JONAS & ASSOCIATES INC.

Environmental Consultants

2815 Mitchell Drive, Suite 209 • Walnut Creek, CA 94598 • Tel: (510) 933-5360 • Fax: (510) 933-5362

November 14, 1997

Ms. Madhulla Logan
Department of Environmental Health
Alameda County Environmental Health Services
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California 94502
(510) 567-6764; 337-9335 fax

Subject: Transmittal of the November 14, 1997 "Risked-Based Corrective Action (RBCA) Modeling, Oakland General Tire, 1201 14th Avenue, Oakland, California"

Project: Former Oakland General Tire Facility
1201 14th Avenue, Oakland, California
J&A #: PCO-220

Dear Madhulla:

Attached is the November 14, 1997 "Risked-Based Corrective Action (RBCA) Modeling, Oakland General Tire, 1201 14th Avenue, Oakland, California". This report presents the methodology and results associated modeling indoor and outdoor air exposure as a result of groundwater contamination. As identified by the modeling results chemical carcinogenic risk did not exceed $1(10)^{-5}$ for indoor and outdoor air exposure and most of the site appears to have significantly lower carcinogenic risk. The modeling effort used four sampling rounds performed under agency oversight and showed that the pathways simulated were within an acceptable degree of risk with respect to agency policy.

Therefore, since the agency had previously determined that groundwater contamination under the Oakland General Tire facility was from an off-site source or source(s) and as simulated the risk associated with on-site groundwater contamination on indoor and outdoor air exposure is considered acceptable, for Continental General Tire, Inc. we are requesting regulatory closure for the site.

During the modeling effort vinyl chloride resulted in the greatest potential risk. The maximum groundwater concentration of vinyl chloride from the four rounds used was 0.0053 mg/L. A subsequent sample collected from monitoring well MW-2 by a consultant for Style Center Cleaners detected a vinyl chloride concentration of 0.0023 mg/L at monitoring well MW-2, which would result in an estimated carcinogenic risk below $1(10)^{-5}$. A split sample detected vinyl chloride at 0.0072 mg/L, which would result in an estimated carcinogenic risk below $1(10)^{-5}$ for outdoor air exposure but slightly above $1(10)^{-5}$ for indoor air exposure at monitoring well MW-2. Risk across the site would still be below $1(10)^{-5}$.

We are requesting that regulatory closure be expatiated in support of a potential real estate transaction. I would be glad to meet with you to discuss the attached report or any aspect associated with this project.

Report Prepared for:

CONTINENTAL GENERAL TIRE, INC.
1800 Continental Boulevard
Charlotte, North Carolina 28273

Risk-Based Corrective Action
(RBCA) Modeling
Oakland General Tire
1201 14th Avenue
Oakland, California

Jonas and Associates Inc. Job No. GT-213

Prepared by:

Mark L. Jonas, R.G.
Project Manager
Jonas and Associates Inc.
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Walnut Creek, California 94598
(510) 933-5360

REGISTERED GEOLOGISTS • STATE OF CALIFORNIA •
MARK L. JONAS No. 6392

November 14, 1997

Risk-Based Corrective Action (RBCA) Modeling

Oakland General Tire
1201 14th Avenue
Oakland, California

November 14, 1997

Prepared for:

Continental General Tire, Inc.
Charlotte, North Carolina

Prepared by:

Jonas and Associates Inc.
Walnut Creek, California
(510) 933-5360

Risk-Based Corrective Action
(RBCA) Modeling

Oakland General Tire
1201 14th Avenue
Oakland, California

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Risk-Based Corrective Action (RBCA) Modeling

Oakland General Tire
1201 14th Avenue, Oakland, California
November 14, 1997

1.0 INTRODUCTION

Jonas and Associates Inc. (J&A) has been retained by Continental General Tire, Inc. (General Tire) to perform Risk-Based Corrective Action (RBCA) modeling for their property located at 1201 14th Avenue, in Oakland, California 94606. The methodology and calculations for RBCA modeling conforms with ASTM E-1739 "Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites". Risk from air exposure from volatile organics detected in groundwater contamination was estimated using a RBCA Spreadsheet System (GSI, 1997). Alameda County Health Care Services Agency has determined that the groundwater contamination found under the Oakland General Tire facility is from an off-site source or sources. RBCA modeling of the Oakland General Tire site was performed for consideration of regulatory closure.

The Oakland General Tire site has been characterized since 1990 as presented in reports identified in Section 4.0 References. Since May 1997 the agency has not required on-site groundwater monitoring. The RBCA characterization of on-site groundwater quality was based on four rounds of groundwater monitoring well samples collected from June 1994 through August 1996.

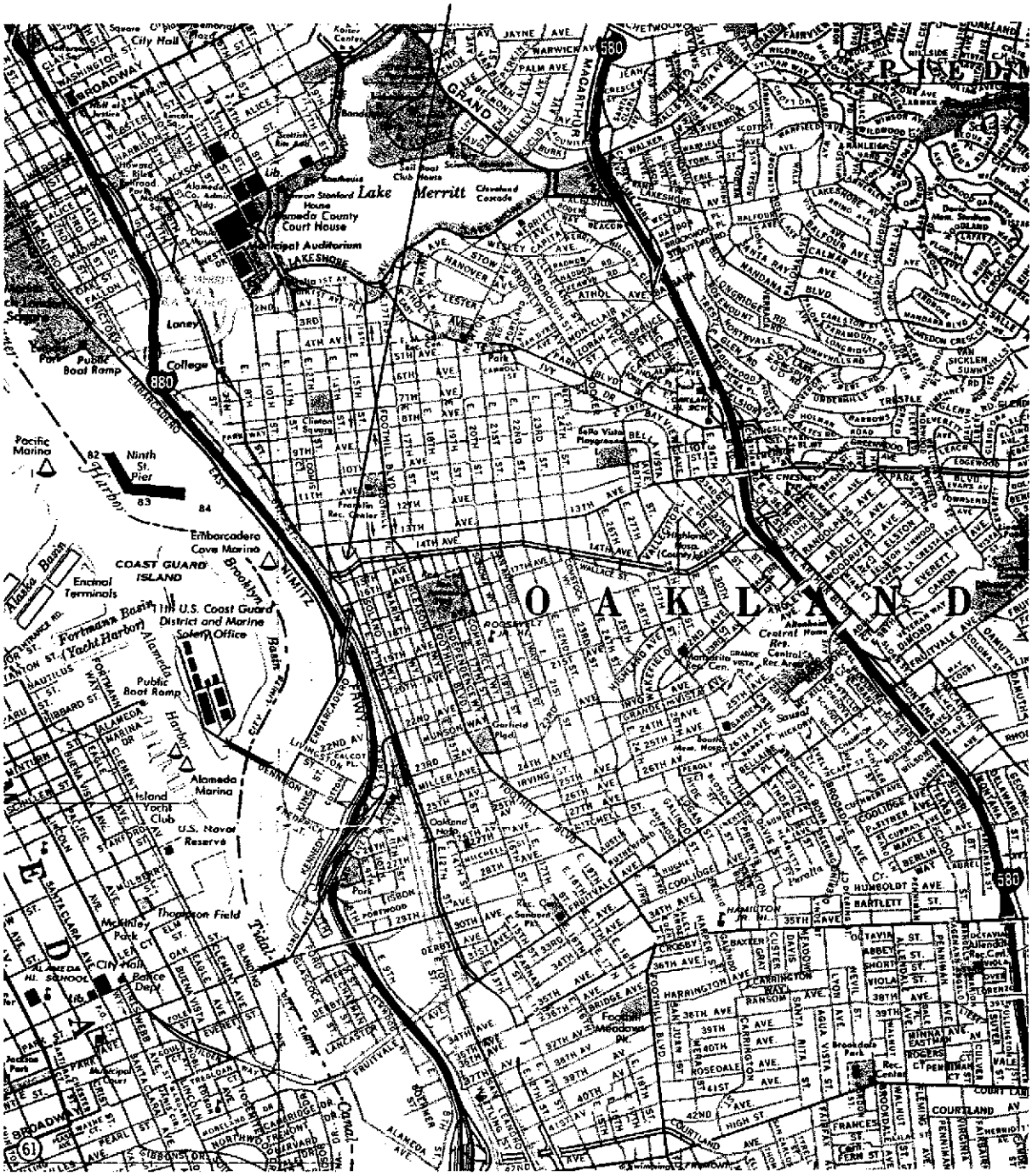
Continental General Tire's environmental representative for this project is Mr. Mike McNally {(704) 583-8561}. The lead agency for this project is the Alameda County Health Care Services Agency, Department of Environmental Health, Hazardous Division (Alameda County Health Services, agency) The address of Alameda County Health Services is 1131 Harbor Bay Parkway, 2nd Floor, Alameda, California 94502. The agency representative is Ms. Madhulla Logan {(510) 567-6764}.

1.1 Site Description

The Oakland General Tire facility is located at 1201 14th Avenue, in Oakland, California, in the County of Alameda. Prior to 1991, General Tire had an active facility at this location. The facility was primarily associated with tire sales and installation, with some minor auto repair (EMG, 1990). Currently, this property is for sale and is vacant.

Figure 1 presents the regional location of the Oakland General Tire facility. On the former Oakland General Tire facility is a single story, irregularly shaped building of approximately 9,400 square feet. It was built in 1960 and is situated along the north edge of a triangular shaped lot with dimensions of approximately 126' by 248' by 279'. Adjacent to the Oakland General Tire property is Style Center Cleaners, located at 1353 East 14th Street. Style Center Cleaners is an active facility and may be contributing to local groundwater contamination

1201 14th Avenue
Oakland, California



REGIONAL LOCATION
GENERAL TIRE, CO.
1201 14TH AVENUE
OAKLAND, CALIFORNIA

1" = 1/2 MILE

Figure 1	Drawing Number GT213-F1

1.2 Scope of Report

This "Risk-Based Corrective Action (RBCA) Modeling" report is presented in four sections and three appendices. Section 1, Introduction, provides a brief description of the site and the scope of the report. Section 2, RBCA Modeling, presents the methodologies and results associated with Risk-Based Corrective Action modeling. Section 3, Conclusions, present the findings of the RBCA modeling effort. Section 4, References, cites various documents relevant to the site.

The appendices of the report include RBCA simulations for maximum concentrations from sampling rounds two through five for monitoring well MW-1 and monitoring well MW-2, and 90% Upper Confidence Limit (UCL) values for monitoring wells MW-1, MW-2, and MW-3.

2.0 RBCA MODELING

Risk-Based Corrective Action (RBCA) modeling is accepted by Alameda County Health Care Services Agency to determine risk associated with exposure pathways. RBCA methodology and calculations are defined in ASTM E-1739 "Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites." To perform these calculations a RBCA Spreadsheet System (version 1.0.1) by Groundwater Services Inc (GSI) was used. The RBCA Spreadsheet System consists of a series of linked worksheets in Microsoft Excel 97. Risk assessment procedures employed by the GSI RBCA Spreadsheet System are also consistent with U.S. EPA guidelines.

2.1 RBCA Modeling Simulations

To characterize potential air exposure risk from on-site groundwater contamination three simulations were performed. Groundwater contamination detected under the Oakland General Tire facility is considered to be from an off-site source or sources. All three RBCA risk simulations for the site are based on volatile organics detected during four rounds of groundwater samples collected from June 1994 through August 1996. Figure 2 identifies the locations of the three on-site monitoring wells and other site features. Table 1 presents a summary of detected constituents for the sampling rounds required by the regulatory agency. For those Table 1 constituents which were not detected a concentration representing half the detection limit was used. Both outdoor and indoor air exposure were evaluated with respect to carcinogenic risk. Input parameters for each of the three RBCA simulations and the results are presented in the appendices of this report. The scenario used to estimate risk, with volatile organics in groundwater entering into indoor and outdoor air, was performed in consultation with and concurrence from Ms. Logan of Alameda Health Care Services Agency.

