August 22, 1997 File No. 152.00

Alameda County Health Care Services, Hazardous Materials Division 1131 Harbor Bay Parkway, Suite 250 Alameda, CA 94052

Attn.: Ms. Madhulla Logan

Re: Addendum to Risk Assessment for Zima Center Corporation 2951 High Street, Oakland, CA (ASE Proj. No. 3011)

Dear Ms. Logan,

This addendum presents the results of the revisions to the Risk-Based Corrective Action (RBCA) for the above referenced site. As you know, a RBCA was prepared and presented to the Alameda County Health Care Services, Hazardous Materials Division (ACHCS) in a report dated May 19, 1997. The model revisions and simulations herein were discussed at your office on June 5, 1997, using soil and groundwater data collected by Aqua-Science Engineers, Inc. (ASE). This work is an addendum to the May 19, 1997 report and was discussed in our August 20, 1997 at your office.

Revisions to the Initial Model

The following changes or additions were requested by ACHCS: using the average of groundwater monitoring data and grab water samples for use in the model; using the average of the soil data in the model; adding a new scenario of a proposed building over existing well MW-5; the construction worker and proposed building scenarios were run for both 10-5 and 10-6 risk for dermal contact and inhalation. The following four scenarios were modeled;

Scenario 1. Vapor entering the off-site residence neighboring the site.

Scenario 2. Vapor entering the existing on-site commercial building.

Scenario 3. Exposure to a construction worker from vapor, inhalation and dermal exposure in an excavation.

Scenario 4. Vapor entering a proposed commercial building over MW-5.

97 0CT 10 PM 4: 16

Final Assessment Rich Assessment

The same Tier 2 RBCA computer model was used as in the previous submittal to ACHCS (model of Groundwater Services, Inc., 1995). This model uses the current ASTM E-1739 guidance for the RBCA calculations and predicts potential contaminant reduction for contaminant levels in each scenario. The contaminants modeled in each scenario were; Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Ethylbenzene, Xylene and Methyl-Tert-Butyl-Ether (MTBE).

Model Assumptions

The computer model calculates the potential risk and indicates cleanup for each scenario using the ASTM guidance as the guiding assumptions. The simulations were calculated for the output of Site Specific Threshold Levels (SSTLs) and contaminant reduction factors as indicated. Built-in model default assumptions were used either in the absence of on-site data or where they are reasonable given overall site conditions. In addition, the following assumptions were made for this set of model simulations (please refer to the model output for each scenario).

Scenario 1. The residence is 30 linear feet from the border of the site and groundwater would travel 30 feet to a point directly under the residence. Depth to groundwater is 20 feet, moves under a gradient of 0.014, and bioattenuation is factored into the transport of contaminants under the house using the Domenico one dimensional groundwater flow model embedded into the software. The contaminant concentrations are averages as previously stated. The vadose pathway of vapor is vertical through the vadose soil toward the structure. The foundation is assumed to have 5% cracks.

The soil chemical data are from ASE reports, specifically from Borings BH-A, BH-B, BH-C, BH-D, BH-E and MW-5. Groundwater chemical data are taken from monitoring wells MW-2, MW-4 and MW-5 and reconnaissance groundwater samples from Borings BH-A through BH-E. The soil data is averaged and the groundwater monitoring wells data are averaged from quarterly sampling results; the reconnaissance sample values are averaged.

Scenario 2. The commercial building is directly over the contaminated area. The groundwater is 20 feet deep, bioattenuation is factored into the model. The vadose pathway of vapor is vertical toward the structure. The foundation is assumed to have 5% cracks. If vapors entered the building they are assumed to disperse in the building according to the model defaults.

The soil chemical concentration data are taken from ASE reports, specifically from Borings BH-A, BH-B, BH-C, BH-D, BH-E and MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6. Groundwater chemical data are taken from monitoring wells MW-1 through MW-6 and are averaged from quarterly sampling results.

Scenario 3. The construction worker is directly over the contaminated area and dermal contact and inhalation are selected in the model. The worker is placed in the middle of the contaminated area (hence direct exposure) by the model (selecting zero feet of vapor movement). Vapor transport is assumed to be vertical toward the surface and worker.

The soil chemical concentration data are taken from ASE reports, specifically from Borings BH-A at 6-feet and MW-5 at 5-feet. Groundwater chemical data are taken from monitoring wells MW-1, MW-2, MW-3, MW-4 and MW-5 using the highest dissolved concentrations observed to date. The soil data is averaged and the groundwater data are averaged from quarterly sampling results.

