (?)

Hydrogeology

Groundwater Darcy velocity	3.0E-6	(cm/d)
Groundwater seepage velocity	8.0E-6	(cm/d)
<i>or</i>	<input type="button" value="Enter Directly"/>	
	↑ <i>or</i>	
Hydraulic conductivity	1.9E-3	(cm/d)
Hydraulic gradient	1.6E-3	(-)
Effective porosity	0.38	(-)

Sorption

Fraction organic carbon--saturated zone	0.001	(-)
Groundwater pH	6.20	(-)

2. Groundwater Source Zone (?)

Groundwater plume width at source	147.6377953	(ft)
Plume (mixing zone) thickness at source	6.56167979	(ft)
<i>or</i>	<input type="button" value="Calculate"/>	
	<i>or</i>	

Site Name: Former Chevron Service Station No. 266008 DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

3. Groundwater Dispersion (?)

Model: GW Ingestion Soil Leaching to GW

Off-site 1

Distance to GW receptors	1700				(ft)
<i>or</i>	<input type="button" value="Enter Directly"/>				
Longitudinal dispersivity	170				(ft)
Transverse dispersivity	56.1				(ft)
Vertical dispersivity	8.5				(ft)

5. Commands and Options

<input type="button" value="Main Screen"/>	<input type="button" value="Use Default Values"/>	<input type="button" value="Print Sheet"/>
<input type="button" value="Set Units"/>		<input type="button" value="Help"/>

Site-Specific Air Parameters

1. Outdoor Air Pathway (?)

or

Air Source Zone

Air mixing zone height (ft)

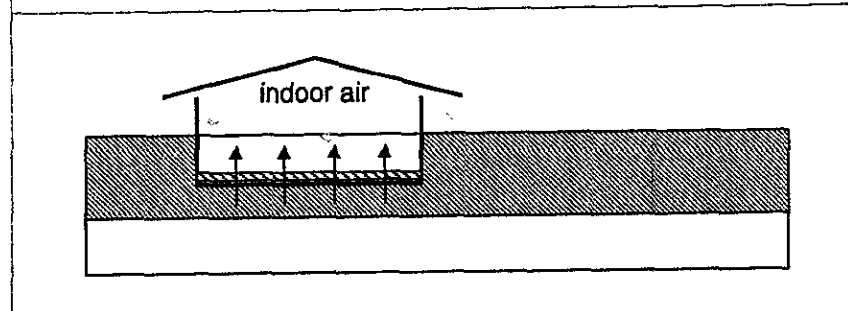
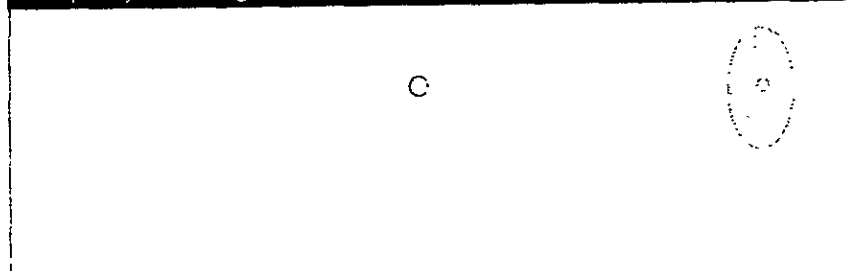
Ambient air velocity in mixing zone (ft/s)

2. Indoor Air Pathway (?)

Building Parameters

	Residential		
Building volume/area ratio	28		(ft)
Foundation area	2822		(ft ²)
Foundation perimeter	270		(ft)
Building air exchange rate	6.5E-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	0.01		(-)
Volumetric water content of cracks	0.12		(-)
Volumetric air content of cracks	0.26		(-)
Indoor/Outdoor differential pressure	0		(g/cm/s ²)

Site Name: Former Chevron Service Station Job ID: 02020208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas



3. Commands and Options

Main Screen

Use Default Values

Print Sheet

Set Units

Help

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

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

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:	6.0E-9	1.0E-6	6.0E-9	1.0E-5	<input type="checkbox"/>	2.3E-2	1.0E+0	3.1E-2	1.0E+0	<input type="checkbox"/>
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	6.8E-7	1.0E-6	6.8E-7	1.0E-5	<input type="checkbox"/>	4.0E-1	1.0E+0	7.0E-1	1.0E+0	<input type="checkbox"/>
SOIL EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	<input type="checkbox"/>	NA	NA	NA	NA	<input type="checkbox"/>
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	3.5E-105	1.0E-6	3.5E-105	1.0E-5	<input type="checkbox"/>	3.2E-100	1.0E+0	4.5E-100	1.0E+0	<input type="checkbox"/>
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	<input type="checkbox"/>	NA	NA	NA	NA	<input type="checkbox"/>
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	6.8E-7	1.0E-6	6.8E-7	1.0E-5	<input type="checkbox"/>	4.0E-1	1.0E+0	7.0E-1	1.0E+0	<input type="checkbox"/>
	<i>Indoor Air</i>		<i>Indoor Air</i>			<i>Indoor Air</i>		<i>Indoor Air</i>		

Exposure Pathway Flowchart

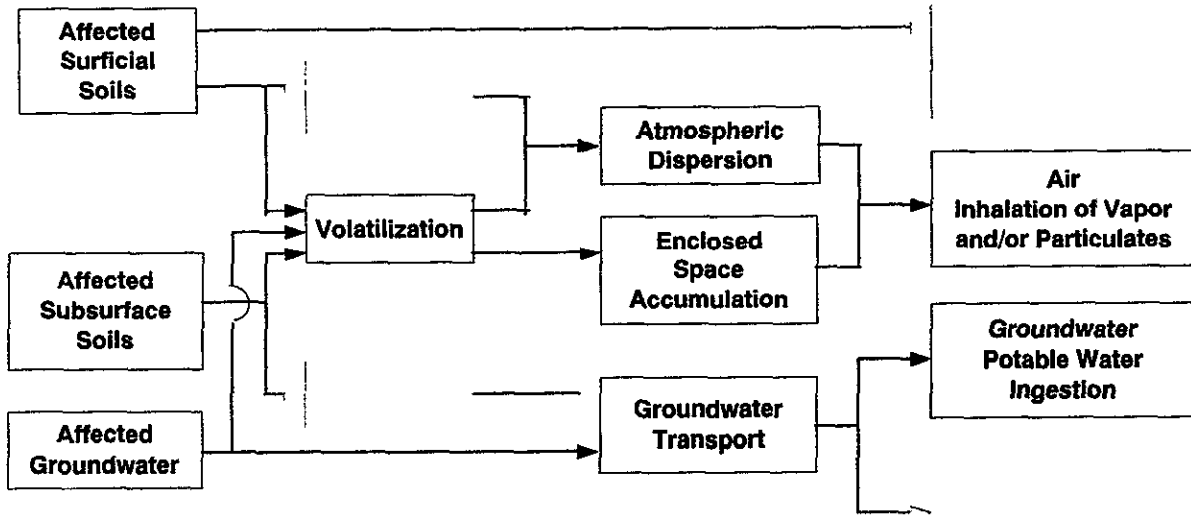
Site Name: Former Chevron Service Station No. J01-10208G20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

Source Media

Transport Mechanisms

Exposure Media

Receptors



	On-site	Off-site1	Off-site2
	None	NA	NA
Outdoor Air: <i>Residential</i>		None	None
Indoor Air: <i>Residential</i>		NA	NA
	None	Commercial	None
	NA	NA	NA



Commands and Options

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole)	ref	Diffusion Coefficients				log (Koc) or log(Kd) (@ 20 - 25 C)		Henry's Law Constant (@ 20 - 25 C)		Vapor Pressure (@ 20 - 25 C)		Solubility (@ 20 - 25 C)		acid pKa	base pKb	ref		
					in air (cm ² /s)	ref	in water (cm ² /s)	ref	log(L/kg) partition	ref	(atm-m ³) mol	(unitless)	ref	(mm Hg)	ref	(mg/L)				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	-	-	-
TPH - Aliph >C12-C16	0-00-0	T	200	T	1.00E-01	T	1.00E-05	T	6.70	Koc	T	1.26E+01	5.21E+02	T	3.65E-02	-	7.60E-04	T	-	-	-
TPH - Aliph >C18-C21	0-00-0	T	270	T	1.00E-01	T	1.00E-05	T	8.80	Koc	T	1.19E+02	4.90E+03	T	8.38E-04	-	2.50E-06	T	-	-	-
TPH - Arom >C16-C21	0-00-0	T	190	T	1.00E-01	T	1.00E-05	T	4.20	Koc	T	3.22E-04	1.33E-02	T	8.36E-04	-	6.50E-01	T	-	-	-
TPH - Arom >C21-C35	0-00-0	T	240	T	1.00E-01	T	1.00E-05	T	5.10	Koc	T	1.60E-05	6.60E-04	T	3.34E-07	-	6.60E-03	T	-	-	-

* = Chemical with user-specified data

Site Name: Former Chevron Service Station No. 21-0208
Site Location: 6006 International Blvd., Oakland, CACompleted By: J. Douglas
Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

CHEMICAL DATA FOR SELECTED COCs **Toxicity Data**

Constituent	Reference Dose (mg/kg/day)				Reference Conc. (mg/m3)				Slope Factors 1/(mg/kg/day)				Unit Risk Factor 1/(µg/m3)		EPA Weight of Evidence	Is Constituent Carcinogenic ?
	Oral		Dermal		Inhalation		Oral		Dermal		Inhalation		ref	PS		
	RfD oral	ref	RfD dermal	ref	RfC Inhal	ref	SF oral	ref	SF dermal	ref	URF Inhal	ref				
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	-	-	-	-	-	-	-	FALSE		
Methyl t-Butyl ether	1.00E-02	31	8.00E-03	TX	3.00E+00	R	-	-	-	-	-	-	D	FALSE		
TPH - Arom >C08-C10	4.00E-02	T	-	-	2.00E-01	T	-	-	-	-	-	-	D	FALSE		
TPH - Aliph >C12-C16	1.00E-01	T	-	-	1.00E+00	T	-	-	-	-	-	-	D	FALSE		
TPH - Aliph >C16-C21	2.00E+00	T	-	-	-	T	-	-	-	-	-	-	D	FALSE		
TPH - Arom >C16-C21	3.00E-02	T	-	-	-	T	-	-	-	-	-	-	D	FALSE		
TPH - Arom >C21-C35	3.00E-02	T	-	-	-	T	-	-	-	-	-	-	D	FALSE		

* = Chemical with user-specific

Site Name: Former Chevron Sei

Site Location: 6006 Internatio

Miscellaneous Chemical Data

Constituent	MCL (mg/L)	Maximum Contaminant Level		Time-Weighted Average Workplace Criteria		Aquatic Life Prot. Criteria		Bioconcentration Factor (L-wat/kg-fish)
			ref	TWA (mg/m3)	ref	AQL (mg/L)	ref	
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
TPH - Aliph >C12-C16	-	-	-	-	-	-	-	1
TPH - Aliph >C16-C21	-	-	-	-	-	-	-	1
TPH - Arom >C16-C21	-	-	-	-	-	-	-	1
TPH - Arom >C21-C35	-	-	-	-	-	-	-	1

* = Chemical with user-specific

Site Name: Former Chevron Ser

Site Location: 6006 Internatio

CHEMICAL DATA FOR SELECTED COCs **Miscellaneous Chemical Data**

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data					Detection Limits				Half Life (First-Order Decay) (days)			
		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 ³ /event)	Groundwater (mg/L)		Soil (mg/kg)		Saturated	Unsaturated	ref	
							ref	ref	ref	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	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH - Arom >C08-C10	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH - Aliph >C12-C16	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH - Aliph >C16-C21	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH - Arom >C16-C21	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH - Arom >C21-C35	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-

* = Chemical with user-specific

Site Name: Former Chevron Sei

Site Location: 6006 Internatio

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Chevron Service Station No 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H3C01

1 OF 1

Exposure Parameters	Residential			Commercial/Industrial	
	Adult (1-lyr)	(1-18)yr		Child	Construct.
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	?
τ Averaging time for vapor flux (yr)	30			25	1
EF Exposure frequency (days/yr)	350			250	180
EF _o 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				
F _{fish} Contaminated fish fraction (unitless)	1				

Surface Parameters	General	Construction	Units
A Source zone area	1.0E+2	NA	(ft ²)
W Length of source-zone area parallel to wind	1.0E+1	NA	(ft)
W _{gw} Length of source-zone area parallel to GW flow	NA	NA	(ft)
U _{air} Ambient air velocity in mixing zone	7.4E+0		(ft/s)
h _{mix} Air mixing zone height	8.6E+0		(ft)
P _a Areal particulate emission rate	NA		(g/cm ² /s)
L _{soil} Thickness of affected surface soils	6.5E+0		(ft)

Surface Soil Column Parameters	Value	Units
h _{cap} Capillary zone thickness	7.9E-1	(ft)
h _v Vadose zone thickness	5.7E+0	(ft)
ρ _s Soil bulk density	1.7E+0	(g/cm ³)
f _{oc} Fraction organic carbon	1.0E-2	(-)
θ _T Soil total porosity	3.8E-1	(-)
K _{vs} Vertical hydraulic conductivity	8.6E-2	(cm/d)
k _v Vapor permeability	1.1E-15	(ft ²)
L _{gw} Depth to groundwater	6.5E+0	(ft)
L _s Depth to top of affected soils	0.0E+0	(ft)
L _{base} Depth to base of affected soils	1.0E+1	(ft)
L _{soil} Thickness of affected soils	1.0E+1	(ft)
pH Soil/groundwater pH	7.7E+0	(-)
θ _v Volumetric water content	0.342	(-)
θ _a Volumetric air content	0.038	(-)

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	Commercial	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	None		
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	Residential	None	None
Volatilization from Groundwater	Residential	None	None
Indoor Air:			
Volatilization from Subsurface Soils	Residential	NA	NA
Volatilization from Groundwater	Residential	NA	NA

Building Parameters	Residential	Commercial	Units
L _b Building volume/area ratio	2.80E+1	NA	(ft)
A _b Foundation area	2.82E+3	NA	(ft ²)
X _{crit} Foundation perimeter	2.70E+2	NA	(ft)
ER Building air exchange rate	6.64E-4	NA	(1/hr)
L _{crit} Foundation thickness	4.92E-1	NA	(ft)
Z _{crit} Depth to bottom of foundation slab	4.92E-1	NA	(ft)
q _f Foundation crack fraction	1.00E-2	NA	(-)
ΔP Indoor/outdoor differential pressure	0.00E+0	NA	(g/cm ² /s)
Q _c Convective air flow through slab	0.00E+0	NA	(ft ³ /s)

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	Units
Groundwater receptor	NA	1700	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Groundwater Parameters	Value	Units
h _{gw} Groundwater mixing zone depth	NA	(ft)
I _g Net groundwater infiltration rate	NA	(in/yr)
U _{gw} Groundwater Darcy velocity	3.0E-6	(cm/d)
V _{gw} Groundwater seepage velocity	8.0E-6	(cm/d)
K _{vs} Saturated hydraulic conductivity	1.9E-3	(cm/d)
i Groundwater gradient	1.6E-3	(-)
S _w Width of groundwater source zone	1.5E+2	(ft)
S _z Depth of groundwater source zone	6.6E+0	(ft)
θ _{sat} Effective porosity in water-bearing unit	3.8E-1	(-)
f _{oc sat} Fraction organic carbon in water-bearing unit	1.0E-3	(-)
pH _{gw} Groundwater pH	6.2E+0	(-)
Biodegradation considered?	1st Order	

Target Health Risk Values	Individual	Cumulative
TR ₁₀₀ 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	Domenico model w/ biodeg.