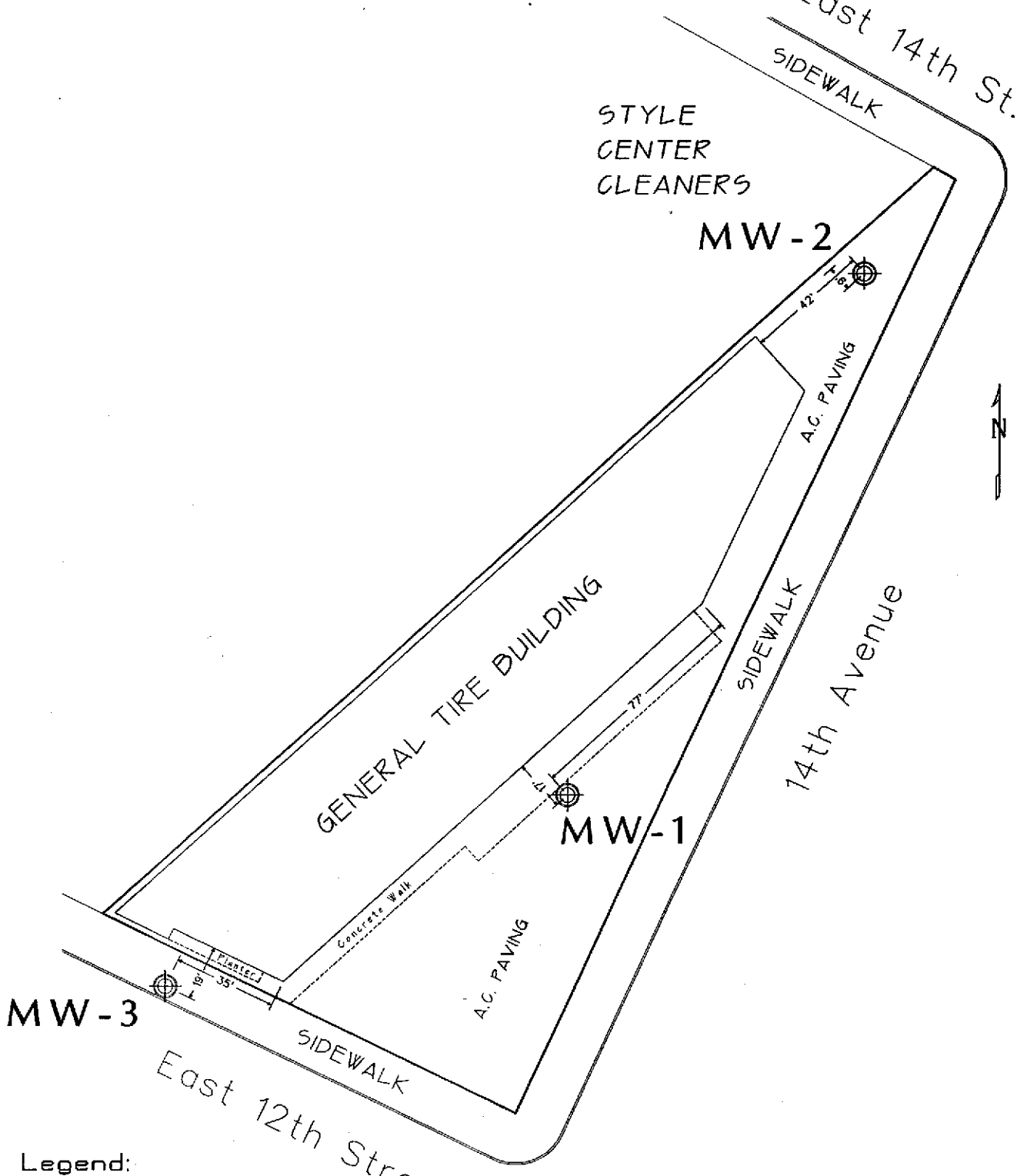
Following is a summary of the three RBCA modeling simulations used for analyzing outdoor and indoor air exposure risk from groundwater contamination:

Monitoring Well MW-2, Maximum Concentrations, Outdoor and Indoor Air Exposure

Monitoring well MW-2 is closest to Style Center Cleaners and has the highest concentrations of volatile organics. Because of the presence of vinyl chloride and elevated concentrations of volatile organics, groundwater in the area of MW-2 may be considered to pose the greatest risk with respect to air exposure. Maximum concentrations detected during sampling rounds two through five were used to determine a "reasonable maximum" risk for the site. This assumes that estimated risk is generally the same or decreases through time. The estimated risk determined by this simulation applies to local conditions represented by concentrations and constituents detected in monitoring well MW-2 groundwater samples.

Monitoring Well MW-1, Maximum Concentrations, Outdoor and Indoor Air Exposure

Monitoring well MW-1 is located in front of the on-site building which housed the Oakland General Tire facility. This monitoring well is located downgradient from Style Centers Cleaners. Volatile organics have been detected in samples collected from



Legend:

Monitoring Well

Well	Date Installed	Total Depth	Screen Depth
MW-1	-3/1992	16.5'	5.5'-15.5'
MW-2	9/7/1993	16.5'	5.5'-15.5'
MW-3	9/7/1993	16.5'	5.5'-15.5'

Scale

25 0 25 50 Feet

Site Map

General Tire, Inc.
1201 14th Avenue
Oakland, California

Prepared by
JONAS & ASSOCIATES INC.

Date: 9-25-1997
Locations Approx.

Figure 2

Drawing Number GT213-9/97:F2

Drawn by M.J. 9-25-1997

Figure 2

Drawing Number GT213-9/97:F2

Table 1

Summary of Detected Concentrations in Groundwater
Oakland General Tire

Well	Sampling Round & Date	Detected Analytes {mg/L}													
		TEPH-Diesel	TEPH-Kerosene	TEPH-Motor Oil	Chloroform	1,1-DCA	1,1-DCE	cis 1,2-DCE	trans 1,2-DCE	1,1,2,2-PCA	PCE	1,1,1-TCA	1,1,2-TCA	TCE	VC
MW-1	Round One (10/5/93)	ND(0.050)	ND(0.050)	ND(0.5)	ND(0.0005)	**0.0013**	ND(0.0005)	**0.00070**	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
	Round Two (6/17/94)	ND(0.050)	ND(0.050)	ND(0.5)	ND(0.0005)	ND(0.0005)	ND(0.0005)	**0.00033**	ND(0.0005)	**0.00058**	ND(0.0005)	ND(0.0005)	**0.00057**	ND(0.0005)	ND(0.0005)
	Round Three (5/17/95)	ND(0.050)	ND(0.050)	ND(0.500)	ND(0.0005)	**0.0060**	ND(0.0005)	**0.0042**	ND(0.0005)	ND(0.0005)	ND(0.0005)	**0.0006**	ND(0.0005)	**0.0013**	ND(0.0005)
	Round Four (8/10/95)	ND(0.050)	ND(0.050)	ND(0.500)	ND(0.0005)	**0.0010**	ND(0.0005)	**0.0010**	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
	Round Five (8/22/96)	**0.050**	ND(0.050)	ND(0.500)	**0.00080**	**0.00060**	ND(0.0005)	**0.00090**	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
MW-2	Round One	ND(0.050)	**0.490**	**0.7**	ND(0.0005)	ND(0.0005)	**0.0010**	**0.031**	ND(0.0005)	ND(0.0005)	**0.040**	ND(0.0005)	ND(0.0005)	**0.046**	**0.0015**
	Round Two	ND(0.050)	ND(0.050)	ND(0.5)	ND(0.0005)	ND(0.0005)	**0.0017**	**0.048**	**0.0013**	ND(0.0005)	**0.044**	ND(0.0005)	ND(0.0005)	**0.087**	**0.0053**
	Round Three	ND(0.050)	ND(0.050)	ND(0.500)	ND(0.0005)	ND(0.0005)	ND(0.0005)	**0.013**	ND(0.0005)	ND(0.0005)	**0.0044**	ND(0.0005)	ND(0.0005)	**0.017**	ND(0.0005)
	Round Four	ND(0.050)	ND(0.050)	ND(0.500)	ND(0.0005)	ND(0.0005)	ND(0.0005)	**0.017**	ND(0.0005)	ND(0.0005)	**0.0060**	ND(0.0005)	ND(0.0005)	**0.026**	**0.0020**
	Round Five	ND(0.050)	ND(0.050)	ND(0.500)	**0.0012**	ND(0.0005)	**0.00080**	**0.026**	**0.00070**	ND(0.0005)	**0.016**	ND(0.0005)	ND(0.0005)	**0.064**	**0.0023**
MW-3	Round One	ND(0.050)	ND(0.050)	ND(0.5)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
	Round Two	ND(0.050)	ND(0.050)	ND(0.5)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
	Round Three	ND(0.050)	ND(0.050)	ND(0.500)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
	Round Four	ND(0.050)	ND(0.050)	ND(0.500)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
	Round Five	ND(0.050)	ND(0.050)	ND(0.500)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)

Legend - TEPH: Total Extractable Petroleum Hydrocarbons
1,1-DCA: 1,1-Dichloroethane
1,1-DCE: 1,1-Dichloroethene
1,2-DCE: 1,2-Dichloroethene
1,1,2,2-PCA: Tetrachloroethane
PCE: Tetrachloroethene
1,1,1-TCA: 1,1,1-Trichloroethane
1,1,2-TCA: 1,1,2-Trichloroethane
TCE: Trichloroethene
VC: Vinyl Chloride

monitoring well MW-1. To determine the reasonable maximum risk for the area around monitoring well MW-1, maximum concentrations detected during four sampling rounds were used. This simulation was performed to assess the differences in air exposure risk when comparing the groundwater concentrations from monitoring well MW-1 versus monitoring well MW-2.

Monitoring Wells MW-1, MW-2, & MW-3, 90% Upper Confidence Limit (UCL) Values, Outdoor and Indoor Air Exposure

This simulation uses data from all three on-site monitoring wells collected during four groundwater sampling rounds. To determine more representative on-site concentrations 90% Upper Confidence Limit (UCL) groundwater values were used in the simulation. This simulation defines an area-wide risk across the Oakland General Tire site from outdoor and indoor air exposure routes. The Oakland General Tire site covers an area approximately 28,600 square feet.

2.2 RBCA Modeling Results

The RBCA modeling effort used three simulation scenarios. The following Table 2 presents the findings of the RBCA modeling simulations with respect to carcinogenic risk associated with outdoor and indoor air exposure impacted from groundwater contamination.

Table 2
Summary of RBCA Modeling Results

RBCA Simulation	Outdoor Air Commercial Exposure Carcinogenic Risk	Exceeds $1(10)^{-5}$ Carcinogenic Risk	Indoor Air Commercial Exposure Carcinogenic Risk	Exceeds $1(10)^{-5}$ Carcinogenic Risk
Monitoring Well MW-2 Maximum Concentrations Rounds Two through Five	$4.7(10)^{-8}$ to $2.0(10)^{-10}$	No	$9.0(10)^{-6}$ to $2.6(10)^{-8}$	No
Monitoring Well MW-1 Maximum Concentrations Rounds Two through Five	$1.3(10)^{-10}$ to $2.5(10)^{-11}$	No	$1.7(10)^{-8}$ to $1.7(10)^{-9}$	No
Monitoring Wells MW-1, MW-2, & MW-3 90% Upper Confidence Limit Rounds Two through Five	$6.4(10)^{-9}$ to $1.4(10)^{-11}$	No	$1.2(10)^{-6}$ to $9.4(10)^{-10}$	No

As seen in the results presented in the appendices and summarized in Table 2, the highest carcinogenic risk is represented by the groundwater concentrations detected in monitoring well MW-2 samples with the greatest risk associated with vinyl chloride. Air exposure risk associated with groundwater concentrations detected in monitoring well MW-1 is significantly lower. Risk associated with indoor air exposure is greater than outdoor air exposure. All RBCA simulations presented in this report did not exceed $1(10)^{-5}$ carcinogenic risk with most of the site exhibiting a significantly lower risk.