Scenario 4. The proposed commercial building is located directly above monitoring well MW-5, and uses the average of soil data. Groundwater is 20 feet deep, bioattenuation is factored into the model, and vapor movement is again vertical. The foundation is assumed to have 5% cracks. If vapors entered the building they are assumed to disperse in the building according to the model defaults.

The soil chemical concentration data are taken from ASE reports, specifically from Borings BH-A, BH-B, BH-C, BH-D, BH-E and MW-5. Groundwater chemical data are taken from monitoring wells MW-2, MW-4 and MW-5 and reconnaissance groundwater samples from Borings BH-A through BH-E. The soil data is averaged, and the groundwater monitoring wells data are averaged from quarterly sampling results; the reconnaissance sample values are averaged.

The bioattenuation factors used the following for contaminant half-lives assumptions; Benzene-720 days; Ethylbenzene-228 days; Toluene- 28 days; Xylene 360 days. A half life was not listed for MTBE in the model; MTBE is assumed to biodegrade more slowly than petroleum contaminants. The model default for capillary fringe thickness is on the order of inches which is reasonable for this site. The vadose soil thickness is assumed to be about 19.5 feet based upon site observations. When the Dominico transport model is used, it assumes one-dimensional transport directly to the receptor, using bioattenuation and contaminant decay as noted above.

Model Results

Scenario 1, off-site residence. The results show that the calculations were so low that an SSTL could not be calculated for soil or groundwater, and the air risk pathway was less than 10-6. In our opinion, this is due to biodegradation of dissolved contaminants and the relatively low concentrations present in clayey soils. This would tend to fit the observed hydrogeologic conditions since the groundwater transport would be the pathway of most concern to get contaminants under the residence. Since groundwater flow mapping to date shows a southerly groundwater flow away from the residence, there is relatively good agreement with the model and observed conditions, and vapor intrusion to the residence should not occur.

Scenario 2, commercial building on-site. The results show that SSTLs were not exceeded for soil, however they were exceeded in groundwater for Benzene. The risk pathway for air was calculated at less than 10-6. The SSTL was exceeded for Benzene in groundwater and this indicates that some groundwater cleanup is needed to decrease the Benzene concentration.

Scenario 3, construction worker. The results show that the SSTLs would not be exceeded for either soil or groundwater, and the air risk pathway was 9.0 x 10-7. This number is so low that the 10-5 risk level would not be exceeded. Thus, a the worker should not be exposed to contaminant vapors in a shallow excavation. Since soil concentrations were relatively low with the exception of the 5-foot sample at MW-5, the low air risk agrees with the observed data in our opinion.

Scenario 4, proposed building over MW-5. The results show that at both the 10-5 risk and 10-6 risk levels, some contaminant reduction to meet SSTLs is indicated in groundwater. An earlier draft simulation indicated that some vapor could enter the proposed building since one soil sample in MW-5 at 5 feet contained elevated concentrations of contaminants. However, a recheck of the data entry revealed a data entry error. A rerun of the model was done and the vapor calculation did not exceed an SSTL according to the model. Consequently, soil vapor would not exceed SSTLs at either 10-5 or 10-6 risk on the basis of the concentrations used (see above and attached output).

Conclusions

On the basis of RBCA computer model simulations using ASE subsurface data, there does not appear to be a threat to the off-site residence, existing or proposed buildings or construction workers from vapors arising from the on-site groundwater plume at this time. The model results show that some groundwater cleanup is indicated on-site since calculations exceeded SSTLs for the site in the commercial building scenarios. While some soil cleanup was potentially indicated in initial draft Scenario 4 results, this was due to a data entry error. A rerun of the model with corrected data shows that vapor SSTLs would not be exceeded under the proposed building.

In my opinion, the results show that vapor entry should not occur at levels above either the 10-5 or 10-6 risk level for a proposed building over MW-5. Since the groundwater exceeds Benzene SSTLs in some simulations, groundwater cleanup to lower SSTLs is indicated.

ASE has initiated a dissolved oxygen delivery to the groundwater to assist in degrading the dissolved contaminants through enhanced biodegradation. This approach should decrease the groundwater concentrations over time and would remove potential sources of vapor. ASE has begun groundwater cleanup and will report to ACHCS on the progress of the oxygen enhancement of contaminant biodegradation.