Transport Parameters	Off-site 1	Off-site 2	Off-site 1	Off-site 2	Units
Lateral Groundwater Transport					
α _z Longitudinal dispersivity	1.7E+2	NA	NA	NA	(ft)
α _y Transverse dispersivity	5.6E+1	NA	NA	NA	(ft)
α _x Vertical dispersivity	8.6E+0	NA	NA	NA	(ft)
Lateral Outdoor Air Transport					
α _y Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
α _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)
h _{pl} Thickness of GW plume at SW discharge	NA	(ft)
DF _{sw} Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

RBCA SITE ASSESSMENT

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 8006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

SOIL (0 - 10 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: Domenico - First Order
 (One-directional vert. dispersion)

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

CONSTITUENTS OF CONCERN		Representative Concentration (mg/kg)	Soil Leaching to Groundwater Ingestion / Discharge to Surface Water				X	Soil Vol. to Indoor Air	X	Soil Volatilization to Outdoor Air				Surface Soil Inhalation, Ingestion, Dermal Contact		Applicable SSTL (mg/kg)	SSTL Exceeded ?	Required CRF Only if "yes" left
			On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)	Residential				On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)	On-site (0 ft)				
										Residential	Construction Worker			None	None			
71-43-2	Benzene*	1.9E-1	NA	NA	NA	3.0E-1	7.9E+1	NA	NA	NA	NA	NA	NA	3.0E-1	<input type="checkbox"/>	<1		
108-88-3	Toluene	5.0E-2	NA	NA	NA	5.4E+2	>7.9E+2	NA	NA	NA	NA	NA	NA	5.4E+2	<input type="checkbox"/>	<1		
100-41-4	Ethylbenzene	1.3E+0	NA	NA	NA	>6.5E+2	>6.5E+2	NA	NA	NA	NA	NA	NA	>6.5E+2	<input type="checkbox"/>	NA		
1330-20-7	Xylene (mixed isomers)	4.5E-1	NA	NA	NA	>5.1E+2	>5.1E+2	NA	NA	NA	NA	NA	NA	>5.1E+2	<input type="checkbox"/>	NA		
1634-04-4	Methyl t-Butyl ether	4.3E-1	NA	NA	NA	5.9E+3	>1.5E+4	NA	NA	NA	NA	NA	NA	5.9E+3	<input type="checkbox"/>	<1		
0-00-0	TPH - Arom >C08-C10	3.4E+2	NA	NA	NA	>1.0E+3	>1.0E+3	NA	NA	NA	NA	NA	NA	>1.0E+3	<input type="checkbox"/>	NA		
0-00-0	TPH - Aliph >C12-C16	2.2E+1	NA	NA	NA	>3.8E+1	>3.8E+1	NA	NA	NA	NA	NA	NA	>3.8E+1	<input type="checkbox"/>	NA		
0-00-0	TPH - Aliph >C16-C21	6.1E+1	NA	NA	NA	NC	NC	NA	NA	NA	NA	NA	NA	NC	<input type="checkbox"/>	NA		
0-00-0	TPH - Arom >C16-C21	1.7E+1	NA	NA	NA	NC	NC	NA	NA	NA	NA	NA	NA	NC	<input type="checkbox"/>	NA		
0-00-0	TPH - Arom >C21-C35	1.1E+1	NA	NA	NA	NC	NC	NA	NA	NA	NA	NA	NA	NC	<input type="checkbox"/>	NA		

* = 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 Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

1 OF 1

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: Domenico - First Order
 (One-directional vert. dispersion)

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

CONSTITUENTS OF CONCERN		Representative Concentration (mg/L)	Groundwater Ingestion			GW Vol. to Indoor Air		Groundwater Volatilization to Outdoor Air			Applicable SSTL (mg/L)	SSTL Exceeded? "■" if yes	Required CRF Only if "yes" left	
			X	On-site (0 ft)	Off-site 1 (1700 ft)	Off-site 2 (0 ft)	X	On-site (0 ft)	On-site (0 ft)	Off-site 1 (0 ft)				Off-site 2 (0 ft)
				None	Commercial	None		Residential	Residential	None				None
71-43-2	Benzene*	1.0E-1	NA	>1.8E+3	NA	2.4E+0	4.0E+1	NA	NA	2.4E+0	<input type="checkbox"/>	<1		
108-88-3	Toluene	1.3E-2	NA	>5.2E+2	NA	>5.2E+2	>5.2E+2	NA	NA	>5.2E+2	<input type="checkbox"/>	NA		
100-41-4	Ethylbenzene	1.8E-1	NA	>1.7E+2	NA	>1.7E+2	>1.7E+2	NA	NA	>1.7E+2	<input type="checkbox"/>	NA		
1330-20-7	Xylene (mixed isomers)	5.7E-2	NA	>2.0E+2	NA	>2.0E+2	>2.0E+2	NA	NA	>2.0E+2	<input type="checkbox"/>	NA		
1634-04-4	Methyl t-Butyl ether	1.4E-1	NA	>4.8E+4	NA	4.0E+4	>4.8E+4	NA	NA	4.0E+4	<input type="checkbox"/>	<1		
0-00-0	TPH - Arom >C08-C10	1.3E+1	NA	>6.5E+1	NA	>6.5E+1	>6.5E+1	NA	NA	>6.5E+1	<input type="checkbox"/>	NA		
0-00-0	TPH - Aliph >C12-C16	1.7E+0	NA	>7.6E-4	NA	>7.6E-4	>7.6E-4	NA	NA	>7.6E-4	<input type="checkbox"/>	NA		
0-00-0	TPH - Aliph >C16-C21	4.6E+0	NA	>2.5E-6	NA	NC	NC	NA	NA	>2.5E-6	<input type="checkbox"/>	NA		
0-00-0	TPH - Arom >C16-C21	1.3E+0	NA	>6.5E-1	NA	NC	NC	NA	NA	>6.5E-1	<input type="checkbox"/>	NA		
0-00-0	TPH - Arom >C21-C35	8.4E-1	NA	>6.6E-3	NA	NC	NC	NA	NA	>6.6E-3	<input type="checkbox"/>	NA		

* = Chemical with user-specified data

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

RBCA SITE ASSESSMENT

TPH Criteria SSTL Worksheet

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

1 OF 1

CALCULATION OF SSTL VALUES FOR TPH

CONSTITUENTS OF CONCERN		Mass Fractions		Representative Concentrations		Calculated Concentration Limits		Applicable SSTL Values	
		Soil (-)	Groundwater (-)	Soil (mg/kg)	Groundwater (mg/L)	Residual Soil Concentration (mg/kg)	Solubility (mg/L)	Soils (0 - 10 ft) (mg/kg)	Groundwater (mg/L)
0-00-0	TPH - Arom >C08-C10	1.0E+0	5.3E-1	3.4E+2	1.3E+1	1.0E+3	6.5E+1	>1.0E+3	>6.5E+1
0-00-0	TPH - Aliph >C12-C16	9.0E-4	9.5E-2	2.2E+1	1.7E+0	3.8E+1	7.6E-4	>3.8E+1	>7.6E-4
0-00-0	TPH - Aliph >C16-C21	2.5E-3	2.6E-1	6.1E+1	4.6E+0	1.6E+1	2.5E-6	NC	>2.5E-6
0-00-0	TPH - Arom >C16-C21	6.8E-4	7.1E-2	1.7E+1	1.3E+0	1.0E+2	6.5E-1	NC	>6.5E-1
0-00-0	TPH - Arom >C21-C35	4.5E-4	4.7E-2	1.1E+1	8.4E-1	8.3E+0	6.6E-3	NC	>6.6E-3
* = Chemical with user-specified data									
Total		1.0E+0	1.0E+0	4.5E+2	2.1E+1	Total TPH SSTL value		>Res	>Sol

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

RBCA SITE ASSESSMENT	Cumulative Risk Worksheet
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Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
		Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene*	1.9E-1	1.0E-1			1.9E-1	1.0E-1
108-88-3	Toluene	5.0E-2	1.3E-2			5.0E-2	1.3E-2
100-41-4	Ethylbenzene	1.3E+0	1.8E-1			1.3E+0	1.8E-1
1330-20-7	Xylene (mixed isomers)	4.5E-1	5.7E-2			4.5E-1	5.7E-2
1634-04-4	Methyl t-Butyl ether	4.3E-1	1.4E-1			4.3E-1	1.4E-1
0-00-0	TPH - Arom >C08-C10	3.4E+2	1.3E+1			3.4E+2	1.3E+1
0-00-0	TPH - Aliph >C12-C16	2.2E+1	1.7E+0			2.2E+1	1.7E+0
0-00-0	TPH - Aliph >C16-C21	6.1E+1	4.6E+0			6.1E+1	4.6E+0
0-00-0	TPH - Arom >C16-C21	1.7E+1	1.3E+0			1.7E+1	1.3E+0
0-00-0	TPH - Arom >C21-C35	1.1E+1	8.4E-1			1.1E+1	8.4E-1

Cumulative Values:

RBCA SITE ASSESSMENT

Cumulative Risk Worksheet

Site Name: Former Chevron Service Station No. 21 Site Name: Former Chevron Service Station No. 21-1 Completed By: J. Douglas
 Site Location: 6006 International Blvd., Oakland, CA Site Location: 6006 International Blvd., Oakland, CA Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:		Indoor Air Exposure:		Soil Exposure:		Groundwater Exposure:	
		Residential		Residential		None		None	
CAS No.	Name	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
		Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene*	6.0E-9	2.8E-4	6.8E-7	3.2E-2				
108-88-3	Toluene		8.3E-7		9.6E-5				
100-41-4	Ethylbenzene		7.1E-6		4.5E-4				
1330-20-7	Xylene (mixed isomers)		3.4E-7		2.7E-5				
1634-04-4	Methyl t-Butyl ether		1.2E-6		7.6E-5				
0-00-0	TPH - Arom >C08-C10		7.9E-3		2.7E-1				
0-00-0	TPH - Aliph >C12-C16		2.3E-2		4.0E-1				
0-00-0	TPH - Aliph >C16-C21								
0-00-0	TPH - Arom >C16-C21								
0-00-0	TPH - Arom >C21-C35								
Cumulative Values:		6.0E-9	3.1E-2	6.8E-7	7.0E-1	0.0E+0	0.0E+0	0.0E+0	0.0E+0

■ indicates risk level exceeding target risk

RBCA SITE ASSESSMENT

Cumulative Risk Worksheet

Site Name: Former Chevron Service Station No. 21 Site Name: Former Chevron Service Station No. 21-0 Completed By: J. Douglas

Job ID: DG20208H.3C01

Site Location: 6006 International Blvd., Oakland, CA Site Location: 6006 International Blvd., Oakland, CA Date Completed: 8-Jul-02

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CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

Groundwater DAF Option: Domenico - First Order

OFF-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		None		None		Commercial (1700 ft)		None	
		Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene*					3.5E-105	3.3E-101		
108-88-3	Toluene						6.1E-104		
100-41-4	Ethylbenzene						1.8E-102		
1330-20-7	Xylene (mixed isomers)						2.8E-104		
1634-04-4	Methyl t-Butyl ether						1.4E-101		
0-00-0	TPH - Arom >C08-C10						3.2E-100		
0-00-0	TPH - Aliph >C12-C16						1.6E-101		
0-00-0	TPH - Aliph >C16-C21						2.3E-102		
0-00-0	TPH - Arom >C16-C21						4.1E-101		
0-00-0	TPH - Arom >C21-C35						2.7E-101		
Cumulative Values:		0.0E+0	0.0E+0	0.0E+0	0.0E+0	3.5E-105	4.5E-100	0.0E+0	0.0E+0