3.0 CONCLUSIONS

Following are conclusions from the RBCA modeling effort presented in this report:

1/ Based on the RBCA modeling effort for the sampling rounds simulated, carcinogenic risk did not exceed $1(10)^{-5}$ for indoor and outdoor air exposure from groundwater contamination.

2/ Most of the site has significantly less than $1(10)^{-5}$ carcinogenic risk for air exposure from groundwater contamination.

3/ Indoor air exposure from groundwater contamination is greater than outdoor air exposure.

4.0 REFERENCES

Alameda County Health Care Services Agency, 1993. Letter submitted to General Tire Inc. titled "No further action recommendation on Spilled material located at General Tire Facility, 1201 14th Ave., Oakland, CA 94606", March 22, 1993.

_____, 1993. Letter submitted to General Tire Inc. titled "Review of Environmental Site Investigation Work Plan for the General Tire Facility at 1202 (1201) E 14th Avenue, Oakland, CA 94606", July 12, 1993.

_____, 1994. Letter submitted to Jonas and Associates titled "General Tire - 1201 14th Avenue, Oakland, California", December 12, 1994.

_____, 1996. Letter submitted to Jonas and Associates titled "Oakland General Tire, 1201 14th Avenue, Oakland, CA", August 21, 1996.

American Society for Testing and Materials (ASTM), 1996. "Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites", Designation: E 1739-95e1, December 1996.

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Groundwater Services, Inc. (GSI), 1997. Tier 2 RBCA Tool Kit with RBCA Spreadsheet System (Version 1.0.1).

H^+GCL Environmental Scientist and Engineers, 1992. "Phase II Investigation, 1201 14th Avenue, Oakland, California", April 1992.

Jonas & Associates Inc, 1993. "Environmental Site Investigation Work Plan, General Tire Oakland Facility, General Tire, Inc., 1201 14th Avenue, Oakland, California", June 4, 1993.

_____, 1993. "Environmental Site Investigation Work Plan Addendum, General Tire Oakland Facility, 1201 14th Avenue, Oakland, California", July 19, 1993.

_____, 1994. "Environmental Site Investigation Report, General Tire Oakland Facility, General Tire, Inc., 1201 14th Avenue, Oakland, California", February 16, 1994.

_____, 1994. "Environmental Site Investigation Report, General Tire Oakland Facility, General Tire, Inc., 1201 14th Avenue, Oakland, California", October 26, 1994.

_____, 1995. Letter submitted to Alameda County Health Care Services Agency titled "Remittal of Work Plan Submittal Requirement, (for) Oakland General Tire, 1201 14th Avenue, Oakland, California", April 13, 1995.

_____, 1995. "Groundwater Monitoring Report, Sampling Rounds Three and Four, Oakland General Tire, 1201 14th Avenue, Oakland, California", November 10, 1995.

_____, 1996. "Groundwater Monitoring Report, Sampling Rounds Five, Oakland General Tire, 1201 14th Avenue, Oakland, California", September 30, 1996.

Keir & Wright Civil Engineers & Surveyors, Inc., 1993. "General Tire Facility", November 22, 1993.

Appendix A

Monitoring Well MW-2
Maximum Concentrations
Outdoor and Indoor Air Exposure
RBCA Simulation

Site Name: Oakland General Tire
Completed By: Mark Jonas, R.G.
Site Location: 1201 14th Ave., Oakland, CA
Date Completed: 9/15/1997

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-4 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air: Commercial Exposure Target Risk: 1.0E-5 / 1.0E-5	Outdoor Air: Commercial Exposure Target HQ: 1.0E+0	Indoor Air: Commercial Exposure Target Risk: 1.0E-5 / 1.0E-5	Indoor Air: Commercial Exposure Target HQ: 1.0E+0	Soil:		Groundwater:	
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
67-66-3	Chloroform	2.0E-10		2.6E-8		NA	NA	NA	NA
75-35-4	Dichloroethene, 1-1	1.5E-9		2.4E-7		NA	NA	NA	NA
156-59-2	Dichloroethene, cis-1,2-					NA	NA	NA	NA
156-60-5	Dichloroethene,1,2-trans-					NA	NA	NA	NA
127-18-4	Tetrachloroethene	6.6E-10		1.2E-7		NA	NA	NA	NA
79-01-6	Trichloroethene	5.4E-9		3.9E-7		NA	NA	NA	NA
75-01-4	Vinyl chloride	4.7E-8		9.0E-6		NA	NA	NA	NA
Cumulative Values:		**5.5E-8**	**0.0E+0**	**9.7E-6**	**0.0E+0**	**0.0E+0**	**0.0E+0**	**0.0E+0**	**0.0E+0**

■ Indicates risk level exceeding target risk

Software: GSI RBCA Spreadsheet
Version: 1.0.1
Serial: G-451-KUX-984

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

(Complete the following table)

CONSTITUENT	Representative COC Concentration in Groundwater value (mg/L)	note	in Surface Soil value (mg/kg)	note	in Subsurface Soil value (mg/kg)	note
Chloroform	1.2E-3	max				
Dichloroethene, 1-1	1.7E-3	max				
Dichloroethene, cis-1,2-	4.8E-2	max				
Dichloroethene,1,2-trans-	1.3E-3	max				
Tetrachloroethene	4.4E-2	max				
Trichloroethene	8.7E-2	max				
Vinyl chloride	5.3E-3	max				

Site Name: Oakland General Tire
Site Location: 1201 14th Ave., Oakland, CA

Completed By: Mark Jonas, R.G.
Date Completed: 9/15/1997

Site Name: Oakland General Tire
Site Location: 1201 14th Ave., Oakland, CA
Completed By: Mark Jonas, R.G.
Date Completed: 9/15/1997

TIER 2 GROUNDWATER CONCENTRATION DATA SUMMARY

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations		
CAS No.	Name	Typical Detection Limit (mg/L)	No. of Samples	No. of Detects	Maximum Conc. (mg/L)	Mean Conc. (mg/L)	UCL on Mean Conc. (mg/L)
67-66-3	Chloroform	5.0E-04	4	4	1.2E-03	4.9E-04	8.8E-04
75-35-4	Dichloroethene, 1-1	5.0E-04	4	4	1.7E-03	7.5E-04	1.3E-03
156-59-2	Dichloroethene, cis-1,2-	5.0E-04	4	4	4.8E-02	2.6E-02	3.9E-02
156-60-5	Dichloroethene,1,2-trans-	5.0E-04	4	4	1.3E-03	6.3E-04	1.0E-03
127-18-4	Tetrachloroethene	5.0E-04	4	4	4.4E-02	1.2E-02	2.7E-02
79-01-6	Trichloroethene	5.0E-04	4	4	8.7E-02	4.9E-02	7.5E-02
75-01-4	Vinyl chloride	5.0E-04	4	4	5.3E-03	2.5E-03	4.2E-03

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 1 OF 4

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAY — ■ CHECKED IF PATHWAYS ARE ACTIVE

Constituents of Concern	(1) EPA Classification	CARCINOGENIC RISK: (2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site Commercial		(3) Inhalation Slope Factor (mg/kg-day)^-1	CARCINOGENIC RISK: (4) Individual COC Risk (2) x (3) On-Site Commercial		TOXIC EFFECTS: (5) Total Toxicant Intake Rate (mg/kg/day) On-Site Commercial		TOXIC EFFECTS: (6) Inhalation Reference Dose (mg/kg-day)	TOXIC EFFECTS: (7) Individual COC Hazard Quotient (5) / (6) On-Site Commercial	
Chloroform	B2	2.5E-9		8.1E-2	2.0E-10						
Dichloroethene, 1-1	C	8.3E-9		1.8E-1	1.5E-9						
Dichloroethene, cis-1,2-	D										
Dichloroethene,1,2-trans-											
Tetrachloroethene	C-B2	3.2E-7		2.0E-3	6.6E-10						
Trichloroethene	B2 (33)	8.9E-7		6.0E-3	5.4E-9						
Vinyl chloride	A	1.6E-7		3.0E-1	4.7E-8						
Total Pathway Carcinogenic Risk =					5.5E-8	0.0E+0	***Total Pathway Hazard Index =***			0.0E+0	0.0E+0

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 3 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

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

GROUNDWATER: VAPOR INHALATION

Constituents of Concern	Exposure Concentration: 1) Source Medium — Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor — On-Site Commercial		3) Exposure Medium — Outdoor Air: POE Conc. (mg/m^3) (1) / (2) — On-Site Commercial		4) Exposure Multiplier (IRxEFxEDy/(BWxAT) (m^3/kg-day) — On-Site Commercial		5) Average Daily Intake Rate (mg/kg-day) (3) X (4) — On-Site Commercial		TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface, subsurface & groundwater routes.) — On-Site Commercial	
Chloroform	1.2E-3	3.4E+4		3.5E-8		7.0E-2		2.5E-9		2.5E-9	
Dichloroethene, 1-1	1.7E-3	1.4E+4		1.2E-7		7.0E-2		8.3E-9		8.3E-9	
Dichloroethene, cis-1,2-	4.8E-2	8.2E+3		5.8E-6		2.0E-1		1.1E-6		1.1E-6	
Dichloroethene,1,2-trans-	1.3E-3	3.1E+4		4.3E-8		2.0E-1		8.3E-9		8.3E-9	
Tetrachloroethene	4.4E-2	9.5E+3		4.6E-6		7.0E-2		3.2E-7		3.2E-7	
Trichloroethene	8.7E-2	6.6E+3		1.3E-5		7.0E-2		8.9E-7		8.9E-7	
Vinyl chloride	5.3E-3	2.4E+3		2.3E-6		7.0E-2		1.6E-7		1.6E-7	

NOTE: ABS = Dermal absorption factor (dim); AF = Adherance factor (mg/cm^2); AT = Averaging time (days); BW = Body weight (kg); CF = Units conversion factor; ED = Exposure duration (yrs); EF = Exposure frequency (days/yr); ET = Exposure time (hrs/day); IR = Inhalation rate (m^3/day); POE = Point of exposure; SA = Skin exposure area (cm^2/day)

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 2 OF 4

TIER 2 PATHWAY RISK CALCULATION

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

Constituents of Concern	(1) EPA Classification	CARCINOGENIC RISK: (2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site	Commercial	(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site	Commercial	TOXIC EFFECTS: (5) Total Toxicant Intake Rate (mg/kg/day) On-Site	Commercial	(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site	Commercial
Chloroform	B2		3.2E-7	8.1E-2		2.6E-8					
Dichloroethene, 1-1	C		1.4E-6	1.6E-1		2.4E-7					
Dichloroethene, cis-1,2-	D										
Dichloroethene,1,2-trans-											
Tetrachloroethene	C-B2		5.9E-5	2.0E-3		1.2E-7					
Trichloroethene	B2 (33)		6.5E-5	6.0E-3		3.9E-7					
Vinyl chloride	A		3.0E-5	3.0E-1		9.0E-6					