Limitations

This report has been prepared for the specifically for the 2951 High Street, Oakland, CA site and was done according to the State and local agency suggested guidance documents for these investigations. The interpretations, conclusions and recommendations made herein are based on the data collected on-site and should be reviewed in the context of the whole report and other consulting supporting documents. Christopher M. Palmer, Consulting Hydrogeologist is not responsible for errors in laboratory analysis and reporting, or information gathered by other consultants. The computer model results herein supersede and modify previous submittals.

If you have any questions, please call.

Sincerely,

Christopher M. Palmer, CEG 1262

Principal

Nº 1262
CERTIFIED
ENGINEERING
GEOLOGIST

OF CALIFORNIA

Attachments:

Model out put results for Scenarios 1 through 4.

References

Aqua Science Engineers, Inc. report dated March 17, 1997 entitled, "Remedial Action Plan for Remediation of Hydrocarbon Impacted Groundwater at Zima Center Corporation 2951 High Street, Oakland, CA (Draft)," 9 pages with attachments.

Aqua Science Engineers, Inc. report dated January 23, 1997 entitled, "Report of Soil and Groundwater Assessment ASE Job No. 3011 at Zima Center Corporation 2951 High Street Oakland, CA,"11 pages with attachments.

Groundwater Services©, Inc., 1995 Tier 2 RBCA for Risk-Based Corrective Action: computer models for soil, groundwater and vapor with accompanying texts.