■ indicates risk level exceeding target risk

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS (0 - 6.5 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)		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	None	None	Residential	Construction Worker	None	None
Benzene*	1.9E-1	5.9E+5				3.2E-7			
Toluene	5.0E-2	8.0E+5				6.3E-8			
Ethylbenzene	1.3E+0	1.2E+6				1.1E-6			
Xylene (mixed isomers)	4.5E-1	1.1E+6				4.2E-7			
Methyl t-Butyl ether	4.3E-1	4.4E+5				9.8E-7			
TPH - Arom >C08-C10	3.4E+2	1.8E+6				1.9E-4			
TPH - Aliph >C12-C16	2.2E+1	3.0E+6				7.2E-6			
TPH - Aliph >C16-C21	6.1E+1	1.1E+7				5.4E-6			
TPH - Arom >C16-C21	1.7E+1	2.4E+7				7.0E-7			
TPH - Arom >C21-C35	1.1E+1	9.0E+7				1.2E-7			

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

Site Name: Former Chevron Service Station No. 21-0208

Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas

Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SURFACE SOILS (0 - 6.5 ft):
VAPOR INHALATION (cont'd)

Constituents of Concern	4) Exposure Multiplier (EF×ED)/(AT×365) (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	None	None	Residential	Construction Worker	None	None
Benzene*	4.1E-1				1.3E-7			
Toluene	9.6E-1				6.0E-8			
Ethylbenzene	9.6E-1				1.0E-6			
Xylene (mixed isomers)	9.6E-1				4.1E-7			
Methyl t-Butyl ether	9.6E-1				9.4E-7			
TPH - Arom >C08-C10	9.6E-1				1.8E-4			
TPH - Aliph >C12-C16	9.6E-1				6.9E-6			
TPH - Aliph >C16-C21	9.6E-1				5.2E-6			
TPH - Arom >C16-C21	9.6E-1				6.7E-7			
TPH - Arom >C21-C35	9.6E-1				1.2E-7			

* = Chemical with user-specified data

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

Site Name: Former Chevron Service Station No. 21-0208
Site Location: 6006 International Blvd., Oakland, CA
Completed By: J. Douglas

Date Completed: 8-Jul-02
Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

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

SUBSURFACE SOILS (6.5 - 10 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) None	Off-site 2 (0 ft) None	On-site (0 ft) Residential	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None
Benzene*	1.9E-1	2.7E+5			7.0E-7		
Toluene	5.0E-2	2.7E+5			1.9E-7		
Ethylbenzene	1.3E+0	2.7E+5			4.8E-6		
Xylene (mixed isomers)	4.5E-1	2.7E+5			1.7E-6		
Methyl t-Butyl ether	4.3E-1	2.7E+5			1.6E-6		
TPH - Arom >C08-C10	3.4E+2	2.7E+5			1.3E-3		
TPH - Aliph >C12-C16	2.2E+1	2.7E+5			8.2E-5		
TPH - Aliph >C16-C21	6.1E+1	2.7E+5			2.2E-4		
TPH - Arom >C16-C21	1.7E+1	2.7E+5			6.1E-5		
TPH - Arom >C21-C35	1.1E+1	2.7E+5			4.1E-5		

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

Site Name: Former Chevron Service Station No. 21-0208
Site Location: 6006 International Blvd., Oakland, CA
Completed By: J. Douglas

Date Completed: 8-Jul-02
Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SUBSURFACE SOILS (6.5 - 10 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	None	None	Residential	None	None
Benzene*	4.1E-1			2.9E-7		
Toluene	9.6E-1			1.8E-7		
Ethylbenzene	9.6E-1			4.6E-6		
Xylene (mixed isomers)	9.6E-1			1.6E-6		
Methyl t-Butyl ether	9.6E-1			1.5E-6		
TPH - Arom >C08-C10	9.6E-1			1.2E-3		
TPH - Aliph >C12-C16	9.6E-1			7.8E-5		
TPH - Aliph >C16-C21	9.6E-1			2.2E-4		
TPH - Arom >C16-C21	9.6E-1			5.9E-5		
TPH - Arom >C21-C35	9.6E-1			3.9E-5		

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

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR
INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium	2) NAF Value (m ³ /L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m ³) (1) / (2)		
	Groundwater Conc. (mg/L)	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	None	None	Residential	None	None
Benzene*	1.0E-1	1.4E+5			7.4E-7		
Toluene	1.3E-2	1.3E+5			9.9E-8		
Ethylbenzene	1.8E-1	1.2E+5			1.5E-6		
Xylene (mixed isomers)	5.7E-2	1.4E+5			4.2E-7		
Methyl t-Butyl ether	1.4E-1	1.3E+5			1.1E-6		
TPH - Arom >C08-C10	1.3E+1	6.5E+4			2.0E-4		
TPH - Aliph >C12-C16	1.7E+0	7.0E+1			2.4E-2		
TPH - Aliph >C16-C21	4.6E+0	7.4E+0			6.3E-1		
TPH - Arom >C16-C21	1.3E+0	7.6E+5			1.7E-6		
TPH - Arom >C21-C35	8.4E-1	1.3E+6			6.4E-7		

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

Site Name: Former Chevron Service Station No. 21-0208
Site Location: 6006 International Blvd., Oakland, CA
Completed By: J. Douglas

Date Completed: 8-Jul-02
Job ID: DG20208H.3C01

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)	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	None	None	Residential	None	None
Benzene*	4.1E-1			3.0E-7		
Toluene	9.6E-1			9.5E-8		
Ethylbenzene	9.6E-1			1.4E-6		
Xylene (mixed isomers)	9.6E-1			4.0E-7		
Methyl t-Butyl ether	9.6E-1			1.0E-6		
TPH - Arom >C08-C10	9.6E-1			1.9E-4		
TPH - Aliph >C12-C16	9.6E-1			2.3E-2		
TPH - Aliph >C16-C21	9.6E-1			6.0E-1		
TPH - Arom >C16-C21	9.6E-1			1.6E-6		
TPH - Arom >C21-C35	9.6E-1			6.1E-7		

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

Site Name: Former Chevron Service Station No. 21-0208

Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas

Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m³)
 (Sum average exposure concentrations
 from soil and groundwater routes.)

Constituents of Concern	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Residential	Construction Worker	None	None
Benzene*	7.3E-7			
Toluene	3.3E-7			
Ethylbenzene	7.1E-6			
Xylene (mixed isomers)	2.4E-6			
Methyl t-Butyl ether	3.5E-6			
TPH - Arom >C08-C10	1.6E-3			
TPH - Aliph >C12-C16	2.3E-2			
TPH - Aliph >C16-C21	6.0E-1			
TPH - Arom >C16-C21	6.1E-5			
TPH - Arom >C21-C35	4.0E-5			

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

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)				(3) Inhalation Unit Risk Factor (μg/m ³) ⁻¹	(4) Individual COC Risk (2) x (3) x 1000			
		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	None	None		Residential	Construction Worker	None	None
Benzene*	A	7.3E-7				8.3E-6	6.0E-9			
Toluene	D									
Ethylbenzene	D									
Xylene (mixed isomers)	D									
Methyl t-Butyl ether	-									
TPH - Arom >C08-C10	D									
TPH - Aliph >C12-C16	D									
TPH - Aliph >C16-C21	D									
TPH - Arom >C16-C21	D									
TPH - Arom >C21-C35	D									

Total Pathway Carcinogenic Risk =

6.0E-9

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

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)				(6) Inhalation Reference Conc. (mg/m ³)	(7) Individual COC Hazard Quotient (5) / (6)			
	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	None	None		Residential	Construction Worker	None	None
Benzene*	1.7E-6				6.0E-3	2.8E-4			
Toluene	3.3E-7				4.0E-1	8.3E-7			
Ethylbenzene	7.1E-6				1.0E+0	7.1E-6			
Xylene (mixed isomers)	2.4E-6				7.0E+0	3.4E-7			
Methyl t-Butyl ether	3.5E-6				3.0E+0	1.2E-6			
TPH - Arom >C08-C10	1.6E-3				2.0E-1	7.9E-3			
TPH - Aliph >C12-C16	2.3E-2				1.0E+0	2.3E-2			
TPH - Aliph >C16-C21									
TPH - Arom >C16-C21									
TPH - Arom >C21-C35									

Total Pathway Hazard Index = 3.1E-2

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

SOILS (0 - 10 ft): VAPOR

INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	1) Source Medium	2) NAF Value (m ³ /kg) Receptor	3) Exposure Medium Indoor Air: POE Conc. (mg/m ³) (1) / (2)	4) Exposure Multiplier (EFxED)/(ATx365) (unitless)	5) Average Inhalation Exposure Concentration (mg/m ³) (3) X (4)
	Soil Conc. (mg/kg)	Residential	Residential	Residential	Residential
Benzene*	1.9E-1	1.0E+3	1.9E-4	4.1E-1	7.7E-5
Toluene	5.0E-2	1.3E+3	3.8E-5	9.6E-1	3.7E-5
Ethylbenzene	1.3E+0	3.0E+3	4.4E-4	9.6E-1	4.2E-4
Xylene (mixed isomers)	4.5E-1	2.3E+3	1.9E-4	9.6E-1	1.9E-4
Methyl t-Butyl ether	4.3E-1	1.9E+3	2.3E-4	9.6E-1	2.2E-4
TPH - Arom >C08-C10	3.4E+2	6.3E+3	5.4E-2	9.6E-1	5.1E-2
TPH - Aliph >C12-C16	2.2E+1	1.8E+4	1.2E-3	9.6E-1	1.1E-3
TPH - Aliph >C16-C21	6.1E+1	2.5E+5	2.4E-4	9.6E-1	2.3E-4
TPH - Arom >C16-C21	1.7E+1	1.8E+6	9.3E-6	9.6E-1	8.9E-6
TPH - Arom >C21-C35	1.1E+1	2.1E+8	5.2E-8	9.6E-1	5.0E-8

* = 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 Service Station No. 21-0208

Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas

Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

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	Exposure Concentration				
	1) Source Medium	2) NAF Value (m ³ /L) Receptor	3) Exposure Medium Indoor Air: POE Conc. (mg/m ³) (1) / (2)	4) Exposure Multiplier (EF×ED)/(AT×365) (unitless)	5) Average Inhalation Exposure Concentration (mg/m ³) (3) X (4)
Constituents of Concern	Groundwater Conc. (mg/L)	Residential	Residential	Residential	Residential
Benzene*	1.0E-1	8.1E+3	1.2E-5	4.1E-1	5.1E-6
Toluene	1.3E-2	7.5E+3	1.7E-6	9.6E-1	1.6E-6
Ethylbenzene	1.8E-1	7.2E+3	2.5E-5	9.6E-1	2.4E-5
Xylene (mixed isomers)	5.7E-2	8.0E+3	7.1E-6	9.6E-1	6.8E-6
Methyl t-Butyl ether	1.4E-1	1.3E+4	1.1E-5	9.6E-1	1.0E-5
TPH - Arom >C08-C10	1.3E+1	3.9E+3	3.4E-3	9.6E-1	3.2E-3
TPH - Aliph >C12-C16	1.7E+0	4.1E+0	4.1E-1	9.6E-1	3.9E-1
TPH - Aliph >C16-C21	4.6E+0	4.3E-1	1.1E+1	9.6E-1	1.0E+1
TPH - Arom >C16-C21	1.3E+0	5.0E+4	2.5E-5	9.6E-1	2.4E-5
TPH - Arom >C21-C35	8.4E-1	2.3E+5	3.6E-6	9.6E-1	3.4E-6

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 Service Station No. 21-0208 Date Completed: 8-Jul-02
 Site Location: 6006 International Blvd., Oakland, CA Job ID: DG20208H.3C01
 Completed By: J. Douglas

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m³)
*(Sum average exposure concentrations
 from soil and groundwater routes.)*

Constituents of Concern	Residential
Benzene*	8.2E-5
Toluene	3.8E-5
Ethylbenzene	4.5E-4
Xylene (mixed isomers)	1.9E-4
Methyl t-Butyl ether	2.3E-4
TPH - Arom >C08-C10	5.5E-2
TPH - Aliph >C12-C16	4.0E-1
TPH - Aliph >C16-C21	1.0E+1
TPH - Arom >C16-C21	3.3E-5
TPH - Arom >C21-C35	3.5E-6

Site Name: Former Chevron Service Station No. 2 Date Completed: 6-Jul-02
 Site Location: 6006 International Blvd., Oakland, C Job ID: DG20208H.3C01
 Completed By: J. Douglas

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAYS ARE ACTIVE)

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m ³)	(3) Inhalation Unit Risk Factor (ug/m ³) ⁻¹	(4) Individual COC Risk (2) x (3) x 1000
		Residential		Residential
Benzene*	A	8.2E-5	8.3E-6	6.8E-7
Toluene	D			
Ethylbenzene	D			
Xylene (mixed isomers)	D			
Methyl t-Butyl ether	-			
TPH - Arom >C08-C10	D			
TPH - Aliph >C12-C16	D			
TPH - Aliph >C16-C21	D			
TPH - Arom >C16-C21	D			
TPH - Arom >C21-C35	D			

Total Pathway Carcinogenic Risk = 6.8E-7

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAYS ARE ACTIVE)

TOXIC EFFECTS

<i>Constituents of Concern</i>	(5) Total Toxicant Exposure (mg/m ³)	(6) Inhalation Reference Concentration (mg/m ³)	(7) Individual COC Hazard Quotient (5) / (6)
	Residential		Residential
Benzene*	1.9E-4	6.0E-3	3.2E-2
Toluene	3.8E-5	4.0E-1	9.6E-5
Ethylbenzene	4.5E-4	1.0E+0	4.5E-4
Xylene (mixed isomers)	1.9E-4	7.0E+0	2.7E-5
Methyl t-Butyl ether	2.3E-4	3.0E+0	7.6E-5
TPH - Arom >C08-C10	5.5E-2	2.0E-1	2.7E-1
TPH - Aliph >C12-C16	4.0E-1	1.0E+0	4.0E-1
TPH - Aliph >C16-C21			
TPH - Arom >C16-C21			
TPH - Arom >C21-C35			