Total Pathway Carcinogenic Risk = 0.0E+0 | 9.7E-6

Total Pathway Hazard Index = 0.0E+0 | 0.0E+0

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 5 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

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

GROUNDWATER: VAPOR INTRUSION TO BUILDINGS

Constituents of Concern	Exposure Concentration 1) Source Medium: Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor: On-Site Commercial	3) Exposure Medium: Indoor Air: POE Conc. (mg/m^3) (1) / (2) — On-Site Commercial	4) Exposure Multiplier: (IRxEFxED)/(BWxAT) (m^3/kg-day) — On-Site Commercial	5) Average Daily Intake Rate: (mg/kg-day) (3) X (4) — On-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from subsurface & groundwater routes.) — On-Site Commercial
Chloroform	1.2E-3	2.6E+2	4.6E-6	7.0E-2	3.2E-7	3.2E-7
Dichloroethene, 1-1	1.7E-3	8.7E+1	2.0E-5	7.0E-2	1.4E-6	1.4E-6
Dichloroethene, cis-1,2-	4.8E-2	4.6E+1	1.0E-3	2.0E-1	2.0E-4	2.0E-4
Dichloroethene,1,2-trans-	1.3E-3	2.4E+2	5.4E-6	2.0E-1	1.1E-6	1.1E-6
Tetrachloroethene	4.4E-2	5.2E+1	8.4E-4	7.0E-2	5.9E-5	5.9E-5
Trichloroethene	8.7E-2	9.3E+1	9.3E-4	7.0E-2	6.5E-5	6.5E-5
Vinyl chloride	5.3E-3	1.2E+1	4.3E-4	7.0E-2	3.0E-5	3.0E-5

NOTE: ABS = Dermal absorption factor (dim); AF = Adherence factor (mg/cm^2); AT = Averaging time (days); BW = Body weight (kg); CF = Units conversion factor; ED = Exposure duration (yrs); EF = Exposure frequency (days/yr); ET = Exposure time (hrs/day); IR = Inhalation rate (m^3/day); POE = Point of exposure; SA = Skin exposure area (cm^2/day)

RBCA CHEMICAL DATABASE

Physical Property Data

CAS Number	Constituent	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients In air (cm2/s) Dair	ref	In water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(l/kg)	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3/mol)	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
67-66-3	Chloroform	C	119.4	4	1.04E-01	4	1.00E-05	4	1.93	4	3.39E-03	1.41E-01	4	2.08E+02	4	9.64E+03	4			
75-35-4	Dichloroethene, 1-1	C	96.94	30	7.90E-02		1.18E-05		1.81	30	1.50E-02	6.24E-01	30	5.91E+02	30	6.40E+03	30			
156-59-2	Dichloroethene, cis-1,2-	C	96.936	4	7.36E-02	4	1.13E-05	4	1.38	8	3.19E-02	1.33E+00	4	2.00E+02	5	8.00E+02	5			
156-60-5	Dichloroethene,1,2-trans-	C	96.936	4	7.07E-02	4	1.19E-05	4	1.46	4	5.32E-03	2.21E-01	4	3.31E+02	4	6.00E+02	5			
127-18-4	Tetrachloroethene	C	165.83	4	7.20E-02	4	8.20E-06	4	2.42	29	2.90E-02	1.21E+00	4	1.90E+01	4	1.43E+02	4			
79-01-6	Trichloroethene	C	131.4	23	8.18E-02	6	1.05E-04	7	1.26	11	1.00E-02	4.17E-01	10	5.80E+01	23	1.00E+03	23			
75-01-4	Vinyl chloride	C	62.5	4	1.06E-01	4	1.23E-05	4	0.06	4	8.60E-02	3.58E+00	4	2.66E+03	4	2.54E+03	4			

Site Name: Oakland General Tire Site Location: 1201 14th Ave., Oakland, Completed By: Mark Jonas, R.G. Date Completed: 9/15/1997

RBCA CHEMICAL DATABASE

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Inhalation RfD_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Inhalation SF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
67-66-3	Chloroform	1.00E-02	R	-		6.10E-03	R	8.05E-02	R	B2	TRUE
75-35-4	Dichloroethene, 1-1	9.00E-03	R			6.00E-01	R	1.75E-01	R	C	TRUE
156-59-2	Dichloroethene, cis-1,2-	1.00E-02	R	-		-		-		D	FALSE
156-60-5	Dichloroethene,1,2-trans-	2.00E-02	R	-		-		-			FALSE
127-18-4	Tetrachloroethene	1.00E-02	R	-		5.20E-02	R	2.03E-03	R	C-B2	TRUE
79-01-6	Trichloroethene	6.00E-03	R	-		1.10E-02	R	6.00E-03	R	B2 (33)	TRUE (33)
75-01-4	Vinyl chloride	-		-		1.90E+00	R	3.00E-01	R	A	TRUE

Site Name: Oakland General Tire Site Location: 1201 14th Ave., Oaklan Completed By: Mark Jonas, R.G. Date Completed: 9/15/1997

CAS Number	Constituent	Maximum Contaminant Level MCL (mg/L)	reference	Permissible Exposure Limit PEL/TLV (mg/m3)	ref	Relative Absorption Factors Oral	Dermal	Detection Limits Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days) Saturated	Unsaturated	ref
67-66-3	Chloroform	1.00E-01	EPA (Oct. 1996)	4.90E+01	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	1800	1800	H
75-35-4	Dichloroethene, 1-1	7.00E-03	EPA (Oct. 1996)	4.00E+00	ACGIH	1	0.5	0.0005	Lab	0.005	Lab			
156-59-2	Dichloroethene, cis-1,2-	7.00E-02	EPA (Oct. 1996)	7.93E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab			
156-60-5	Dichloroethene,1,2-trans-	1.00E-01	EPA (Oct. 1996)	7.93E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab			
127-18-4	Tetrachloroethene	5.00E-03	EPA (Oct. 1996)	1.70E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	720	720	H
79-01-6	Trichloroethene	5.00E-03	EPA (Oct. 1996)	2.69E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	1653	1653	H
75-01-4	Vinyl chloride	2.00E-03	EPA (Oct. 1996)	1.30E+01	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	2875	2875	H

Site Name: Oakland General Tire Site Location: 1201 14th Ave., Oakland, CA Completed By: Mark Jonas, R.G. Date Completed: 9/15/1997

Ref	Description
R	EPA Region III Risk Based Concentration Table, EPA Region 3, March 7, 1995, updated April 30, 1996.
S	USEPA, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, OSWER, November 1986.
H	Howard, Handbook of Environmental Degradation Rates, Lewis Publishers, Chelsea, MI, 1989
A	Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, ASTM, ES 38-94.
3	based on Kow from (2) and DiToro, D. M., 1985:"A Particle Interaction Model of Reversible Organic Chemical Sorption", Chemosphere, 14(10), 1505-1538. log(Koc) = 0.00028 + 0.983 log(Kow)
4	USEPA, 1989: Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - USEPA, OAQPS, Air Emission Models, (EPA-450/3-87-026).
5	Verschueren, Karel, 1983: Handbook of Environmental data on organic Chemicals, Second Ed., (Van nostrand Reinhold Company Inc., New York), ISBN: 0-442-28802-6.
6	Calculated diffusivity using the method of Fuller, Schettler, and Giddings from (9).
7	Calculated diffusivity using the method of Hayduk and Laudie and the reference from (9).
8	Calculated using Kenaga ang Goring Kow/solubility regression equation reference (9) and Kow data from (2), log(S, mg/l) = -0.922 log(Kow) + 4.184
9	Handbook of Chemical Property Estimation Methods, 1982, W.J. Lyman, (McGraw-Hill, New York), ISBN -0-07-039175-0.
10	Calculated from (Pv/Patm)/(solubility/mol wt).
11	Back calculated from solubility, Note (8) and (3).
12	Aldrich Chemical Catalog, 1991.
13	Calculated using Modified Watson Correlation from (9) and normal boiling point.
14	USEPA, 1979: Water Related Environmental Fate of 129 Priority Pollutants, Vol.1, USEPA, OWQPS,(EPA-4404-79-029a).
15	The Agrochemicals Handbook, (The Royal Society of Chemistry, The University, Nottingham, England), ISBN 0-85186-406-6.
16	Vapor pressure specified at elevated temperature, adjustments to 25C using methods presented by (9).
17	Wauchope, R. D., T. M. Buter, A. G. Hornsby, P. W. M. Augustijn-Beckers, and J.P. Burt, 1992: "The SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making", Reviews of Environmental Contamination and Toxicology, vol 123, 1-155.
18	Farm Chemicals Handbook 91, C. Sine, ed., (Meister Publishing Company, Willoughby, Ohio).
19	Structure and Nomenclature Search System, (Version 7.00/7.03) December, 1992.
20	From Syracuse Research Corporation Calculated Value from pcchem-pcgems, 1988, ref no. 255435 in Enfrofate database, Accession no. 105543.
23	NIOSH, 1990: Pocket Guide to Chemical Hazards, (U. S. Dept. of Health & Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health).
24	Buchter, B. et al., 1989: Correlation of Freundlich Kd and N retention Parameters with Soils and Elements, Soil Science, 148, 370-379.
25	USEPA, 1993: Air/Superfund National Technical Guidance Study series: Estimation of Air Impacts for Thermal Desorption Units Used at Superfund Sites, US Environmental Protection Agency, Office of Air Quality Planning and Standards, EPA-451/R-93-005, NTIS Accession No. PB93-215630, April 1993.
27	Based on salt solubilities in Table 3-120, R. H. Perry and D. W. Green, " Perry's Chemical Engineering Handbook" Sixth Edition, (McGraw-Hill, New York), 1973.
28	Based on salt solubilities in Table of Physical Constants for Inorganic Compounds, Weast, R. C., CRC Handbook of Chemistry and Physics, 67th edition, (CRC Press, Inc., Boca Raton), 1987.
29	Montgomery and Welkom, "Groundwater Chemicals Desk Reference", Lewis Publishers, Chelsea, MI, 1990.
30	Montgomery, J.H., "Groundwater Chemicials Field Guide", Lewis Publishers, Chelsea, MI, 1991.
31	USEPA, "Drinking Water Regulations and Health Advisories", EPA 822-B-958-002, Office of Water, October, 1996.
32	ACGIH, "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices", 1993.
33	IRIS (4/1/97) for TCE states "carcinogen assessment summary for this substance has been withdrawn following further review." Prior to this determination the EPA Classification (Cancer Group) for TCE was identified as B2.

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Oakland General Tire Job Identification: GT-213
Site Location: 1201 14th Ave., Oakland, CA Date Completed: 9/15/97
Completed By: Mark Jonas, R.G.

Software: GSI RBCA Spreadsheet
Version: 1.0.1

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

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF.Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing. rate (mg-yr/kg-d)	1.1E+02			8.4E+01	
IRa.in	Inhalation rate indoor (m^3/day)	15			20	
IRa.out	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5.8E+03		2.0E+03	5.8E+03	5.8E+03
SAadj	Adjusted dermal area (cm^2-yr/kg)	2.1E+03			1.7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	Use EPA tox data for air (or PEL based)?	***FALSE***				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

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

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

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***1.0E-05***	1.0E-04
TRc	Target Risk (class C carcinogens)	1.0E-05	
THQ	Target Hazard Quotient	1.0E+00	1.0E+00
Opt	Calculation Option (1, 2, or 3)	3	
Tier	RBCA Tier	2	

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

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	***7.9E+01***
Ugw.tr	Groundwater seepage velocity (cm/yr)	***2.1E+02***
Ks	Saturated hydraulic conductivity(cm/s)	1.0E-04
grad	Groundwater gradient (cm/cm)	2.5E-02
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
phi.eff	Effective porosity in water-bearing unit	3.8E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value
hc	Capillary zone thickness (cm)	***3.7E+00***
hv	Vadose zone thickness (cm)	***2.1E+02***
rho	Soil density (g/cm^3)	1.7
foc	Fraction of organic carbon in vadose zone	0.01
phi	Soil porosity in vadose zone	0.38
Lgw	Depth to groundwater (cm)	***2.1E+02***
Ls	Depth to top of affected subsurface soil (cm)	1.0E+02
Lsubs	Thickness of affected subsurface soils (cm)	2.0E+02
pH	Soil/groundwater pH	6.5

		capillary	vadose	foundation
phi.w	Volumetric water content	0.342	0.12	0.12
phi.a	Volumetric air content	0.038	0.26	0.26

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	***0.005***	

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

Appendix B

Monitoring Well MW-1
Maximum Concentrations
Outdoor and Indoor Air Exposure
RBCA Simulation

Site Name: Oakland General Tire
Completed By: Mark Jonas, R.G.
Site Location: 1201 14th Ave., Oakland, CA
Date Completed: 9/15/1997

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-4 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air: Commercial Exposure Target Risk: 1.0E-5 / 1.0E-5		Indoor Air: Commercial Exposure Target Risk: 1.0E-5 / 1.0E-5		Soil:		Groundwater:	
		Target HQ: 1.0E+0		Target HQ: 1.0E+0					
CAS No.	Name	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient	Carcinogenic Risk	Hazard Quotient
67-66-3	Chloroform	1.3E-10		1.7E-8		NA	NA	NA	NA
75-34-3	Dichloroethane, 1,1-		5.3E-7		9.0E-5	NA	NA	NA	NA
156-59-2	Dichloroethene, cis-1,2-					NA	NA	NA	NA
79-34-5	Tetrachloroethane, 1,1,2,2-	1.3E-10		1.4E-8		NA	NA	NA	NA
71-55-6	Trichloroethane, 1,1,1-		2.9E-8		5.2E-6	NA	NA	NA	NA
79-00-5	Trichloroethane, 1,1,2-	2.5E-11		1.7E-9		NA	NA	NA	NA
79-01-6	Trichloroethene	7.8E-11		5.8E-9		NA	NA	NA	NA
Cumulative Values:		**3.6E-10**	**5.6E-7**	**3.9E-8**	**9.5E-5**	**0.0E+0**	**0.0E+0**	**0.0E+0**	**0.0E+0**

■ indicates risk level exceeding target risk

Software: GSI RBCA Spreadsheet Serial: G-451-KUX-984
Version: 1.0.1

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

(Complete the following table)

CONSTITUENT	Representative COC Concentration in Groundwater		in Surface Soil		in Subsurface Soil	
	value (mg/L)	note	value (mg/kg)	note	value (mg/kg)	note
Chloroform	8.0E-4	max				
Dichloroethane, 1,1-	6.0E-3	max				
Dichloroethene, cis-1,2-	4.2E-3	max				
Tetrachloroethane, 1,1,2,2-	5.8E-4	max				
Trichloroethane, 1,1,1-	6.0E-4	max				
Trichloroethane, 1,1,2-	5.7E-4	max				
Trichloroethene	1.3E-3	max				

Site Name: Oakland General Tire
Site Location: 1201 14th Ave., Oakland, CA

Completed By: Mark Jonas, R.G.
Date Completed: 9/15/1997

Site Name: Oakland General Tire
Site Location: 1201 14th Ave., Oakland, CA

Completed By: Mark Jonas, R.G.
Date Completed: 9/15/1997

TIER 2 GROUNDWATER CONCENTRATION DATA SUMMARY

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations		
CAS No.	Name	Typical Detection Limit (mg/L)	No. of Samples	No. of Detects	Maximum Conc. (mg/L)	Mean Conc. (mg/L)	UCL on Mean Conc. (mg/L)
67-66-3	Chloroform	5.0E-04	4	4	8.0E-04	3.9E-04	6.1E-04
75-34-3	Dichloroethane, 1,1-	5.0E-04	4	4	6.0E-03	9.7E-04	2.9E-03
156-59-2	Dichloroethene, cis-1,2-	5.0E-04	4	4	4.2E-03	1.1E-03	2.5E-03
79-34-5	Tetrachloroethane, 1,1,2,2-	5.0E-04	4	4	5.8E-04	3.3E-04	4.7E-04
71-55-6	Trichloroethane, 1,1,1-	5.0E-04	4	4	6.0E-04	3.4E-04	4.8E-04
79-00-5	Trichloroethane, 1,1,2-	5.0E-04	4	4	5.7E-04	3.3E-04	4.6E-04
79-01-6	Trichloroethene	5.0E-04	4	4	1.3E-03	3.8E-04	7.4E-04

Serial: G-451-KUX-8

Software: GSI RBCA Spreadsheet
Version: 1.0.1

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 1 OF 4

TIER 2 PATHWAY RISK CALCULATION

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

Constituents of Concern	(1) EPA Classification	CARCINOGENIC RISK: (2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site Commercial		(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site Commercial		TOXIC EFFECTS: (5) Total Toxicant Intake Rate (mg/kg/day) On-Site Commercial		(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site Commercial	
Chloroform	B2	1.6E-9		8.1E-2	1.3E-10						
Dichloroethane, 1,1-	C						7.6E-8		1.4E-1	5.3E-7	
Dichloroethene, cis-1,2-	D										
Tetrachloroethene, 1,1,2,2-	C	6.5E-10		2.0E-1	1.3E-10						
Trichloroethane, 1,1,1-	D						8.4E-9		2.9E-1	2.9E-8	
Trichloroethane, 1,1,2-	C	4.4E-10		5.6E-2	2.5E-11						
Trichloroethene	B2 (33)	1.3E-8		6.0E-3	7.8E-11						

Total Pathway Carcinogenic Risk = 3.6E-10 | 0.0E+0

Total Pathway Hazard Index = 5.6E-7 | 0.0E+0

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 3 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS — ■ = CHECKED IS PATHWAY IS ACTIVE

GROUNDWATER: VAPOR INHALATION

Constituents of Concern	Exposure Concentration: 1) Source Medium — Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) — Receptor: On-Site Commercial		3) Exposure Medium — Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-Site Commercial		4) Exposure Multiplier (IRxEFxED)/(BWxAT) (m^3/kg-day): On-Site Commercial		5) Average Daily Intake Rate (mg/kg-day) (3) X (4): On-Site Commercial		TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface, subsurface & groundwater routes.): On-Site Commercial	
Chloroform	8.0E-4	3.5E+4		2.3E-8		7.0E-2		1.6E-9		1.6E-9	
Dichloroethane, 1,1-	6.0E-3	1.5E+4		3.9E-7		2.0E-1		7.6E-8		7.6E-8	
Dichloroethene, cis-1,2-	4.2E-3	8.4E+3		5.0E-7		2.0E-1		9.8E-8		9.8E-8	
Tetrachloroethane, 1,1,2,2-	5.8E-4	6.3E+4		9.2E-9		7.0E-2		6.5E-10		6.5E-10	
Trichloroethane, 1,1,1-	6.0E-4	1.4E+4		4.3E-8		2.0E-1		8.4E-9		8.4E-9	
Trichloroethane, 1,1,2-	5.7E-4	9.0E+4		6.3E-9		7.0E-2		4.4E-10		4.4E-10	
Trichloroethene	1.3E-3	7.0E+3		1.9E-7		7.0E-2		1.3E-8		1.3E-8	

NOTE: ABS = Dermal absorption factor (dim); AF = Adherance factor (mg/cm^2); AT = Averaging time (days); BW = Body weight (kg); CF = Units conversion factor; ED = Exposure duration (yrs); EF = Exposure frequency (days/yr); ET = Exposure time (hrs/day); IR = Inhalation rate (m^3/day); POE = Point of exposure; SA = Skin exposure area (cm^2/day)

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jones, R.G. | Date Completed: 9/15/1997 | 2 OF 4

TIER 2 PATHWAY RISK CALCULATION

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

Constituents of Concern	(1) EPA Classification	CARCINOGENIC RISK: (2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site	Commercial	(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site	Commercial	TOXIC EFFECTS: (5) Total Toxicant Intake Rate (mg/kg/day) On-Site	Commercial	(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site	Commercial
Chloroform	B2		2.1E-7	8.1E-2		1.7E-8					
Dichloroethane, 1,1-	C							1.3E-5	1.4E-1		9.0E-5
Dichloroethene, cis-1,2-	D										
Tetrachloroethane, 1,1,2,2-	C		6.8E-8	2.0E-1		1.4E-8					
Trichloroethane, 1,1,1-	D							1.5E-6	2.9E-1		5.2E-6
Trichloroethane, 1,1,2-	C		3.0E-8	5.6E-2		1.7E-9					
Trichloroethene	B2 (33)		9.7E-7	6.0E-3		5.8E-9					
Total Pathway Carcinogenic Risk =					0.0E+0	3.9E-8	***Total Pathway Hazard Index =***			0.0E+0	9.5E-5

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 5 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

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

GROUNDWATER: VAPOR INTRUSION TO BUILDINGS Constituents of Concern	Exposure Concentration 1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor On-Site Commercial	3) Exposure Medium Indoor Air: POE Conc. (mg/m^3) (1) / (2) On-Site Commercial	4) Exposure Multiplier ((IR)(EF)(ED))/(BW)(AT) (m^3/kg-day) On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) X (4) On-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from subsurface & groundwater routes.) On-Site Commercial
Chloroform	8.0E-4	2.6E+2	3.1E-6	7.0E-2	2.1E-7	2.1E-7
Dichloroethane, 1,1-	6.0E-3	9.1E+1	6.6E-5	2.0E-1	1.3E-5	1.3E-5
Dichloroethene, cis-1,2-	4.2E-3	4.6E+1	9.0E-5	2.0E-1	1.8E-5	1.8E-5
Tetrachloroethane, 1,1,2,2-	5.6E-4	5.9E+2	9.6E-7	7.0E-2	6.6E-8	6.6E-8
Trichloroethane, 1,1,1-	8.0E-4	8.0E+1	7.5E-6	2.0E-1	1.5E-6	1.5E-6
Trichloroethane, 1,1,2-	5.7E-4	1.3E+3	4.3E-7	7.0E-2	3.0E-8	3.0E-8
Trichloroethene	1.3E-3	9.4E+1	1.4E-5	7.0E-2	9.7E-7	9.7E-7

NOTE: ABS = Dermal absorption factor (dim) | AF = Adherance factor (mg/cm^2) | AT = Averaging time (days) | BW = Body weight (kg) | CF = Units conversion factor | ED = Exposure duration (yrs) | EF = Exposure frequency (days/yr) | ET = Exposure time (hrs/day) | IR = Inhalation rate (m^3/day) | POE = Point of exposure | SA = Skin exposure area (cm^2/day)