Total Pathway Hazard Index = 7.0E-1

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

1 OF 5

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

SOILS : LEACHING TO
GROUNDWATER INGESTION

Constituents of Concern	1) Source Medium	2) NAF Value (L/kg) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
	Soil Conc. (mg/kg)	On-site (0 ft) None	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None	On-site (0 ft) None	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None
Benzene*	1.9E-1						
Toluene	5.0E-2						
Ethylbenzene	1.3E+0						
Xylene (mixed isomers)	4.5E-1						
Methyl t-Butyl ether	4.3E-1						
TPH - Arom >C08-C10	3.4E+2						
TPH - Aliph >C12-C16	2.2E+1						
TPH - Aliph >C16-C21	6.1E+1						
TPH - Arom >C16-C21	1.7E+1						
TPH - Arom >C21-C35	1.1E+1						

* = Chemical with user-specified data

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

Site Name: Former Chevron Service Station No. 21-0208

Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas

Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

SOILS : LEACHING TO
GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxExED)/(BWxAT) (L/kg-day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft) None	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None	On-site (0 ft) None	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None
Benzene*						
Toluene						
Ethylbenzene						
Xylene (mixed isomers)						
Methyl t-Butyl ether						
TPH - Arom >C08-C10						
TPH - Aliph >C12-C16						
TPH - Aliph >C16-C21						
TPH - Arom >C16-C21						
TPH - Arom >C21-C35						

* = Chemical with user-specified data

NOTE: AT = Averaging time (days) ED = Exposure duration (yr) IR = Ingestion rate (mg/day)
 BW = Body weight (kg) EF = Exposure frequency (days/yr)

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.30

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: INGESTION

Constituents of Concern	1) Source Medium	2) NAF Value (unitless) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
	Groundwater Conc. (mg/L)	On-site (0 ft) None	Off-site 1 (1700 ft) Commercial	Off-site 2 (0 ft) None	On-site (0 ft) None	Off-site 1 (1700 ft) Commercial	Off-site 2 (0 ft) None
Benzene*	1.0E-1		1.0E+100			1.0E-101	
Toluene	1.3E-2		1.0E+100			1.3E-102	
Ethylbenzene	1.8E-1		1.0E+100			1.8E-101	
Xylene (mixed isomers)	5.7E-2		1.0E+100			5.7E-102	
Methyl t-Butyl ether	1.4E-1		1.0E+100			1.4E-101	
TPH - Arom >C08-C10	1.3E+1		1.0E+100			1.3E-99	
TPH - Aliph >C12-C16	1.7E+0		1.0E+100			1.7E-100	
TPH - Aliph >C16-C21	4.6E+0		1.0E+100			4.6E-100	
TPH - Arom >C16-C21	1.3E+0		1.0E+100			1.3E-100	
TPH - Arom >C21-C35	8.4E-1		1.0E+100			8.4E-101	

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

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg/day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft)	Off-site 1 (1700 ft)	Off-site 2 (0 ft)	On-site (0 ft)	Off-site 1 (1700 ft)	Off-site 2 (0 ft)
	None	Commercial	None	None	Commercial	None
Benzene*		3.5E-3			3.5E-104	
Toluene		9.8E-3			1.2E-104	
Ethylbenzene		9.8E-3			1.8E-103	
Xylene (mixed isomers)		9.8E-3			5.6E-104	
Methyl t-Butyl ether		9.8E-3			1.4E-103	
TPH - Arom >C08-C10		9.8E-3			1.3E-101	
TPH - Aliph >C12-C16		9.8E-3			1.6E-102	
TPH - Aliph >C16-C21		9.8E-3			4.5E-102	
TPH - Arom >C16-C21		9.8E-3			1.2E-102	
TPH - Arom >C21-C35		9.8E-3			8.2E-103	

* = Chemical with user-specified data

NOTE: AT = Averaging time (days)
BW = Body weight (kg)

ED = Exposure duration (yr)
EF = Exposure frequency (days/yr)

IR = Ingestion rate (mg/day)

Site Name: Former Chevron Service Station No. 21-0208
Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
Date Completed: 8-Jul-02

Job ID: DG20208H.3

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

MAXIMUM PATHWAY INTAKE (mg/kg/day)
*(Maximum intake of active pathways
 soil leaching & groundwater routes.)*

Constituents of Concern	On-site (0 ft)	Off-site 1	Off-site 2
	None	Commercial	None
Benzene*		3.5E-104	
Toluene		1.2E-104	
Ethylbenzene		1.8E-103	
Xylene (mixed isomers)		5.6E-104	
Methyl t-Butyl ether		1.4E-103	
TPH - Arom >C08-C10		1.3E-101	
TPH - Aliph >C12-C16		1.6E-102	
TPH - Aliph >C16-C21		4.5E-102	
TPH - Arom >C16-C21		1.2E-102	
TPH - Arom >C21-C35		8.2E-103	

* = Chemical with user-specified data

Site Name: Former Chevron Service Station No. 21-0208
 3C Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

(CHECKED IF PATHWAYS ARE ACTIVE)

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Maximum Carcinogenic Intake Rate (mg/kg/day)			(3) Oral Slope Factor (mg/kg-day) ⁻¹	(4) Individual COC Risk (2) x (3)		
		On-site (0 ft) None	Off-site 1 Commercial	Off-site 2 None		On-site (0 ft) None	Off-site 1 Commercial	Off-site 2 None
Benzene*	A		3.5E-104		1.0E-1		3.5E-105	
Toluene	D							
Ethylbenzene	D							
Xylene (mixed isomers)	D							
Methyl t-Butyl ether	-							
TPH - Arom >C08-C10	D							
TPH - Aliph >C12-C16	D							
TPH - Aliph >C16-C21	D							
TPH - Arom >C16-C21	D							
TPH - Arom >C21-C35	D							

Total Pathway Carcinogenic Risk = 3.5E-105

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

 (CHECKED IF PATHWAYS ARE ACTIVE)

TOXIC EFFECTS

Constituents of Concern	(5) Maximum Toxicant Intake Rate (mg/kg/day)			(6) Oral Reference Dose (mg/kg/day)	(7) Individual COC Hazard Quotient (5) / (6)		
	On-site (0 ft) None	Off-site 1 Commercial	Off-site 2 None		On-site (0 ft) None	Off-site 1 Commercial	Off-site 2 None
Benzene*		9.8E-104		3.0E-3		3.3E-101	
Toluene		1.2E-104		2.0E-1		6.1E-104	
Ethylbenzene		1.8E-103		1.0E-1		1.8E-102	
Xylene (mixed isomers)		5.6E-104		2.0E+0		2.8E-104	
Methyl t-Butyl ether		1.4E-103		1.0E-2		1.4E-101	
TPH - Arom >C08-C10		1.3E-101		4.0E-2		3.2E-100	
TPH - Aliph >C12-C16		1.6E-102		1.0E-1		1.6E-101	
TPH - Aliph >C16-C21		4.5E-102		2.0E+0		2.3E-102	
TPH - Arom >C16-C21		1.2E-102		3.0E-2		4.1E-101	
TPH - Arom >C21-C35		8.2E-103		3.0E-2		2.7E-101	

Total Pathway Hazard Index =

4.5E-100

Site Name: Former Chevron Service Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

APPENDIX B

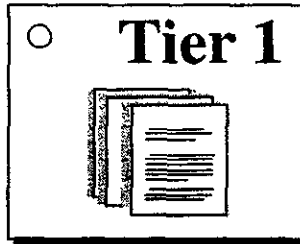
Main Screen

RBCA Tool Kit for Chemical Releases
Version 1.3a © 2000

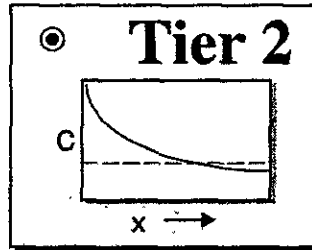
1. Project Information

Site Name:	Former Chevron Station No. 21-0208		
Location:	6006 International Blvd., Oakland, CA		
Compl. By:	J. Douglas		
Date:	8-Jul-02	Job ID:	DG20208H.3C01

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 (?)

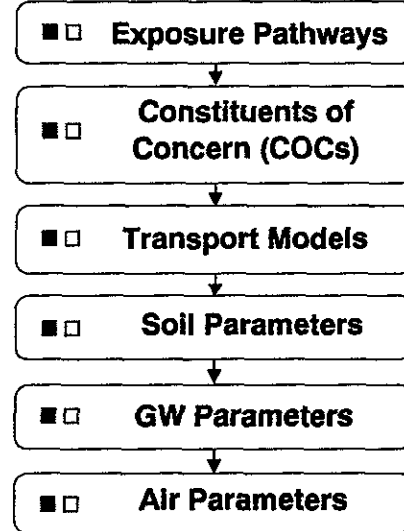
Affects which input data are required

- Baseline Risks (Forward mode)**
- RBCA Cleanup Standards (Backward mode)**

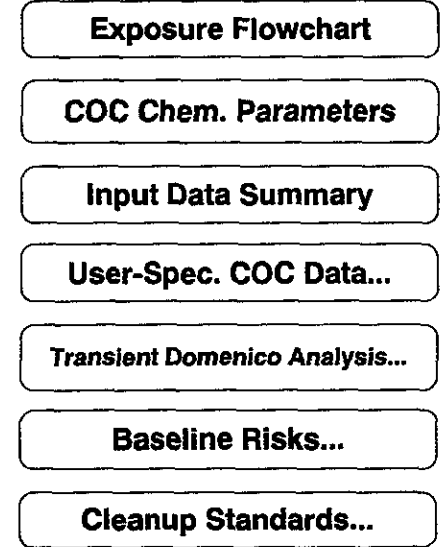
4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (= yes, = no)



Review Output



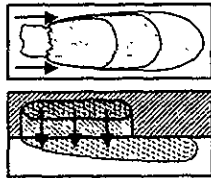
5. Commands and Options

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

Deep
water
10 Kt

Exposure Pathway Identification

1. Groundwater Exposure ?



**Groundwater Ingestion/
Surface Water Impact**

Receptor: None ▼ Com. ▼ None ▼
 Type: On-site Off-site1 Off-site2

Source Media:

- Affected Groundwater
- Affected Soils Leaching to Groundwater

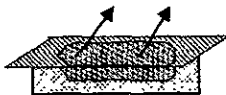
Distance to GW receptors

	1700	(ft)
On-site	Off-site1	Off-site2
		(ft)



Enter ALP Criteria

2. Surface Soil Exposure ?



**Direct Ingestion
and Dermal Contact**

Receptor: None ▼
 Type: On-site No off-site receptors

Site Name: Former Chevron Station No. 21-0208

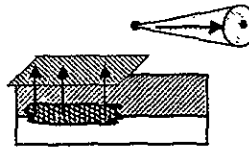
Location: 6006 International Blvd., Oakland, CA

Compl. By: J. Douglas

Job ID: DG20208H.3C01

Date: 8-Jul-02

3. Air Exposure ?

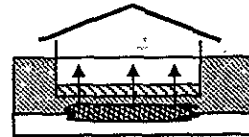


**Volatilization and Particulates
to Outdoor Air Inhalation**

Receptor: Res. ▼ None ▼ None ▼
 Type: On-site Off-site1 Off-site2
 0 (ft)

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**

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

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

4. Commands and Options

[Main Screen](#) [Print Sheet](#) [Set Units](#) [Help](#)

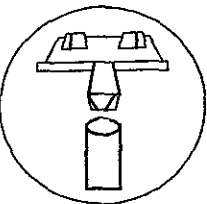
Exposure Factors & Target Risks [Exposure Flowchart](#)

Exposure Factors and Target Risk Limits

Site Name: Former Chevron Service Station No. 21-0208
 Location: 6006 International Blvd., Oakland, CA
 Compl. By: J. Douglas
 Job ID: DG20208H.3C01
 Date: 2-Jul-02

1. Exposure Parameters

	Residential			Commercial	
	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 carcin.)	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

Site Name: Former Chevron Station No. 21-0208
 Location: 6006 International Blvd., Oakland, CA
 Compl. By: J. Douglas

Job ID: DG20208H.3C01
 Date: 8-Jul-02

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

Benzene*
 Toluene
 Ethylbenzene
 Xylene (mixed isomers)
 Methyl t-Butyl ether
 TPH - Arom >C08-C10
 TPH - Aliph >C12-C16
 TPH - Aliph >C16-C21
 TPH - Arom >C16-C21
 TPH - Arom >C21-C35

Representative COC Concentration ?

Groundwater Source Zone

Enter Directly

Enter Site Data

(mg/L)

note

1.0E-1

1.3E-2

1.8E-1

5.7E-2

1.4E-1

1.3E+1

1.7E+0

4.6E+0

1.3E+0

8.4E-1

Soil Source Zone

Calculate

Enter Site Data

(mg/kg)

note

1.9E-1

5.0E-2

1.3E+0

4.5E-1

4.3E-1

3.4E+2

2.2E+1

6.1E+1

1.7E+1

1.1E+1

* = Chemical with user-specified data

Commands and Options

Return

Print Sheet

Help

Site Name: Former Chevron Station Numb 210020620208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

Groundwater Source Zone Concentration Calculator

Paste Defaults

Mean Option

UCL
 Percentile
 95%

Constituent	Detection Limit	No. of Samples	No. of Detects	Estimated Distribution of Data	Max. Conc.	Mean Conc.	UCL on Mean
	(mg/L)				(mg/L)	(mg/L)	(mg/L)
Benzene*	5.0E-4	10	10	Lognormal	1.0E-1	2.8E-3	9.2E-3
Toluene	5.0E-4	10	10	Lognormal	1.3E-2	1.2E-3	3.1E-3
Ethylbenzene	5.0E-4	10	10	Lognormal	1.8E-1	7.5E-3	2.5E-2
Xylene (mixed isomers)	5.0E-4	10	10	Lognormal	5.7E-2	6.7E-3	1.6E-2
Methyl t-Butyl ether	2.5E-3	10	10	Lognormal	1.4E-1	5.6E-3	1.5E-2
TPH - Arom >C08-C10	5.0E-2	10	10	Lognormal	1.3E+1	1.3E+0	4.0E+0
TPH - Aliph >C12-C16	5.0E-2	6	6	Lognormal	1.7E+0	3.1E-1	7.2E-1
TPH - Aliph >C16-C21	5.0E-2	6	6	Lognormal	4.6E+0	8.4E-1	2.0E+0
TPH - Arom >C16-C21	5.0E-2	6	6	Lognormal	1.3E+0	2.3E-1	5.4E-1
TPH - Arom >C21-C35	5.0E-2	6	6	Lognormal	8.4E-1	1.5E-1	3.6E-1

* = Chemical with user-specified data

RBCA Tool Kit for Chemical Releases, Version 1.3a

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

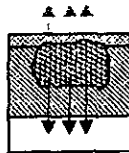
										Analytical Data			
	1	2	3	4	5	6	7	8	9	10	11	12	13
ID	gp11-w	gp14-w	gp15-w	gp16-w	TC-1	TC-1	TC-2	TC-2	TC-3	TC-3			
Date	17-Jul-01	18-Jul-01	18-Jul-01	18-Jul-01	27-Feb-02	27-Mar-02	27-Feb-02	27-Mar-02	27-Feb-02	27-Mar-02			
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
	2.80E-2	1.00E-1	1.25E-2	2.50E-4	2.50E-4	2.50E-4	1.25E-3	4.10E-3	5.00E-3	1.80E-3			
	5.00E-3	1.25E-3	1.25E-2	2.50E-4	2.50E-4	2.50E-4	8.00E-3	2.50E-4	6.80E-3	2.50E-4			
	1.10E-1	1.80E-1	4.30E-2	4.70E-3	2.50E-4	1.20E-3	1.25E-3	3.60E-3	1.30E-2	8.00E-3			
	5.70E-2	2.40E-2	4.80E-2	6.00E-3	7.50E-4	7.50E-4	3.75E-3	5.50E-3	7.50E-3	5.00E-3			
	2.50E-3	1.40E-1	6.00E-2	1.25E-3	1.25E-3	7.00E-3	6.50E-3	1.25E-3	1.25E-2	1.25E-3			
	1.30E+1	8.10E+0	1.10E+1	9.70E-1	2.50E-2	2.10E-1	4.80E-1	8.00E-1	3.10E+0	1.80E+0			
					6.60E-2	2.60E-1	1.68E+0	3.20E-1	2.40E-1	3.80E-1			
					1.82E-1	7.15E-1	4.62E+0	8.80E-1	6.60E-1	1.05E+0			
					4.95E-2	1.95E-1	1.26E+0	2.40E-1	1.80E-1	2.85E-1			
					3.30E-2	1.30E-1	8.40E-1	1.60E-1	1.20E-1	1.90E-1			

Transport Modeling Options

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 (ft)
- User-specified VF from other model



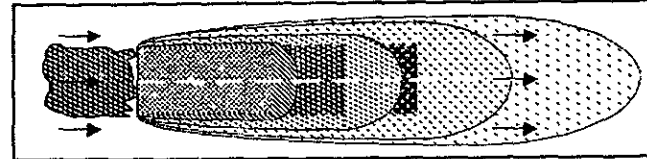
Indoor Air Volatilization Factors ?

- Johnson & Ettinger model
- User-specified VF from other model
- ?
-
-

- Off-site 1
- Off-site 2 (-)

Site Name: Former Chevron Station No. 21-0208 Job ID: DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model ?

- Domenico equation with dispersion only (no biodegradation)
- Domenico equation first-order decay Enter Decay Rates
- Modified Domenico equation using electron acceptor superposition
-

— or —

User-Specified DAF Values

- DAF values from other model or site data

4. Commands and Options

Site Name: Former Chevron Station No. 21-0208 Job ID: DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

Commands and Options

Return Print Sheet
 Paste Default Values Help

Constituent Half-Life Values

<i>Constituent</i>	Saturated Zone		Unsaturated Zone	
	First-Order Decay		First-Order Decay	
	Half-Life <i>(day)</i>	Coefficient <i>(1/day)</i>	Half-Life <i>(day)</i>	Coefficient <i>(1/day)</i>
Benzene*	7.2E+2	9.6E-4	7.2E+2	9.6E-4
Toluene	2.8E+1	2.5E-2	2.8E+1	2.5E-2
Ethylbenzene	2.3E+2	3.0E-3	2.3E+2	3.0E-3
Xylene (mixed isomers)	3.6E+2	1.9E-3	3.6E+2	1.9E-3
Methyl t-Butyl ether	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Arom >C08-C10	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Aliph >C12-C16	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Aliph >C16-C21	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Arom >C16-C21	3.6E+2	1.9E-3	1.8E+2	3.9E-3
TPH - Arom >C21-C35	3.6E+2	1.9E-3	1.8E+2	3.9E-3

Site-Specific Soil Parameters

1. Soil Source Zone Characteristics (?)

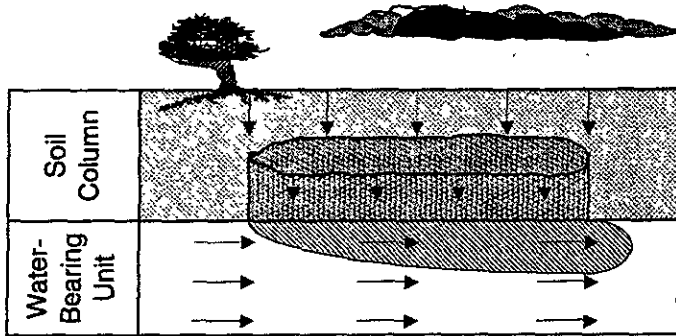
Hydrogeology

General Case Construction

Depth to water-bearing unit (ft)
 Capillary zone thickness (ft)
 Soil column thickness (ft)

Affected Soil Zone

Depth to top of affected soils (ft)
 Depth to base of affected soils (ft)
 Affected soil area (ft²)
 Length of affected soil parallel to assumed wind direction (ft)



Site Name: Former Chevron Station No. 21-0208 Job ID: DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

2. Surface Soil Column

Vadose Zone Capillary Fringe

Predominant USCS Soil Type

CL: Sandy Clay (?)

or

Total porosity (-)
 Volumetric water content (-)
 Volumetric air content (-)
 Dry bulk density (kg/L)
 Vertical hydraulic conductivity (cm/d)
 Vapor permeability (ft²)
 Capillary zone thickness (ft)

NA

or

Partitioning Parameters

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

3. Commands and Options

Site-Specific Groundwater Parameters

1. Water-Bearing Unit (?)

Hydrogeology

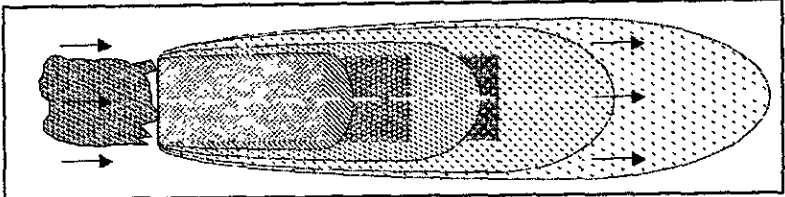
Groundwater Darcy velocity	3.0E-6	(cm/d)
Groundwater seepage velocity	8.0E-6	(cm/d)
<i>or</i>	<input type="button" value="Enter Directly"/>	
	↑ <i>or</i>	
Hydraulic conductivity	1.9E-3	(cm/d)
Hydraulic gradient	1.6E-3	(-)
Effective porosity	0.38	(-)

Sorption

Fraction organic carbon--saturated zone	0.001	(-)
Groundwater pH	6.20	(-)

2. Groundwater Source Zone (?)

Groundwater plume width at source	147.6377953	(ft)
Plume (mixing zone) thickness at source	6.56167979	(ft)
<i>or</i>	<input type="button" value="Calculate"/>	<i>or</i>
	<input type="text"/>	



Site Name: Former Chevron Station No. 21-0208 Job ID: DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

3. Groundwater Dispersion (?)

Model: <input type="text" value="ASTM Default"/>		GW Ingestion		Soil Leaching to GW	
Distance to GW receptors	1700	<input type="text"/>	<input type="text"/>	<input type="text"/>	(ft)
<i>or</i>	<input type="button" value="Enter Directly"/>	↓ <i>or</i>	<i>or</i>		
Longitudinal dispersivity	170	<input type="text"/>	<input type="text"/>	<input type="text"/>	(ft)
Transverse dispersivity	56.1	<input type="text"/>	<input type="text"/>	<input type="text"/>	(ft)
Vertical dispersivity	8.5	<input type="text"/>	<input type="text"/>	<input type="text"/>	(ft)

(?)

<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

5. Commands and Options

<input type="button" value="Main Screen"/>	<input type="button" value="Use Default Values"/>	<input type="button" value="Print Sheet"/>
<input type="button" value="Set Units"/>		<input type="button" value="Help"/>

Site-Specific Air Parameters

Site Name: Former Chevron Station No. 21-02031D: DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas

1. Outdoor Air Pathway

or

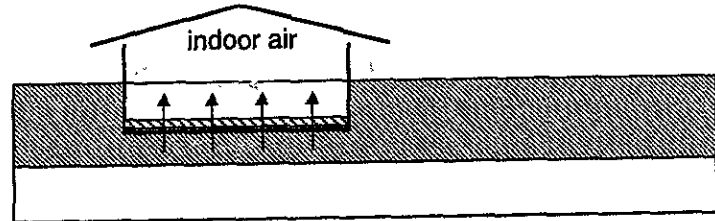
Air Source Zone

Air mixing zone height (ft)
 Ambient air velocity in mixing zone (ft/s)

2. Indoor Air Pathway

Building Parameters

	Residential		
Building volume/area ratio	28		(ft)
Foundation area	2822		(ft ²)
Foundation perimeter	270		(ft)
Building air exchange rate	6.5E-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	0.01		(-)
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

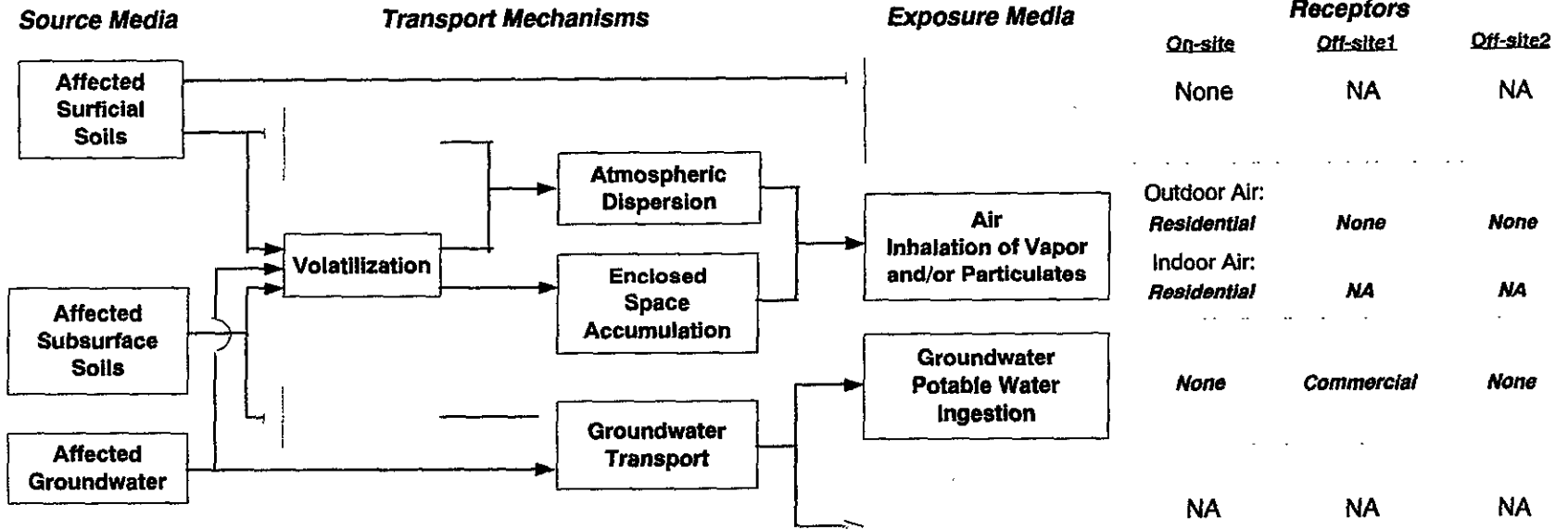
Print Sheet

Set Units

Help

Exposure Pathway Flowchart

Site Name: Former Chevron Station No. 21-020 Job ID: DG20208H.3C01
 Location: 6006 International Blvd., Oakland, CA Date: 8-Jul-02
 Compl. By: J. Douglas



Commands and Options

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

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

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:	2.9E-9	1.0E-6	2.9E-9	1.0E-5	<input type="checkbox"/>	1.8E-2	1.0E+0	2.0E-2	1.0E+0	<input type="checkbox"/>
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	6.7E-7	1.0E-6	6.7E-7	1.0E-5	<input type="checkbox"/>	3.1E-1	1.0E+0	6.1E-1	1.0E+0	<input type="checkbox"/>
SOIL EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	<input type="checkbox"/>	NA	NA	NA	NA	<input type="checkbox"/>
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	3.5E-105	1.0E-6	3.5E-105	1.0E-5	<input type="checkbox"/>	3.2E-100	1.0E+0	4.5E-100	1.0E+0	<input type="checkbox"/>
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	<input type="checkbox"/>	NA	NA	NA	NA	<input type="checkbox"/>
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	6.7E-7	1.0E-6	6.7E-7	1.0E-5	<input type="checkbox"/>	3.1E-1	1.0E+0	6.1E-1	1.0E+0	<input type="checkbox"/>
	<i>Indoor Air</i>		<i>Indoor Air</i>			<i>Indoor Air</i>		<i>Indoor Air</i>		