RBCA CHEMICAL DATABASE

Physical Property Data

CAS Number	Constituent	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	Diffusion Coefficients in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(l/kg)	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3/mol)	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
67-66-3	Chloroform	C	119.4	4	1.04E-01	4	1.00E-05	4	1.93	4	3.39E-03	1.41E-01	4	2.08E+02	4	9.64E+03	4			
75-34-3	Dichloroethane, 1,1-	C	98.96	4	7.42E-02	4	1.05E-05	4	1.76	4	1.54E-02	6.41E-01	4	5.91E+02	4	5.50E+03	5			
156-59-2	Dichloroethene, cis-1,2-	C	96.936	4	7.36E-02	4	1.13E-05	4	1.38	8	3.19E-02	1.33E+00	4	2.00E+02	5	8.00E+02	5			
79-34-5	Tetrachloroethane, 1,1,2,2-	C	168	4	7.10E-02	4	7.90E-06	4	0.00	4	2.00E-03	8.32E-02	4	6.50E+00	4	7.18E+02	4			
71-55-6	Trichloroethane, 1,1,1-	C	133.4	4	7.80E-02	4	8.80E-06	4	2.45	4	1.72E-02	7.15E-01	4	1.23E+02	4	1.26E+03	4			
79-00-5	Trichloroethane, 1,1,2-	C	133.4	4	7.80E-02	4	8.80E-06	4	0.00	4	7.40E-04	3.08E-02	4	2.50E+01	4	5.93E+03	4			
79-01-6	Trichloroethene	C	131.4	23	8.18E-02	6	1.05E-04	7	1.26	11	1.00E-02	4.17E-01	10	5.80E+01	23	1.00E+03	23			

Site Name: Oakland General Tire Site Location: 1201 14th Ave., Oakland, Completed By: Mark Jonas, R.G. Date Completed: 9/15/1997

Software version: 1.0.1

RBCA CHEMICAL DATABASE

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Inhalation RfD_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Inhalation SF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
67-66-3	Chloroform	1.00E-02	R	-		6.10E-03	R	8.05E-02	R	B2	TRUE
75-34-3	Dichloroethane, 1,1-	1.00E-01	R	1.43E-01	R	-		-		C	FALSE
156-59-2	Dichloroethene, cis-1,2-	1.00E-02	R	-		-		-		D	FALSE
79-34-5	Tetrachloroethane, 1,1,2,2-	-		-		2.00E-01	R	2.03E-01	R	C	TRUE
71-55-6	Trichloroethane, 1,1,1-	3.50E-02	R	2.86E-01	R	-		-		D	FALSE
79-00-5	Trichloroethane, 1,1,2-	4.00E-03	R	-		5.70E-02	R	5.60E-02	R	C	TRUE
79-01-6	Trichloroethene	6.00E-03	R	-		1.10E-02	R	6.00E-03	R	B2 (33)	TRUE (33)

Site Name: Oakland General Tire Site Location: 1201 14th Ave., Oaklan Completed By: Mark Jonas, R.G. Date Completed: 9/15/1997

Software version: 1.0.1

RBCA CHEMICAL DATABASE

Miscellaneous Chemical Data

CAS Number	Constituent	Maximum Contaminant Level MCL (mg/L)	reference	Permissible Exposure Limit PEL/TLV (mg/m3)	ref	Relative Absorption Factors Oral	Dermal	Detection Limits Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days) Saturated	Unsaturated	ref
67-66-3	Chloroform	1.00E-01	EPA (Oct. 1996)	4.90E+01	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	1800	1800	H
75-34-3	Dichloroethane, 1,1-			4.00E+02	OSHA	1	0.5	0.0005	Lab	0.005	Lab	360	360	H
156-59-2	Dichloroethene, cis-1,2-	7.00E-02	EPA (Oct. 1996)	7.93E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab			
79-34-5	Tetrachloroethane, 1,1,2,2-			3.50E+01	OSHA	1	0.5	0.0005	Lab	0.005	Lab	45	45	H
71-55-6	Trichloroethane, 1,1,1-	2.00E-01	EPA (Oct. 1996)	1.90E+03	OSHA	1	0.5	0.0005	Lab	0.005	Lab	546	546	H
79-00-5	Trichloroethane, 1,1,2-	5.00E-03	EPA (Oct. 1996)	4.50E+01	OSHA	1	0.5	0.0005	Lab	0.005	Lab	730	730	H
79-01-6	Trichloroethene	5.00E-03	EPA (Oct. 1996)	2.69E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	1653	1653	H

Site Name: Oakland General Tire Site Location: 1201 14th Ave., Oakland, CA Completed By: Mark Jonas, R.G. Date Completed: 9/15/1997

Software version: 1.0.1

Ref	Description
R	EPA Region III Risk Based Concentration Table, EPA Region 3, March 7, 1995, updated April 30, 1996.
S	USEPA, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, OSWER, November 1986.
H	Howard, Handbook of Environmental Degradation Rates, Lewis Publishers, Chelsea, MI, 1989
A	Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, ASTM, ES 38-94.
3	based on Kow from (2) and DiToro, D. M., 1985:"A Particle Interaction Model of Reversible Organic Chemical Sorption", Chemosphere, 14(10), 1505-1538. log(Koc) = 0.00028 + 0.983 log(Kow)
4	USEPA, 1989: Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - USEPA, OAQPS, Air Emission Models, (EPA-450/3-87-026).
5	Verschueren, Karel, 1983: Handbook of Environmental data on organic Chemicals, Second Ed., (Van nostrand Reinhold Company Inc., New York), ISBN: 0-442-28802-6.
6	Calculated diffusivity using the method of Fuller, Schettler, and Giddings from (9).
7	Calculated diffusivity using the method of Hayduk and Laudie and the reference from (9).
8	Calculated using Kenaga ang Goring Kow/solubility regression equation reference (9) and Kow data from (2), log(S, mg/l) = -0.922 log(Kow) + 4.184
9	Handbook of Chemical Property Estimation Methods, 1982, W.J. Lyman, (McGraw-Hill, New York), ISBN -0-07-039175-0.
10	Calculated from (Pv/Patm)/(solubility/mol wt).
11	Back calculated from solubility, Note (6) and (3).
12	Aldrich Chemical Catalog, 1991.
13	Calculated using Modified Watson Correlation from (9) and normal boiling point.
14	USEPA, 1979: Water Related Environmental Fate of 129 Priority Pollutants, Vol.1, USEPA, OWOPS,(EPA-4404-79-029a).
15	The Agrochemicals Handbook, (The Royal Society of Chemistry, The University, Nottingham, England), ISBN 0-85186-406-6.
16	Vapor pressure specified at elevated temperature, adjustments to 25C using methods presented by (9).
17	Wauchope, R. D., T. M. Butler, A. G. Hornsby, P. W. M. Augustijn-Beckers, and J.P. Burt, 1992: "The SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making", Reviews of Environmental Contamination and Toxicology, vol 123, 1-155.
18	Farm Chemicals Handbook 91, C. Sine, ed., (Meister Publishing Company, Willoughby, Ohio).
19	Structure and Nomenclature Search System, (Version 7.00/7.03) December, 1992.
20	From Syracuse Research Corporation Calculated Value from pochem-pcgems, 1988, ref no. 255435 in Enirofate database, Accesion no. 105543.
23	NIOSH, 1990: Pocket Guide to Chemical Hazards, (U. S. Dept. of Health & Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health).
24	Buchter, B. et al., 1989: Correlation of Freundlich Kd and N retention Parameters with Soils and Elements, Soil Science, 148, 370-379.
25	USEPA, 1993: Air/Superfund National Technical Guidance Study series: Estimation of Air Impacts for Thermal Desorption Units Used at Superfund Sites, US Environmental Protection Agency, Office of Air Quality Planning and Standards, EPA-451/R-93-005, NTIS Accesion No. PB93-215830, April 1993.
27	Based on salt solubilities in Table 3-120, R. H. Perry and D. W. Green, " Perry's Chemical Engineering Handbook" Sixth Edition, (McGraw-Hill, New York), 1973.
28	Based on salt solubilities in Table of Physical Constants for Inorganic Compounds, Weast, R. C., CRC Handbook of Chemistry and Physics, 67th edition, (CRC Press, Inc., Boca Raton), 1987.
29	Montgomery and Welkom, "Groundwater Chemicals Desk Reference", Lewis Publishers, Chelsea, MI, 1990.
30	Montgomery, J.H., "Groundwater Chemicals Field Guide", Lewis Publishers, Chelsea, MI, 1991.
31	USEPA, "Drinking Water Regulations and Health Advisories", EPA 822-B-96-002, Office of Water, October, 1996.
32	ACGIH, "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices", 1993.
33	IRIS (4/1/97) for TCE states "carcinogen assessment summary for this substance has been withdrawn following further review." Prior to this determination the EPA Classification (Cancer Group) for TCE was identified as B2.

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Oakland General Tire — Job Identification: GT-213
Site Location: 1201 14th Ave., Oakland, CA — Date Completed: 9/15/97
Completed By: Mark Jonas, R.G.

Software: GSI RBCA Spreadsheet
Version: 1.0.1

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

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

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

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

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***1.0E-05***	1.0E-04
TRc	Target Risk (class C carcinogens)	1.0E-05	
THQ	Target Hazard Quotient	1.0E+00	1.0E+00
Opt	Calculation Option (1, 2, or 3)	3	
Tier	RBCA Tier	2	

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

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	***7.9E+01***
Ugw.tr	Groundwater seepage velocity (cm/yr)	***2.1E+02***
Ks	Saturated hydraulic conductivity(cm/s)	1.0E-04
grad	Groundwater gradient (cm/cm)	2.5E-02
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
phi.eff	Effective porosity in water-bearing unit	3.8E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value	capillary	vadose	foundation
hc	Capillary zone thickness (cm)	***3.7E+00***			
hv	Vadose zone thickness (cm)	***2.2E+02***			
rho	Soil density (g/cm^3)	1.7			
foc	Fraction of organic carbon in vadose zone	0.01			
phi	Soil porosity in vadose zone	0.38			
Lgw	Depth to groundwater (cm)	***2.2E+02***			
Ls	Depth to top of affected subsurface soil (cm)	1.0E+02			
Lsubs	Thickness of affected subsurface soils (cm)	2.0E+02			
pH	Soil/groundwater pH	6.5			
phi.w	Volumetric water content		0.342	0.12	0.12
phi.a	Volumetric air content		0.038	0.26	0.26

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	***0.005***	

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

Appendix C

Monitoring Wells MW-1, MW-2, & MW-3
90% Upper Confidence Limit (UCL) Values
Outdoor and Indoor Air Exposure
RBCA Simulation

Site Name: Oakland General Tire
Site Location: 1201 14th Ave., Oakland, CA

Completed By: Mark Jonas, R.G.
Date Completed: 9/15/1997

CUMULATIVE RISK WORKSHEET

Cumulative Target Risk: 1.0E-4 Target Hazard Index: 1.0E+0

ON-SITE RECEPTORS

CONSTITUENTS OF CONCERN		Outdoor Air: Commercial Exposure		Indoor Air: Commercial Exposure		Soil:		Groundwater:	
		Target Risk: 1.0E-5 / 1.0E-5	Target HQ: 1.0E+0	Target Risk: 1.0E-5 / 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
67-66-3	Chloroform	8.2E-11		1.1E-8		NA	NA	NA	NA
75-34-3	Dichloroethane, 1,1-		5.2E-8		8.7E-6	NA	NA	NA	NA
75-35-4	Dichloroethene, 1-1	3.5E-10		5.8E-8		NA	NA	NA	NA
156-59-2	Dichloroethene, cis-1,2-					NA	NA	NA	NA
156-60-5	Dichloroethene,1,2-trans-					NA	NA	NA	NA
79-34-5	Tetrachloroethane, 1,1,2,2-	7.3E-11		7.6E-9		NA	NA	NA	NA
127-18-4	Tetrachloroethene	2.9E-11		5.3E-9		NA	NA	NA	NA
71-55-6	Trichloroethane, 1,1,1-		1.6E-8		2.8E-6	NA	NA	NA	NA
79-00-5	Trichloroethane, 1,1,2-	1.4E-11		9.4E-10		NA	NA	NA	NA
79-01-6	Trichloroethene	2.5E-10		1.8E-8		NA	NA	NA	NA
75-01-4	Vinyl chloride	6.4E-9		1.2E-6		NA	NA	NA	NA
Cumulative Values:		**7.2E-9**	**6.8E-8**	**1.3E-6**	**1.1E-5**	**0.0E+0**	**0.0E+0**	**0.0E+0**	**0.0E+0**