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole)		Diffusion Coefficients				log (Koc) or log(Kd) (@ 20 - 25 C)		Henry's Law Constant (@ 20 - 25 C)			Vapor Pressure (@ 20 - 25 C)		Solubility (@ 20 - 25 C)		acid pKa	base pKb	ref	
			MW	ref	in air (cm ² /s)	ref	in water (cm ² /s)	ref	log(L/kg) partition	ref	(atm-m ³) mol	(unitless)	ref	(mm Hg)	ref	(mg/L)	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	-	-	-
TPH - Aliph >C12-C16	0-00-0	T	200	T	1.00E-01	T	1.00E-05	T	6.70	Koc	T	1.26E+01	5.21E+02	T	3.65E-02	-	7.60E-04	T	-	-	-
TPH - Aliph >C16-C21	0-00-0	T	270	T	1.00E-01	T	1.00E-05	T	8.80	Koc	T	1.19E+02	4.90E+03	T	8.36E-04	-	2.50E-06	T	-	-	-
TPH - Arom >C16-C21	0-00-0	T	190	T	1.00E-01	T	1.00E-05	T	4.20	Koc	T	3.22E-04	1.33E-02	T	8.36E-04	-	6.50E-01	T	-	-	-
TPH - Arom >C21-C35	0-00-0	T	240	T	1.00E-01	T	1.00E-05	T	5.10	Koc	T	1.60E-05	6.60E-04	T	3.34E-07	-	6.60E-03	T	-	-	-

* = Chemical with user-specified data

Site Name: Former Chevron Station No. 21-0208

Completed By: J. Douglas

Job ID: DG20208H.3C01

Site Location: 6006 International Blvd., Oakland, CA

Date Completed: 8-Jul-02

CHEMICAL DATA FOR SELECTED COCs **Toxicity Data**

Constituent	Reference Dose (mg/kg/day)				Reference Conc. (mg/m3)				Slope Factors 1/(mg/kg/day)				Unit Risk Factor 1/(µg/m3)		EPA Weight of Evidence	Is Constituent Carcinogenic?
	Oral		Dermal		Inhalation		Oral		Dermal		Inhalation		URF	ref		
	RfD	ref	RfD	ref	RfC	ref	SF	ref	SF	ref	URF	ref				
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	-	-	-	-	-	-	-	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		
TPH - Aliph >C12-C16	1.00E-01	T	-	-	1.00E+00	T	-	-	-	-	-	-	D	FALSE		
TPH - Aliph >C16-C21	2.00E+00	T	-	-	-	T	-	-	-	-	-	-	D	FALSE		
TPH - Arom >C16-C21	3.00E-02	T	-	-	-	T	-	-	-	-	-	-	D	FALSE		
TPH - Arom >C21-C35	3.00E-02	T	-	-	-	T	-	-	-	-	-	-	D	FALSE		

* = Chemical with user-specific

Site Name: Former Chevron Sta

Site Location: 6006 Internatio

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level		Time-Weighted Average Workplace Criteria		Aquatic Life Prot. Criteria		Bioconcentration Factor (L-wat/kg-flsh)
	MCL (mg/L)	ref	TWA (mg/m3)	ref	AQL (mg/L)	ref	
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
TPH - Aliph >C12-C16	-	-	-	-	-	-	1
TPH - Aliph >C16-C21	-	-	-	-	-	-	1
TPH - Arom >C16-C21	-	-	-	-	-	-	1
TPH - Arom >C21-C35	-	-	-	-	-	-	1

* = Chemical with user-specific

Site Name: Former Chevron Sta

Site Location: 6006 Internatio

CHEMICAL DATA FOR SELECTED COCs **Miscellaneous Chemical Data**

Constituent	Dermal		Water Dermal Permeability Data				Detection Limits				Half Life (First-Order Decay)			
	Relative Absorp. Factor (unitless)	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	Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Saturated (days)	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
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	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH - Aliph >C12-C16	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH - Aliph >C16-C21	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH - Arom >C16-C21	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH - Arom >C21-C35	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-

* = Chemical with user-specific

Site Name: Former Chevron Sta

Site Location: 6006 Internatio

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H3C01

1 OF 1

Exposure Parameters	Residential			Commercial/Industrial	
	Adult (L/day)	(L/day)	(L/day)	Chronic	Construction
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	36	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	6800	6800
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				
F _{fish} Contaminated fish fraction (unitless)	1				

Surface Parameters	General	Construction	(Units)
	A Source zone area	1.0E+2	NA
W Length of source-zone area parallel to wind	1.0E+1	NA	(ft)
W _{gw} Length of source-zone area parallel to GW flow	NA	NA	(ft)
U _{av} Ambient air velocity in mixing zone	7.4E+0		(ft/s)
h _{av} Air mixing zone height	6.6E+0		(ft)
P _a Areal particulate emission rate	NA		(g/cm ² /s)
L _{so} Thickness of affected surface soils	1.0E+1		(ft)

Surface Soil Column Parameters	Value	(Units)
h _{cap} Capillary zone thickness	7.9E-1	(ft)
h _v Vadose zone thickness	9.2E+0	(ft)
ρ _s Soil bulk density	1.7E+0	(g/cm ³)
f _{oc} Fraction organic carbon	1.0E-2	(-)
θ _T Soil total porosity	3.8E-1	(-)
K _{sat} Vertical hydraulic conductivity	8.8E-2	(cm/d)
k _v Vapor permeability	1.1E-15	(ft ²)
L _{gw} Depth to groundwater	1.0E+1	(ft)
L _s Depth to top of affected soils	0.0E+0	(ft)
L _{base} Depth to base of affected soils	1.0E+1	(ft)
L _{soils} Thickness of affected soils	1.0E+1	(ft)
pH Soil/groundwater pH	7.7E+0	(-)
θ _w Volumetric water content	0.342	capillary vadose foundation (-)
θ _a Volumetric air content	0.038	0.07 0.26 (-)

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	Commercial	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	None		
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	Residential	None	None
Volatilization from Groundwater	Residential	None	None
Indoor Air:			
Volatilization from Subsurface Soils	Residential	NA	NA
Volatilization from Groundwater	Residential	NA	NA

Building Parameters	Residential	Commercial	(Units)
L _b Building volume/area ratio	2.80E+1	NA	(ft)
A _b Foundation area	2.82E+3	NA	(ft ²)
X _{cm} Foundation perimeter	2.70E+2	NA	(ft)
ER Building air exchange rate	6.54E-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-2	NA	(-)
dP Indoor/outdoor differential pressure	0.00E+0	NA	(g/cm/s ²)
Q _c Convective air flow through slab	0.00E+0	NA	(ft ³ /s)

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	1700	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Groundwater Parameters	Value	(Units)
δ _{gw} Groundwater mixing zone depth	NA	(ft)
i _T Not groundwater infiltration rate	NA	(in/yr)
U _{gw} Groundwater Darcy velocity	3.0E-6	(cm/d)
V _{gw} Groundwater seepage velocity	8.0E-6	(cm/d)
K _s Saturated hydraulic conductivity	1.9E-3	(cm/d)
i Groundwater gradient	1.6E-3	(-)
S _w Width of groundwater source zone	1.5E+2	(ft)
S _d Depth of groundwater source zone	6.6E+0	(ft)
θ _{eff} Effective porosity in water-bearing unit	3.8E-1	(-)
f _{oc-gw} Fraction organic carbon in water-bearing unit	1.0E-3	(-)
pH _{gw} Groundwater pH	6.2E+0	(-)
Biodegradation considered?	1st Order	

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

Modelling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	Surface & subsurface models
Indoor air volatilization model	Johnson & Etlinger model
Soil leaching model	NA
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	Domenico model w/ biodeg.

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	1.7E+2	NA	NA	NA	(ft)
α _y Transverse dispersivity	5.6E+1	NA	NA	NA	(ft)
α _z Vertical dispersivity	8.5E+0	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)
Δh _{pl} Thickness of GW plume at SW discharge	NA	(ft)
DI _{sw} Groundwater-to-surface water dilution factor	NA	(-)

NOTE: NA = Not applicable

RBCA SITE ASSESSMENT

Site Name: Former Chevron Station No. 21-0208
 Site Location: 8008 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

SOIL (0 - 10 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: Domenico - First Order
 (One-directional vert. dispersion)

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

CONSTITUENTS OF CONCERN		Representative Concentration (mg/kg)	Soil Leaching to Groundwater Ingestion / Discharge to Surface Water				X	Soil Vol. to Indoor Air		X	Soil Volatilization to Outdoor Air				Surface Soil Inhalation, Ingestion, Dermal Contact		Applicable SSTL (mg/kg)	SSTL Exceeded? "X" if yes	Required CRF Only if "yes" left	
			On-site (0 ft)			Off-site 1 (ft)		Off-site 2 (0 ft)	On-site (0 ft)		On-site (0 ft)			Off-site 1 (ft)	Off-site 2 (0 ft)	On-site (0 ft)				
			None	None	None	Residential		Residential	Construction Worker		None	None	None	None	Construction Worker					
71-43-2	Benzene*	1.9E-1	NA	NA	NA	3.0E-1	7.9E+1	NA	NA	NA	NA	NA	NA	3.0E-1	<input type="checkbox"/>	<1				
108-88-3	Toluene	5.0E-2	NA	NA	NA	5.4E+2	>7.9E+2	NA	NA	NA	NA	NA	NA	5.4E+2	<input type="checkbox"/>	<1				
100-41-4	Ethylbenzene	1.3E+0	NA	NA	NA	>6.5E+2	>6.5E+2	NA	NA	NA	NA	NA	NA	>6.5E+2	<input type="checkbox"/>	NA				
1330-20-7	Xylene (mixed isomers)	4.5E-1	NA	NA	NA	>5.1E+2	>5.1E+2	NA	NA	NA	NA	NA	NA	>5.1E+2	<input type="checkbox"/>	NA				
1634-04-4	Methyl t-Butyl ether	4.3E-1	NA	NA	NA	5.9E+3	>1.5E+4	NA	NA	NA	NA	NA	NA	5.9E+3	<input type="checkbox"/>	<1				
0-00-0	TPH - Arom >C08-C10	3.4E+2	NA	NA	NA	>1.0E+3	>1.0E+3	NA	NA	NA	NA	NA	NA	>1.0E+3	<input type="checkbox"/>	NA				
0-00-0	TPH - Aliph >C12-C16	2.2E+1	NA	NA	NA	>3.8E+1	>3.8E+1	NA	NA	NA	NA	NA	NA	>3.8E+1	<input type="checkbox"/>	NA				
0-00-0	TPH - Aliph >C16-C21	6.1E+1	NA	NA	NA	NC	NC	NA	NA	NA	NA	NA	NA	NC	<input type="checkbox"/>	NA				
0-00-0	TPH - Arom >C16-C21	1.7E+1	NA	NA	NA	NC	NC	NA	NA	NA	NA	NA	NA	NC	<input type="checkbox"/>	NA				
0-00-0	TPH - Arom >C21-C35	1.1E+1	NA	NA	NA	NC	NC	NA	NA	NA	NA	NA	NA	NC	<input type="checkbox"/>	NA				

* = 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 Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG2Q208H-3C01

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: Domenico - First Order
 (One-directional vert. dispersion)

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

CONSTITUENTS OF CONCERN		Representative Concentration (mg/L)	X Groundwater Ingestion			X GW Vol. to Indoor Air	X Groundwater Volatilization to Outdoor Air			Applicable SSTL (mg/L)	SSTL Exceeded? *■* if yes	Required CRF Only if "yes" left
			On-site (0 ft)	Off-site 1 (1700 ft)	Off-site 2 (0 ft)	On-site (0 ft)	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)			
			None	Commercial	None	Residential	Residential	None	None			
71-43-2	Benzene*	1.0E-1	NA	>1.8E+3	NA	3.2E+0	5.4E+1	NA	NA	3.2E+0	<input type="checkbox"/>	<1
108-88-3	Toluene	1.3E-2	NA	>5.2E+2	NA	>5.2E+2	>5.2E+2	NA	NA	>5.2E+2	<input type="checkbox"/>	NA
100-41-4	Ethylbenzene	1.8E-1	NA	>1.7E+2	NA	>1.7E+2	>1.7E+2	NA	NA	>1.7E+2	<input type="checkbox"/>	NA
1330-20-7	Xylene (mixed isomers)	5.7E-2	NA	>2.0E+2	NA	>2.0E+2	>2.0E+2	NA	NA	>2.0E+2	<input type="checkbox"/>	NA
1634-04-4	Methyl t-Butyl ether	1.4E-1	NA	>4.8E+4	NA	>4.8E+4	>4.8E+4	NA	NA	>4.8E+4	<input type="checkbox"/>	NA
0-00-0	TPH - Arom >C08-C10	1.3E+1	NA	>6.5E+1	NA	>6.5E+1	>6.5E+1	NA	NA	>6.5E+1	<input type="checkbox"/>	NA
0-00-0	TPH - Aliph >C12-C16	1.7E+0	NA	>7.6E-4	NA	>7.6E-4	>7.6E-4	NA	NA	>7.6E-4	<input type="checkbox"/>	NA
0-00-0	TPH - Aliph >C16-C21	4.6E+0	NA	>2.5E-6	NA	NC	NC	NA	NA	>2.5E-6	<input type="checkbox"/>	NA
0-00-0	TPH - Arom >C16-C21	1.3E+0	NA	>6.5E-1	NA	NC	NC	NA	NA	>6.5E-1	<input type="checkbox"/>	NA
0-00-0	TPH - Arom >C21-C35	8.4E-1	NA	>6.6E-3	NA	NC	NC	NA	NA	>6.6E-3	<input type="checkbox"/>	NA