■ Indicates risk level exceeding target risk

Software: GSI RBCA Spreadsheet
Version: 1.0.1

Serial: G-451-KUX-984

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

(Complete the following table)

CONSTITUENT	Representative COC Concentration in Groundwater		in Surface Soil		In Subsurface Soil	
	value (mg/L)	note	value (mg/kg)	note	value (mg/kg)	note
Chloroform	4.9E-4	UCL				
Dichloroethane, 1,1-	5.8E-4	UCL				
Dichloroethene, 1-1	4.1E-4	UCL				
Dichloroethene, cis-1,2-	4.1E-3	UCL				
Dichloroethene,1,2-trans-	5.0E-4	UCL				
Tetrachloroethane, 1,1,2,2-	3.1E-4	UCL				
Tetrachloroethene	2.0E-3	UCL				
Trichloroethane, 1,1,1-	3.2E-4	UCL				
Trichloroethane, 1,1,2-	3.1E-4	UCL				
Trichloroethene	4.1E-3	UCL				
Vinyl chloride	7.2E-4	UCL				

Site Name: Oakland General Tire
Site Location: 1201 14th Ave., Oakland, CA

Completed By: Mark Jonas, R.G.
Date Completed: 9/15/1997

Site Name: Oakland General Tire
Site Location: 1201 14th Ave., Oakland, CA

Completed By: Mark Jonas, R.G.
Date Completed: 9/15/1997

TIER 2 GROUNDWATER CONCENTRATION DATA SUMMARY

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations		
CAS No.	Name	Typical Detection Limit (mg/L)	No. of Samples	No. of Detects	Maximum Conc. (mg/L)	Mean Conc. (mg/L)	UCL on Mean Conc. (mg/L)
67-66-3	Chloroform	5.0E-04	12	12	1.2E-03	3.8E-04	4.9E-04
75-34-3	Dichloroethane, 1,1-	5.0E-04	12	12	6.0E-03	3.9E-04	5.8E-04
75-35-4	Dichloroethene, 1-1	5.0E-04	12	12	1.7E-03	3.2E-04	4.1E-04
156-59-2	Dichloroethene, cis-1,2-	5.0E-04	12	12	4.8E-02	1.8E-03	4.1E-03
156-60-5	Dichloroethene,1,2-trans-	5.0E-04	12	12	1.3E-03	3.8E-04	5.0E-04
79-34-5	Tetrachloroethane, 1,1,2,2-	5.0E-04	12	12	5.8E-04	2.8E-04	3.1E-04
127-18-4	Tetrachloroethene	5.0E-04	12	12	4.4E-02	9.0E-04	2.0E-03
71-55-6	Trichloroethane, 1,1,1-	5.0E-04	12	12	6.0E-04	2.8E-04	3.2E-04
79-00-5	Trichloroethane, 1,1,2-	5.0E-04	12	12	5.7E-04	2.8E-04	3.1E-04
79-01-6	Trichloroethene	5.0E-04	12	12	8.7E-02	1.6E-03	4.1E-03
75-01-4	Vinyl chloride	5.0E-04	12	12	5.3E-03	4.6E-04	7.2E-04

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jones, R.G. | Date Completed: 9/15/1997 | 1 OF 4

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS (☒ = CHECKED IF PATHWAYS ARE ACTIVE)

Constituents of Concern	(1) EPA Classification	CARCINOGENIC RISK: (2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site Commercial		(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site Commercial		TOXIC EFFECTS: (5) Total Toxicant Intake Rate (mg/kg/day) On-Site Commercial		(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site Commercial	
Chloroform	B2	1.0E-9		8.1E-2	8.2E-11						
Dichloroethane, 1,1-	C						7.5E-9		1.4E-1	5.2E-8	
Dichloroethene, 1-1	C	2.0E-9		1.8E-1	3.5E-10						
Dichloroethene, cis-1,2-	D										
Dichloroethene,1,2-trans-											
Tetrachloroethane, 1,1,2,2-	C	3.6E-10		2.0E-1	7.3E-11						
Tetrachloroethene	C-B2	1.4E-8		2.0E-3	2.9E-11						
Trichloroethane, 1,1,1-	D						4.5E-9		2.9E-1	1.6E-8	
Trichloroethane, 1,1,2-	C	2.5E-10		5.6E-2	1.4E-11						
Trichloroethene	B2 (33)	4.2E-8		6.0E-3	2.5E-10						
Vinyl chloride	A	2.1E-8		3.0E-1	6.4E-9						
Total Pathway Carcinogenic Risk =					**7.2E-9**	**0.0E+0**			***Total Pathway Hazard Index =***	**6.8E-8**	**0.0E+0**

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 3 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ = CHECKED IF PATHWAY IS ACTIVE

GROUNDWATER: VAPOR INHALATION

Constituents of Concern	Exposure Concentration: 1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor On-Site Commercial		3) Exposure Medium Outdoor Air: POE Conc. (mg/m^3) (1) / (2) On-Site Commercial		4) Exposure Multiplier (IRxEFxED)/(BWxAT) (m^3/kg-day) On-Site Commercial		5) Average Daily Intake Rate (mg/kg-day) (3) X (4) On-Site Commercial		TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface, subsurface & groundwater routes) On-Site Commercial	
Chloroform	4.9E-4	3.4E+4		1.4E-8		7.0E-2		1.0E-9		1.0E-9	
Dichloroethane, 1,1-	5.8E-4	1.5E+4		3.8E-8		2.0E-1		7.5E-9		7.5E-9	
Dichloroethene, 1-1	4.1E-4	1.4E+4		2.9E-8		7.0E-2		2.0E-9		2.0E-9	
Dichloroethene, cis-1,2-	4.1E-3	8.2E+3		5.0E-7		2.0E-1		9.8E-8		9.8E-8	
Dichloroethene,1,2-trans-	5.0E-4	3.1E+4		1.6E-8		2.0E-1		3.2E-9		3.2E-9	
Tetrachloroethane, 1,1,2,2-	3.1E-4	6.1E+4		5.1E-9		7.0E-2		3.6E-10		3.6E-10	
Tetrachloroethene	2.0E-3	9.5E+3		2.1E-7		7.0E-2		1.4E-8		1.4E-8	
Trichloroethane, 1,1,1-	3.2E-4	1.4E+4		2.3E-8		2.0E-1		4.5E-9		4.5E-9	
Trichloroethane, 1,1,2-	3.1E-4	8.8E+4		3.6E-9		7.0E-2		2.5E-10		2.5E-10	
Trichloroethene	4.1E-3	6.8E+3		6.0E-7		7.0E-2		4.2E-8		4.2E-8	
Vinyl chloride	7.2E-4	2.4E+3		3.1E-7		7.0E-2		2.1E-8		2.1E-8	

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequency (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 2 OF 4

TIER 2 PATHWAY RISK CALCULATION

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

Constituents of Concern	(1) EPA Classification	CARCINOGENIC RISK: (2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site	Commercial	(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site	Commercial	TOXIC EFFECTS: (5) Total Toxicant Intake Rate (mg/kg/day) On-Site	Commercial	(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site	Commercial
Chloroform	B2		1.3E-7	8.1E-2		1.1E-8					
Dichloroethane, 1,1-	C							1.2E-6	1.4E-1		8.7E-6
Dichloroethene, 1-1	C		3.3E-7	1.8E-1		5.8E-8					
Dichloroethene, cis-1,2-	D										
Dichloroethene,1,2-trans-											
Tetrachloroethane, 1,1,2,2-	C		3.7E-8	2.0E-1		7.6E-9					
Tetrachloroethene	C-B2		2.6E-6	2.0E-3		5.3E-9					
Trichloroethane, 1,1,1-	D							7.9E-7	2.9E-1		2.8E-6
Trichloroethane, 1,1,2-	C		1.7E-8	5.6E-2		9.4E-10					
Trichloroethene	B2 (33)		3.1E-6	6.0E-3		1.8E-8					
Vinyl chloride	A		4.1E-6	3.0E-1		1.2E-6					
Total Pathway Carcinogenic Risk =					0.0E+0	1.3E-6	***Total Pathway Hazard Index =***			0.0E+0	1.1E-5

Site Name: Oakland General Tire | Site Location: 1201 14th Ave., Oakland, CA | Completed By: Mark Jonas, R.G. | Date Completed: 9/15/1997 | 5 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

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

GROUNDWATER: VAPOR INTRUSION TO BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium: Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor: On-Site Commercial	3) Exposure Medium: Indoor Air: POE Conc. (mg/m^3) (1) / (2): On-Site Commercial	4) Exposure Multiplier: (IRxEF xED)/(BWxAT) (m^3/kg-day): On-Site Commercial	5) Average Daily Intake Rate: (mg/kg-day) (3) X (4): On-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from subsurface & groundwater routes): On-Site Commercial
Chloroform	4.9E-4	2.6E+2	1.9E-6	7.0E-2	1.3E-7	1.3E-7
Dichloroethane, 1,1-	5.8E-4	9.1E+1	6.4E-6	2.0E-1	1.2E-6	1.2E-6
Dichloroethene, 1-1	4.1E-4	8.7E+1	4.6E-6	7.0E-2	3.3E-7	3.3E-7
Dichloroethene, cis-1,2-	4.1E-3	4.6E+1	8.9E-5	2.0E-1	1.7E-5	1.7E-5
Dichloroethene,1,2-trans-	5.0E-4	2.4E+2	2.1E-6	2.0E-1	4.1E-7	4.1E-7
Tetrachloroethane, 1,1,2,2-	3.1E-4	5.9E+2	5.3E-7	7.0E-2	3.7E-8	3.7E-8
Tetrachloroethene	2.0E-3	5.2E+1	3.7E-5	7.0E-2	2.6E-6	2.6E-6
Trichloroethane, 1,1,1-	3.2E-4	7.9E+1	4.0E-6	2.0E-1	7.9E-7	7.9E-7
Trichloroethane, 1,1,2-	3.1E-4	1.3E+3	2.4E-7	7.0E-2	1.7E-8	1.7E-8
Trichloroethene	4.1E-3	9.3E+1	4.4E-5	7.0E-2	3.1E-6	3.1E-6
Vinyl chloride	7.2E-4	1.2E+1	5.8E-5	7.0E-2	4.1E-6	4.1E-6

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequency (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