* = Chemical with user-specified data

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

RBCA SITE ASSESSMENT

TPH Criteria SSTL Worksheet

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

CALCULATION OF SSTL VALUES FOR TPH

CONSTITUENTS OF CONCERN		Mass Fractions		Representative Concentrations		Calculated Concentration Limits		Applicable SSTL Values	
		Soil (-)	Groundwater (-)	Soil (mg/kg)	Groundwater (mg/L)	Residual Soil Concentration (mg/kg)	Solubility (mg/L)	Soils (0 - 10 ft) (mg/kg)	Groundwater (mg/L)
0-00-0	TPH - Arom >C08-C10	1.0E+0	5.3E-1	3.4E+2	1.3E+1	1.0E+3	6.5E+1	>1.0E+3	>6.5E+1
0-00-0	TPH - Aliph >C12-C16	9.0E-4	9.5E-2	2.2E+1	1.7E+0	3.8E+1	7.6E-4	>3.8E+1	>7.6E-4
0-00-0	TPH - Aliph >C16-C21	2.5E-3	2.6E-1	6.1E+1	4.6E+0	1.6E+1	2.5E-6	NC	>2.5E-6
0-00-0	TPH - Arom >C16-C21	6.8E-4	7.1E-2	1.7E+1	1.3E+0	1.0E+2	6.5E-1	NC	>6.5E-1
0-00-0	TPH - Arom >C21-C35	4.5E-4	4.7E-2	1.1E+1	8.4E-1	8.3E+0	6.6E-3	NC	>6.6E-3
* = Chemical with user-specified data									
Total		1.0E+0	1.0E+0	4.5E+2	2.1E+1	Total TPH SSTL value		>Res	>Sol

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

RBCA SITE ASSESSMENT	Cumulative Risk Worksheet
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Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

CUMULATIVE RISK WORKSHEET

CONSTITUENTS OF CONCERN		Representative Concentration		Proposed CRF		Resultant Target Concentration	
CAS No.	Name	Soil (mg/kg)	Groundwater (mg/L)	Soil	GW	Soil (mg/kg)	Groundwater (mg/L)
71-43-2	Benzene*	1.9E-1	1.0E-1			1.9E-1	1.0E-1
108-88-3	Toluene	5.0E-2	1.3E-2			5.0E-2	1.3E-2
100-41-4	Ethylbenzene	1.3E+0	1.8E-1			1.3E+0	1.8E-1
1330-20-7	Xylene (mixed isomers)	4.5E-1	5.7E-2			4.5E-1	5.7E-2
1634-04-4	Methyl t-Butyl ether	4.3E-1	1.4E-1			4.3E-1	1.4E-1
0-00-0	TPH - Arom >C08-C10	3.4E+2	1.3E+1			3.4E+2	1.3E+1
0-00-0	TPH - Aliph >C12-C16	2.2E+1	1.7E+0			2.2E+1	1.7E+0
0-00-0	TPH - Aliph >C16-C21	6.1E+1	4.6E+0			6.1E+1	4.6E+0
0-00-0	TPH - Arom >C16-C21	1.7E+1	1.3E+0			1.7E+1	1.3E+0
0-00-0	TPH - Arom >C21-C35	1.1E+1	8.4E-1			1.1E+1	8.4E-1

Cumulative Values:

RBCA SITE ASSESSMENT

Cumulative Risk Worksheet

Site Name: Former Chevron Station No. 21-0208 Site Name: Former Chevron Station No. 21-0208 Completed By: J. Douglas

Job ID: DG20208H.3C01

Site Location: 6006 International Blvd., Oakland, CA Site Location: 6006 International Blvd., Oakland, CA Date Completed: 8-Jul-02

2 OF 3

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

CUMULATIVE RISK WORKSHEET

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:		Indoor Air Exposure:		Soil Exposure:		Groundwater Exposure:	
		Residential		Residential		None		None	
CAS No.	Name	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
		Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene*	5.3E-9	2.5E-4	6.7E-7	3.2E-2				
108-88-3	Toluene		7.7E-7		9.5E-5				
100-41-4	Ethylbenzene		6.7E-6		4.4E-4				
1330-20-7	Xylene (mixed isomers)		3.3E-7		2.7E-5				
1634-04-4	Methyl t-Butyl ether		1.0E-6		7.5E-5				
0-00-0	TPH - Arom >C08-C10		7.7E-3		2.7E-1				
0-00-0	TPH - Aliph >C12-C16		1.8E-2		3.1E-1				
0-00-0	TPH - Aliph >C16-C21								
0-00-0	TPH - Arom >C16-C21								
0-00-0	TPH - Arom >C21-C35								
Cumulative Values:		5.3E-9	2.6E-2	6.7E-7	6.1E-1	0.0E+0	0.0E+0	0.0E+0	0.0E+0

* indicates risk level exceeding target risk

RBCA SITE ASSESSMENT

Cumulative Risk Worksheet

Site Name: Former Chevron Station No. 21-0208 Site Name: Former Chevron Station No. 21-0208 Completed By: J. Douglas

Job ID: DG20208H.3C01

Site Location: 6006 International Blvd., Oakland, CA Site Location: 6006 International Blvd., Oakland, CA Date Completed: 8-Jul-02

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CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-5 Target Hazard Index: 1.0E+0

Groundwater DAF Option: Domenico - First Order

OFF-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air Exposure:				Groundwater Exposure:			
		None		None		Commercial (1700 ft)		None	
CAS No.	Name	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-6 / 1.0E-5	Target HQ: 1.0E+0
		Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
71-43-2	Benzene*					3.5E-105	3.3E-101		
108-88-3	Toluene						6.1E-104		
100-41-4	Ethylbenzene						1.8E-102		
1330-20-7	Xylene (mixed isomers)						2.8E-104		
1634-04-4	Methyl t-Butyl ether						1.4E-101		
0-00-0	TPH - Arom >C08-C10						3.2E-100		
0-00-0	TPH - Aliph >C12-C16						1.6E-101		
0-00-0	TPH - Aliph >C16-C21						2.3E-102		
0-00-0	TPH - Arom >C16-C21						4.1E-101		
0-00-0	TPH - Arom >C21-C35						2.7E-101		
Cumulative Values:		0.0E+0	0.0E+0	0.0E+0	0.0E+0	3.5E-105	4.5E-100	0.0E+0	0.0E+0

■ indicates risk level exceeding target risk

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS (0 - 10 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)		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	None	None	Residential	Construction Worker	None	None
Benzene*	1.9E-1	5.9E+5				3.2E-7			
Toluene	5.0E-2	8.0E+5				6.3E-8			
Ethylbenzene	1.3E+0	1.2E+6				1.1E-6			
Xylene (mixed isomers)	4.5E-1	1.1E+6				4.2E-7			
Methyl t-Butyl ether	4.3E-1	4.4E+5				9.8E-7			
TPH - Arom >C08-C10	3.4E+2	1.8E+6				1.9E-4			
TPH - Aliph >C12-C16	2.2E+1	3.0E+6				7.2E-6			
TPH - Aliph >C16-C21	6.1E+1	1.1E+7				5.4E-6			
TPH - Arom >C16-C21	1.7E+1	2.4E+7				7.0E-7			
TPH - Arom >C21-C35	1.1E+1	9.0E+7				1.2E-7			

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

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SURFACE SOILS (0 - 10 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	Construction Worker	None	None	Residential	Construction Worker	None	None
Benzene*	4.1E-1				1.3E-7			
Toluene	9.6E-1				6.0E-8			
Ethylbenzene	9.6E-1				1.0E-6			
Xylene (mixed isomers)	9.6E-1				4.1E-7			
Methyl t-Butyl ether	9.6E-1				9.4E-7			
TPH - Arom >C08-C10	9.6E-1				1.8E-4			
TPH - Aliph >C12-C16	9.6E-1				6.9E-6			
TPH - Aliph >C16-C21	9.6E-1				5.2E-6			
TPH - Arom >C16-C21	9.6E-1				6.7E-7			
TPH - Arom >C21-C35	9.6E-1				1.2E-7			

* = Chemical with user-specified data

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

Site Name: Former Chevron Station No. 21-0208
Site Location: 6006 International Blvd., Oakland, CA
Completed By: J. Douglas

Date Completed: 8-Jul-02
Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS (10 - 10 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)	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	None	None	Residential	None	None
Benzene*	1.9E-1						
Toluene	5.0E-2						
Ethylbenzene	1.3E+0						
Xylene (mixed isomers)	4.5E-1						
Methyl t-Butyl ether	4.3E-1						
TPH - Arom >C08-C10	3.4E+2						
TPH - Aliph >C12-C16	2.2E+1						
TPH - Aliph >C16-C21	6.1E+1						
TPH - Arom >C16-C21	1.7E+1						
TPH - Arom >C21-C35	1.1E+1						

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

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

SUBSURFACE SOILS (10 - 10 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	None	None	Residential	None	None
Benzene*						
Toluene						
Ethylbenzene						
Xylene (mixed isomers)						
Methyl t-Butyl ether						
TPH - Arom >C08-C10						
TPH - Aliph >C12-C16						
TPH - Aliph >C16-C21						
TPH - Arom >C16-C21						
TPH - Arom >C21-C35						

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

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)							
GROUNDWATER: VAPOR INHALATION	Exposure Concentration						
	1) Source Medium	2) NAF Value (m ³ /L) Receptor			3) Exposure Medium Outdoor Air: POE Conc. (mg/m ³) (1) / (2)		
	Groundwater Conc. (mg/L)	On-site (0 ft) Residential	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None	On-site (0 ft) Residential	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None
Constituents of Concern							
Benzene*	1.0E-1	1.9E+5			5.4E-7		
Toluene	1.3E-2	1.7E+5			7.2E-8		
Ethylbenzene	1.8E-1	1.6E+5			1.1E-6		
Xylene (mixed isomers)	5.7E-2	1.8E+5			3.1E-7		
Methyl t-Butyl ether	1.4E-1	2.0E+5			7.0E-7		
TPH - Arom >C08-C10	1.3E+1	8.7E+4			1.5E-4		
TPH - Aliph >C12-C16	1.7E+0	9.0E+1			1.9E-2		
TPH - Aliph >C16-C21	4.6E+0	9.6E+0			4.8E-1		
TPH - Arom >C16-C21	1.3E+0	1.1E+6			1.1E-6		
TPH - Arom >C21-C35	8.4E-1	2.0E+6			4.1E-7		

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

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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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)	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	None	None	Residential	None	None
Benzene*	4.1E-1			2.2E-7		
Toluene	9.6E-1			6.9E-8		
Ethylbenzene	9.6E-1			1.1E-6		
Xylene (mixed isomers)	9.6E-1			3.0E-7		
Methyl t-Butyl ether	9.6E-1			6.7E-7		
TPH - Arom >C08-C10	9.6E-1			1.4E-4		
TPH - Aliph >C12-C16	9.6E-1			1.8E-2		
TPH - Aliph >C16-C21	9.6E-1			4.6E-1		
TPH - Arom >C16-C21	9.6E-1			1.1E-6		
TPH - Arom >C21-C35	9.6E-1			4.0E-7		

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

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m³)
 (Sum average exposure concentrations
 from soil and groundwater routes.)

Constituents of Concern	On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Residential	Construction Worker	None	None
Benzene*	3.5E-7			
Toluene	1.3E-7			
Ethylbenzene	2.1E-6			
Xylene (mixed isomers)	7.0E-7			
Methyl t-Butyl ether	1.6E-6			
TPH - Arom >C08-C10	3.3E-4			
TPH - Aliph >C12-C16	1.8E-2			
TPH - Aliph >C16-C21	4.6E-1			
TPH - Arom >C16-C21	1.7E-6			
TPH - Arom >C21-C35	5.1E-7			

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

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)				(3) Inhalation Unit Risk Factor (µg/m ³) ⁻¹	(4) Individual COC Risk (2) x (3) x 1000			
		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	None	None		Residential	Construction Worker	None	None
Benzene*	A	3.5E-7				8.3E-6	2.9E-9			
Toluene	D									
Ethylbenzene	D									
Xylene (mixed isomers)	D									
Methyl t-Butyl ether	-									
TPH - Arom >C08-C10	D									
TPH - Aliph >C12-C16	D									
TPH - Aliph >C16-C21	D									
TPH - Arom >C16-C21	D									
TPH - Arom >C21-C35	D									

Total Pathway Carcinogenic Risk = 2.9E-9

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

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)			(6) Inhalation Reference Conc. (mg/m ³)	(7) Individual COC Hazard Quotient (5) / (6)			
	On-site (0 ft)		Off-site 1 (0 ft)		On-site (0 ft)		Off-site 1 (0 ft)	Off-site 2 (0 ft)
	Residential	Construction Worker	None		Residential	Construction Worker	None	None
Benzene*	8.3E-7			6.0E-3	1.4E-4			
Toluene	1.3E-7			4.0E-1	3.2E-7			
Ethylbenzene	2.1E-6			1.0E+0	2.1E-6			
Xylene (mixed isomers)	7.0E-7			7.0E+0	1.0E-7			
Methyl t-Butyl ether	1.6E-6			3.0E+0	5.4E-7			
TPH - Arom >C08-C10	3.3E-4			2.0E-1	1.6E-3			
TPH - Aliph >C12-C16	1.8E-2			1.0E+0	1.8E-2			
TPH - Aliph >C16-C21								
TPH - Arom >C16-C21								
TPH - Arom >C21-C35								

Total Pathway Hazard Index = 2.0E-2

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
 Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