CAS Number	Constituent	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients In air (cm2/s) Dair	ref	In water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(l/kg)	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
67-66-3	Chloroform	C	119.4	4	1.04E-01	4	1.00E-05	4	1.93	4	3.39E-03	1.41E-01	4	2.08E+02	4	9.64E+03	4			
75-34-3	Dichloroethane, 1,1-	C	98.96	4	7.42E-02	4	1.05E-05	4	1.76	4	1.54E-02	6.41E-01	4	5.91E+02	4	5.50E+03	5			
75-35-4	Dichloroethene, 1-1	C	96.94	30	7.90E-02		1.18E-05		1.81	30	1.50E-02	6.24E-01	30	5.91E+02	30	6.40E+03	30			
156-59-2	Dichloroethene, cis-1,2-	C	96.936	4	7.36E-02	4	1.13E-05	4	1.38	8	3.19E-02	1.33E+00	4	2.00E+02	5	8.00E+02	5			
156-60-5	Dichloroethene,1,2-trans-	C	96.936	4	7.07E-02	4	1.19E-05	4	1.46	4	5.32E-03	2.21E-01	4	3.31E+02	4	6.00E+02	5			
79-34-5	Tetrachloroethane, 1,1,2,2-	C	168	4	7.10E-02	4	7.90E-06	4	0.00	4	2.00E-03	8.32E-02	4	6.50E+00	4	7.18E+02	4			
127-18-4	Tetrachloroethene	C	165.83	4	7.20E-02	4	8.20E-06	4	2.42	29	2.90E-02	1.21E+00	4	1.90E+01	4	1.43E+02	4			
71-55-6	Trichloroethane, 1,1,1-	C	133.4	4	7.80E-02	4	8.80E-06	4	2.45	4	1.72E-02	7.15E-01	4	1.23E+02	4	1.26E+03	4			
79-00-5	Trichloroethane, 1,1,2-	C	133.4	4	7.80E-02	4	8.80E-06	4	0.00	4	7.40E-04	3.08E-02	4	2.50E+01	4	5.93E+03	4			
79-01-6	Trichloroethene	C	131.4	23	8.18E-02	6	1.05E-04	7	1.26	11	1.00E-02	4.17E-01	10	5.80E+01	23	1.00E+03	23			
75-01-4	Vinyl chloride	C	62.5	4	1.06E-01	4	1.23E-05	4	0.06	4	8.60E-02	3.58E+00	4	2.66E+03	4	2.54E+03	4			

Site Name: Oakland General Tire Site Location: 1201 14th Ave., Oakland, Completed By: Mark Jonas, R.G. Date Completed: 9/15/1997

RBCA CHEMICAL DATABASE

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Inhalation RfD_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Inhalation SF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
67-66-3	Chloroform	1.00E-02	R	-		6.10E-03	R	8.05E-02	R	B2	TRUE
75-34-3	Dichloroethane, 1,1-	1.00E-01	R	1.43E-01	R	-		-		C	FALSE
75-35-4	Dichloroethene, 1-1	9.00E-03	R			6.00E-01	R	1.75E-01	R	C	TRUE
156-59-2	Dichloroethene, cis-1,2-	1.00E-02	R	-		-		-		D	FALSE
156-60-5	Dichloroethene,1,2-trans-	2.00E-02	R	-		-		-			FALSE
79-34-5	Tetrachloroethane, 1,1,2,2-	-		-		2.00E-01	R	2.03E-01	R	C	TRUE
127-18-4	Tetrachloroethene	1.00E-02	R	-		5.20E-02	R	2.03E-03	R	C-B2	TRUE
71-55-6	Trichloroethane, 1,1,1-	3.50E-02	R	2.86E-01	R	-		-		D	FALSE
79-00-5	Trichloroethane, 1,1,2-	4.00E-03	R	-		5.70E-02	R	5.60E-02	R	C	TRUE
79-01-6	Trichloroethene	6.00E-03	R	-		1.10E-02	R	6.00E-03	R	B2 (33)	TRUE (33)
75-01-4	Vinyl chloride	-		-		1.90E+00	R	3.00E-01	R	A	TRUE

Site Name: Oakland General Tire Site Location: 1201 14th Ave., Oaklan Completed By: Mark Jonas, R.G. Date Completed: 9/15/1997

RBCA CHEMICAL DATABASE

Miscellaneous Chemical Data

CAS Number	Constituent	Maximum Contaminant Level MCL (mg/L)	Maximum Contaminant Level reference	Permissible Exposure Limit PEL/TLV (mg/m3)	PEL/TLV ref	Relative Absorption Factors Oral	Relative Absorption Factors Dermal	Detection Limits Groundwater (mg/L)	Groundwater ref	Detection Limits Soil (mg/kg)	Soil ref	Half Life (First-Order Decay) (days) Saturated	Half Life (First-Order Decay) (days) Unsaturated	ref
67-66-3	Chloroform	1.00E-01	EPA (Oct. 1996)	4.90E+01	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	1600	1600	H
75-34-3	Dichloroethane, 1,1-			4.00E+02	OSHA	1	0.5	0.0005	Lab	0.005	Lab	360	360	H
75-35-4	Dichloroethene, 1-1	7.00E-03	EPA (Oct. 1996)	4.00E+00	ACGIH	1	0.5	0.0005	Lab	0.005	Lab			
156-59-2	Dichloroethene, cis-1,2-	7.00E-02	EPA (Oct. 1996)	7.93E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab			
156-60-5	Dichloroethene,1,2-trans-	1.00E-01	EPA (Oct. 1996)	7.93E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab			
79-34-5	Tetrachloroethane, 1,1,2,2-			3.50E+01	OSHA	1	0.5	0.0005	Lab	0.005	Lab	45	45	H
127-18-4	Tetrachloroethene	5.00E-03	EPA (Oct. 1996)	1.70E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	720	720	H
71-55-6	Trichloroethane, 1,1,1-	2.00E-01	EPA (Oct. 1996)	1.90E+03	OSHA	1	0.5	0.0005	Lab	0.005	Lab	546	546	H
79-00-5	Trichloroethane, 1,1,2-	5.00E-03	EPA (Oct. 1996)	4.50E+01	OSHA	1	0.5	0.0005	Lab	0.005	Lab	730	730	H
79-01-6	Trichloroethene	5.00E-03	EPA (Oct. 1996)	2.69E+02	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	1653	1653	H
75-01-4	Vinyl chloride	2.00E-03	EPA (Oct. 1996)	1.30E+01	ACGIH	1	0.5	0.0005	Lab	0.005	Lab	2875	2875	H

Site Name: Oakland General Tire Site Location: 1201 14th Ave., Oakland, CA Completed By: Mark Jonas, R.G. Date Completed: 9/15/1997

Ref	Description
R	EPA Region III Risk Based Concentration Table, EPA Region 3, March 7, 1995, updated April 30, 1996.
S	USEPA, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, OSWER, November 1986.
H	Howard, Handbook of Environmental Degradation Rates, Lewis Publishers, Chelsea, MI, 1989
A	Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, ASTM, ES 38-94.
3	based on Kow from (2) and DiToro, D. M., 1985:"A Particle Interaction Model of Reversible Organic Chemical Sorption", Chemosphere, 14(10), 1505-1538. log(Koc) = 0.00028 + 0.983 log(Kow)
4	USEPA, 1989: Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) - USEPA, OAQPS, Air Emission Models, (EPA-450/3-87-026).
5	Verschueren, Karel, 1983: Handbook of Environmental data on organic Chemicals, Second Ed., (Van nostrand Reinhold Company Inc., New York), ISBN: 0-442-28802-6.
6	Calculated diffusivity using the method of Fuller, Schettler, and Giddings from (9).
7	Calculated diffusivity using the method of Hayduk and Laudie and the reference from (9).
8	Calculated using Kenaga ang Goring Kow/solubility regression equation reference (9) and Kow data from (2), log(S, mg/l) = -0.922 log(Kow) + 4.184
9	Handbook of Chemical Property Estimation Methods, 1982, W.J. Lyman, (McGraw-Hill, New York), ISBN -0-07-039175-0.
10	Calculated from (Pv/Patm)/(solubility/mol wt).
11	Back calculated from solubility, Note (8) and (3).
12	Aldrich Chemical Catalog, 1991.
13	Calculated using Modified Watson Correlation from (9) and normal boiling point.
14	USEPA, 1979: Water Related Environmental Fate of 129 Priority Pollutants, Vol.1, USEPA, OWQPS,(EPA-4404-79-029a).
15	The Agrochemicals Handbook, (The Royal Society of Chemistry, The University, Nottingham, England), ISBN 0-85186-406-6.
16	Vapor pressure specified at elevated temperature, adjustments to 25C using methods presented by (9).
17	Wauchope, R. D., T. M. Buter, A. G. Hornsby, P. W. M. Augustijn-Beckers, and J.P. Burt, 1992: "The SCS/ARS/CES Pesticide Properties Database for Environmental Decision Making", Reviews of Environmental Contamination and Toxicology, vol 123, 1-155.
18	Farm Chemicals Handbook 91, C. Sine, ed., (Meister Publishing Company, Willoughby, Ohio).
19	Structure and Nomenclature Search System, (Version 7.00/7.03) December, 1992.
20	From Syracuse Research Corporation Calculated Value from pcchem-pcgems, 1988, ref no. 255435 in Enirofate database, Accession no. 105543.
23	NIOSH, 1990: Pocket Guide to Chemical Hazards, (U. S. Dept. of Health & Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health).
24	Buchter, B. et al., 1989: Correlation of Freundlich Kd and N retention Parameters with Soils and Elements, Soil Science, 148, 370-379.
25	USEPA, 1993: Air/Superfund National Technical Guidance Study series: Estimation of Air Impacts for Thermal Desorption Units Used at Superfund Sites, US Environmental Protection Agency, Office of Air Quality Planning and Standards, EPA-451/R-93-005, NTIS Accession No. PB93-215630, April 1993.
27	Based on salt solubilities in Table 3-120, R. H. Perry and D. W. Green, " Perry's Chemical Engineering Handbook" Sixth Edition, (McGraw-Hill, New York), 1973.
28	Based on salt solubilities in Table of Physical Constants for Inorganic Compounds, Weast, R. C., CRC Handbook of Chemistry and Physics, 67th edition, (CRC Press, Inc., Boca Raton), 1987.
29	Montgomery and Welkom, "Groundwater Chemicals Desk Reference", Lewis Publishers, Chelsea, MI, 1990.
30	Montgomery, J.H., "Groundwater Chemicals Field Guide", Lewis Publishers, Chelsea, MI, 1991.
31	USEPA, "Drinking Water Regulations and Health Advisories", EPA 822-B-96-002, Office of Water, October, 1996.
32	ACGIH, "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices", 1993.
33	IRIS (4/1/97) for TCE states "carcinogen assessment summary for this substance has been withdrawn following further review." Prior to this determination the EPA Classification (Cancer Group) for TCE was identified as B2.

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Oakland General Tire Job Identification: GT-213 Software: GSI RBCA Spreadsheet
Site Location: 1201 14th Ave., Oakland, CA Date Completed: 9/15/97 Version: 1.0.1
Completed By: Mark Jonas, R.G.

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

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

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

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

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***1.0E-05***	1.0E-04
TRc	Target Risk (class C carcinogens)	1.0E-05	
THQ	Target Hazard Quotient	1.0E+00	1.0E+00
Opt	Calculation Option (1, 2, or 3)	3	
Tier	RBCA Tier	2	

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

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	***7.9E+01***
Ugw.tr	Groundwater seepage velocity (cm/yr)	***2.1E+02***
Ks	Saturated hydraulic conductivity(cm/s)	1.0E-04
grad	Groundwater gradient (cm/cm)	2.5E-02
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
phi.eff	Effective porosity in water-bearing unit	3.8E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value	capillary	vadose	foundation
hc	Capillary zone thickness (cm)	***3.7E+00***			
hv	Vadose zone thickness (cm)	***2.1E+02***			
rho	Soil density (g/cm^3)	1.7			
foc	Fraction of organic carbon in vadose zone	0.01			
phi	Soil porosity in vadose zone	0.38			
Lgw	Depth to groundwater (cm)	***2.1E+02***			
Ls	Depth to top of affected subsurface soil (cm)	1.0E+02			
Lsubs	Thickness of affected subsurface soils (cm)	2.0E+02			
pH	Soil/groundwater pH	6.5			
phi.w	Volumetric water content		0.342	0.12	0.12
phi.a	Volumetric air content		0.038	0.26	0.26

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	***0.005***	

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