■ (CHECKED IF PATHWAY IS ACTIVE)

SOILS (0 - 10 ft): VAPOR

INTRUSION INTO ON-SITE BUILDINGS

Constituents of Concern	1) Source Medium	2) NAF Value (m ³ /kg) Receptor	3) Exposure Medium Indoor Air: POE Conc. (mg/m ³) (1) / (2)	4) Exposure Multiplier (EF×ED)/(AT×365) (unitless)	5) Average Inhalation Exposure Concentration (mg/m ³) (3) × (4)
	Soil Conc. (mg/kg)	Residential	Residential	Residential	Residential
Benzene*	1.9E-1	1.0E+3	1.9E-4	4.1E-1	7.7E-5
Toluene	5.0E-2	1.3E+3	3.8E-5	9.6E-1	3.7E-5
Ethylbenzene	1.3E+0	3.0E+3	4.4E-4	9.6E-1	4.2E-4
Xylene (mixed isomers)	4.5E-1	2.3E+3	1.9E-4	9.6E-1	1.9E-4
Methyl t-Butyl ether	4.3E-1	1.9E+3	2.3E-4	9.6E-1	2.2E-4
TPH - Arom >C08-C10	3.4E+2	6.3E+3	5.4E-2	9.6E-1	5.1E-2
TPH - Aliph >C12-C16	2.2E+1	1.8E+4	1.2E-3	9.6E-1	1.1E-3
TPH - Aliph >C16-C21	6.1E+1	2.5E+5	2.4E-4	9.6E-1	2.3E-4
TPH - Arom >C16-C21	1.7E+1	1.8E+6	9.3E-6	9.6E-1	8.9E-6
TPH - Arom >C21-C35	1.1E+1	2.1E+8	5.2E-8	9.6E-1	5.0E-8

* = 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 Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

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	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 (EF×ED)/(AT×365) (unitless) Residential	5) Average Inhalation Exposure Concentration (mg/m ³) (3) × (4) Residential
Constituents of Concern					
Benzene*	1.0E-1	1.1E+4	9.2E-6	4.1E-1	3.8E-6
Toluene	1.3E-2	1.0E+4	1.2E-6	9.6E-1	1.2E-6
Ethylbenzene	1.8E-1	9.5E+3	1.9E-5	9.6E-1	1.8E-5
Xylene (mixed isomers)	5.7E-2	1.1E+4	5.3E-6	9.6E-1	5.1E-6
Methyl t-Butyl ether	1.4E-1	1.7E+4	8.3E-6	9.6E-1	8.0E-6
TPH - Arom >C08-C10	1.3E+1	5.1E+3	2.6E-3	9.6E-1	2.5E-3
TPH - Aliph >C12-C16	1.7E+0	5.2E+0	3.2E-1	9.6E-1	3.1E-1
TPH - Aliph >C16-C21	4.6E+0	5.6E-1	8.3E+0	9.6E-1	7.9E+0
TPH - Arom >C16-C21	1.3E+0	7.2E+4	1.7E-5	9.6E-1	1.7E-5
TPH - Arom >C21-C35	8.4E-1	2.7E+5	3.1E-6	9.6E-1	2.9E-6

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 Station No. 21-0208 Date Completed: 8-Jul-02
 Site Location: 6006 International Blvd., Oakland, CA Job ID: DG20208H.3C01
 Completed By: J. Douglas

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

TOTAL PATHWAY EXPOSURE (mg/m³)
*(Sum average exposure concentrations
 from soil and groundwater routes.)*

Constituents of Concern	Residential
Benzene*	8.0E-5
Toluene	3.8E-5
Ethylbenzene	4.4E-4
Xylene (mixed isomers)	1.9E-4
Methyl t-Butyl ether	2.3E-4
TPH - Arom >C08-C10	5.4E-2
TPH - Aliph >C12-C16	3.1E-1
TPH - Aliph >C16-C21	7.9E+0
TPH - Arom >C16-C21	2.6E-5
TPH - Arom >C21-C35	3.0E-6

Site Name: Former Chevron Station No. 21-0208 Date Completed: 8-Jul-02
 Site Location: 6006 International Blvd., Oakland, C Job ID: DG20208H.3C01
 Completed By: J. Douglas

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAYS ARE ACTIVE)

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Exposure (mg/m ³)	(3) Inhalation Unit Risk Factor (μg/m ³) ⁻¹	(4) Individual COC Risk (2) x (3) x 1000
		Residential		Residential
Benzene*	A	8.0E-5	8.3E-6	6.7E-7
Toluene	D			
Ethylbenzene	D			
Xylene (mixed isomers)	D			
Methyl t-Butyl ether	-			
TPH - Arom >C08-C10	D			
TPH - Aliph >C12-C16	D			
TPH - Aliph >C16-C21	D			
TPH - Arom >C16-C21	D			
TPH - Arom >C21-C35	D			

Total Pathway Carcinogenic Risk = 6.7E-7

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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TIER 2 PATHWAY RISK CALCULATION

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

Constituents of Concern	TOXIC EFFECTS		
	(5) Total Toxicant Exposure (mg/m ³) Residential	(6) Inhalation Reference Concentration (mg/m ³)	(7) Individual COC Hazard Quotient (5) / (6) Residential
Benzene*	1.9E-4	6.0E-3	3.2E-2
Toluene	3.8E-5	4.0E-1	9.5E-5
Ethylbenzene	4.4E-4	1.0E+0	4.4E-4
Xylene (mixed isomers)	1.9E-4	7.0E+0	2.7E-5
Methyl t-Butyl ether	2.3E-4	3.0E+0	7.5E-5
TPH - Arom >C08-C10	5.4E-2	2.0E-1	2.7E-1
TPH - Aliph >C12-C16	3.1E-1	1.0E+0	3.1E-1
TPH - Aliph >C16-C21			
TPH - Arom >C16-C21			
TPH - Arom >C21-C35			

Total Pathway Hazard Index = 6.1E-1

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

SOILS : LEACHING TO
GROUNDWATER INGESTION

Constituents of Concern	1) Source Medium	2) NAF Value (L/kg) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
	Soil Conc. (mg/kg)	On-site (0 ft) None	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None	On-site (0 ft) None	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None
Benzene*	1.9E-1						
Toluene	5.0E-2						
Ethylbenzene	1.3E+0						
Xylene (mixed isomers)	4.5E-1						
Methyl t-Butyl ether	4.3E-1						
TPH - Arom >C08-C10	3.4E+2						
TPH - Aliph >C12-C16	2.2E+1						
TPH - Aliph >C16-C21	6.1E+1						
TPH - Arom >C16-C21	1.7E+1						
TPH - Arom >C21-C35	1.1E+1						

* = Chemical with user-specified data

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

Site Name: Former Chevron Station No. 21-0208

Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas

Date Completed: 8-Jul-02

Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

SOILS : LEACHING TO
GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day)			5) Average Daily Intake Rate (mg/kg/day) (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)
	None	None	None	None	None	None
Benzene*						
Toluene						
Ethylbenzene						
Xylene (mixed isomers)						
Methyl t-Butyl ether						
TPH - Arom >C08-C10						
TPH - Aliph >C12-C16						
TPH - Aliph >C16-C21						
TPH - Arom >C16-C21						
TPH - Arom >C21-C35						

* = Chemical with user-specified data

NOTE: AT = Averaging time (days)
BW = Body weight (kg)

ED = Exposure duration (yr)
EF = Exposure frequency (days/yr)

IR = Ingestion rate (mg/day)

Site Name: Former Chevron Station No. 21-0208
Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
Date Completed: 8-Jul-02

Job ID: DG20208H.30

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: INGESTION

Constituents of Concern	1) Source Medium	2) NAF Value (unitless) Receptor			3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2)		
	Groundwater Conc. (mg/L)	On-site (0 ft) None	Off-site 1 (1700 ft) Commercial	Off-site 2 (0 ft) None	On-site (0 ft) None	Off-site 1 (1700 ft) Commercial	Off-site 2 (0 ft) None
Benzene*	1.0E-1		1.0E+100			1.0E-101	
Toluene	1.3E-2		1.0E+100			1.3E-102	
Ethylbenzene	1.8E-1		1.0E+100			1.8E-101	
Xylene (mixed isomers)	5.7E-2		1.0E+100			5.7E-102	
Methyl t-Butyl ether	1.4E-1		1.0E+100			1.4E-101	
TPH - Arom >C08-C10	1.3E+1		1.0E+100			1.3E-99	
TPH - Aliph >C12-C16	1.7E+0		1.0E+100			1.7E-100	
TPH - Aliph >C16-C21	4.6E+0		1.0E+100			4.6E-100	
TPH - Arom >C16-C21	1.3E+0		1.0E+100			1.3E-100	
TPH - Arom >C21-C35	8.4E-1		1.0E+100			8.4E-101	

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

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

GROUNDWATER INGESTION (cont'd)

Constituents of Concern	4) Exposure Multiplier (IRxExED)/(BWxAT) (L/kg/day)			5) Average Daily Intake Rate (mg/kg/day) (3) x (4)		
	On-site (0 ft)	Off-site 1 (1700 ft)	Off-site 2 (0 ft)	On-site (0 ft)	Off-site 1 (1700 ft)	Off-site 2 (0 ft)
	None	Commercial	None	None	Commercial	None
Benzene*		3.5E-3			3.5E-104	
Toluene		9.8E-3			1.2E-104	
Ethylbenzene		9.8E-3			1.8E-103	
Xylene (mixed isomers)		9.8E-3			5.6E-104	
Methyl t-Butyl ether		9.8E-3			1.4E-103	
TPH - Arom >C08-C10		9.8E-3			1.3E-101	
TPH - Aliph >C12-C16		9.8E-3			1.6E-102	
TPH - Aliph >C16-C21		9.8E-3			4.5E-102	
TPH - Arom >C16-C21		9.8E-3			1.2E-102	
TPH - Arom >C21-C35		9.8E-3			8.2E-103	

* = Chemical with user-specified data

NOTE: AT = Averaging time (days)
BW = Body weight (kg)

ED = Exposure duration (yr)
EF = Exposure frequency (days/yr)

IR = Ingestion rate (mg/day)

Site Name: Former Chevron Station No. 21-0208
Site Location: 6006 International Blvd., Oakland, CA

Completed By: J. Douglas
Date Completed: 8-Jul-02

Job ID: DG20208H.3

RBCA SITE ASSESSMENT

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TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

MAXIMUM PATHWAY INTAKE (mg/kg/day)
*(Maximum intake of active pathways
 soil leaching & groundwater routes.)*

Constituents of Concern	On-site (0 ft)	Off-site 1	Off-site 2
	None	Commercial	None
Benzene*		3.5E-104	
Toluene		1.2E-104	
Ethylbenzene		1.8E-103	
Xylene (mixed isomers)		5.6E-104	
Methyl t-Butyl ether		1.4E-103	
TPH - Arom >C08-C10		1.3E-101	
TPH - Aliph >C12-C16		1.6E-102	
TPH - Aliph >C16-C21		4.5E-102	
TPH - Arom >C16-C21		1.2E-102	
TPH - Arom >C21-C35		8.2E-103	

* = Chemical with user-specified data

Site Name: Former Chevron Station No. 21-0208
 3C Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

■ (CHECKED IF PATHWAYS ARE ACTIVE)

CARCINOGENIC RISK

Constituents of Concern	(1) EPA Carcinogenic Classification	(2) Maximum Carcinogenic Intake Rate (mg/kg/day)			(3) Oral Slope Factor (mg/kg-day) ⁻¹	(4) Individual COC Risk (2) x (3)		
		On-site (0 ft)	Off-site 1	Off-site 2		On-site (0 ft)	Off-site 1	Off-site 2
		None	Commercial	None		None	Commercial	None
Benzene*	A		3.5E-104		1.0E-1		3.5E-105	
Toluene	D							
Ethylbenzene	D							
Xylene (mixed isomers)	D							
Methyl t-Butyl ether	-							
TPH - Arom >C08-C10	D							
TPH - Aliph >C12-C16	D							
TPH - Aliph >C16-C21	D							
TPH - Arom >C16-C21	D							
TPH - Arom >C21-C35	D							

Total Pathway Carcinogenic Risk =

3.5E-105

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
 Completed By: J. Douglas

Date Completed: 8-Jul-02
 Job ID: DG20208H.3C01

RBCA SITE ASSESSMENT

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TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS

(CHECKED IF PATHWAYS ARE ACTIVE)

TOXIC EFFECTS

Constituents of Concern	(5) Maximum Toxicant Intake Rate (mg/kg/day)			(6) Oral Reference Dose (mg/kg/day)	(7) Individual COC Hazard Quotient (5) / (6)		
	On-site (0 ft) None	Off-site 1 Commercial	Off-site 2 None		On-site (0 ft) None	Off-site 1 Commercial	Off-site 2 None
Benzene*		9.8E-104		3.0E-3		3.3E-101	
Toluene		1.2E-104		2.0E-1		6.1E-104	
Ethylbenzene		1.8E-103		1.0E-1		1.8E-102	
Xylene (mixed isomers)		5.6E-104		2.0E+0		2.8E-104	
Methyl t-Butyl ether		1.4E-103		1.0E-2		1.4E-101	
TPH - Arom >C08-C10		1.3E-101		4.0E-2		3.2E-100	
TPH - Aliph >C12-C16		1.6E-102		1.0E-1		1.6E-101	
TPH - Aliph >C16-C21		4.5E-102		2.0E+0		2.3E-102	
TPH - Arom >C16-C21		1.2E-102		3.0E-2		4.1E-101	
TPH - Arom >C21-C35		8.2E-103		3.0E-2		2.7E-101	

Total Pathway Hazard Index =

4.5E-100

Site Name: Former Chevron Station No. 21-0208
 Site Location: 6006 International Blvd., Oakland, CA
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