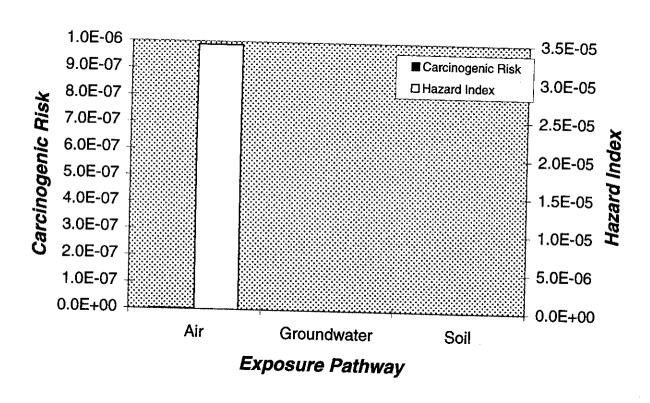
51	BCA	TIER 1	/TIER:	2 EVAL	LIATION

Output Table 1

ſ										utput la	nie i
	Site Nam	e: Zima Center (Corp. (Scenario 1)	otsidentisication:	3011	·	Software	e. GSI RBCA Spreadsheet			
	Site Cocatio	m: ∠951 High Str	eet, Oakland, CAL	Pate Completed:	7/25/97		Varcin	n: v 1.0			
				Completed By:	Chris Palmer		7013101	¥ 1,0			
	DEE	AULT PAR	AMETERS				NOTE: value	es which differ from Tier 1 default values are shown	المعاملة المع		
xposure	52.	AULI FAD						THE PARTY OF THE PARTY OF THE STORY	as polo italics a	ina underlined.	
arameter	Definition (Units)	Adult	Residential			ial/Industrial	Surface			_	
ATc	Averaging time for carcinogens (yr)	70	(1-6yrs)	(1-16 yrs)	Chronic	Constrctn	Parameters	Definition (Units)	Boolets-41-		clal/industria
:Tn	Averaging time for non-carcinogens (yr)	30	6				t	Exposure duration (yr)	Residentia 30	Chronic Chronic	Construc
SW .	Body Weight (kg)	70	15	16			Α	Contaminated soil area (cm^2)			
D	Exposure Duration (yr)	30	15 6	35			w	Length of affected soil parallel to wind (cm)	2.2E+06		
F	Exposure Frequency (days/yr)	350	ь	16			W.gw	Length of affected soil parallel to groundwater (co	9.1E+02		
F.Derm	Exposure Frequency for dermal exposure	350					Uair	Ambient air velocity in mixing zone (cm/s)			
I gw	Ingestion Rate of Water (I/day)	330					delta	Air mixing zone height (cm)	2.3E+02		
રેક	Ingestion Rate of Soil (mo/day)						Lss	Definition of surficial soils (cm)	2.0E+02		
Radi	Adjusted soil ing. rate (mg-yr/kg-d)						Pe	Particulate areal emission rate (g/cm^2/s)	1.0E+02		
Ra.in	Inhalation rate indoor (m/3/day)	15			#DIV/01			and and an anisonal late (graff-2/5)	2.2E-10		
Ra.out	Inhalation rate outdoor (m^3/day)	20					Groundwate	Definition (Units)	11-1		
A	Skin surface area (dermal) (cm^2)	5.8E+03					delta.gw	Groundwater mixing zone depth (cm)	Value	_	
Aadj	Adjusted dermal area (cm^2+yr/kg)	2.1E+03		2.0E+03			ı	Groundwater infiltration rate (cm/yr)	2.0E+02		
ŧ	Soil to Skin adherence factor	1			#DIV/01		Ugw	Groundwater Darcy velocity (cm/yr)	3.0E+01		
AFs	Age adjustment on soil ingestion	FALSE					Ugw.tr	Groundwater Transport velocity (cm/yr)	1.3E+03		
AFd	Age adjustment on skin surface area	FALSE			FALSE		Ks	Saturated Hydraulic Conductivity(cm/s)	5.0E+03		
)X	Use EPA tox data for air (or PEL based)	TRUE			FALSE		grad	Groundwater Gradient (cm/cm)	1.0E-03		
wMCL?	Use MCL as exposure limit in groundwater?	FALSE					Sw	Width of groundwater source zone (cm)	4.0E-02		
	and and an	FALSE					Sd	Depth of groundwater source zone (cm)	1.8E+03		
							BC	Biodegradation Capacity (mg/L)	3.0E+02		
							BIO?	is Bioattenuation Considered			
							phi.eff	Effective Porosity in Water-Bearing Unit	TRUE		
atrix of Expo	sed Persons to	Dealdoutus					foc.sat	Fraction organic carbon in water-bearing unit	2.5E-01		
	osure Pathways	_Residential			Commercia	aVindustrial		Listoriou ordenic carport in water-beautid fult	1.0E-03		
roundwater	athways:				Chronic	Constrcto	Soit	Definition (Units)	V-1		
W.i	Groundwater Ingestion	TRUE					hc	Capillary zone thickness (cm)	Value	_	
W.v	Volatilization to Outdoor Air	FALSE			FALSE		hv	Vadose zone thickness (cm)	5.0E+00		
W.b	Vapor Intrusion to Buildings	TRUE			FALSE		ιħο	Soil density (g/cm^3)	6.0E±02		
oil Pathways		ITIOC			FALSE		foc	Fraction of organic carbon in vadose zone	1.7		
. v	Volatiles from Subsurface Soils	TRUE					phi	Soil porosity in vadose zone	0.01 0.38		
S.v	Volatiles and Particulate Inhalation	TRUE			FALSE		Ĺgw	Depth to groundwater (cm)			
S.d	Direct Ingestion and Dermal Contact	FALSE			FALSE	FALSE	Ls	Depth to top of affected soil (cm)	6.0E+02		
.1	Leaching to Groundwater from all Soils	TRUE			FALSE	FALSE	Lsubs	Thickness of affected subsurface soils (cm)	1.5E+02		
.b	Intrusion to Buildings - Subsurface Soils	TRUE			FALSE		pΗ	Soil/groundwater pH	4.6E+02		
		INCE			FALSE		•		6.5		
							phi.w	Volumetric water content	caplilary	vadose	foundation
								Volumetric air content	0.342	0.12	0.12
									0.038	0.26	0.26
							Building	Definition (Units)	Dogleto-stat		
itrix of Recei	otor Distance	Doold	iential					Building volume/area ratio (cm)	Residential	Commercial	
d Location o	n- or off-site	Distance		_	Commercia	Vindustrial	ER	Building air exchange rate (s^-1)	2.0E+02		
-		Distance	On-Site		Distance	On-Site	Lork	Foundation crack thickness (cm)	1.4E-04		
٧	Groundwater receptor (cm)	9.1E+02					eta	Foundation crack fraction	1.5E+01		
	Inhalation receptor (cm)		FALSE		9.1E+02	FALSE		TOTAL STATE OF THE	<u>0.005</u>		
		9.1E+02	FALSE		9.1E+02	FALSE					
trix of							Dispersive Tra	ansport .			
get Risks	•	Implicated as a 2					Parameters	Definition (Units)	5	_	
		Individua!	Cumulative				Groundwater	- ommune (Ottika)	Residential	Commercial	
ab '	Target Risk (class A&B carcinogens)	4.05-4-						Longitudinal dispersion coefficient (cm)		_	
	Farget Risk (class C carcinogens)	1.0E-06					-	Francisco dispossion coefficient (cm)	9.1E+01		
_	Farget Hazard Quotient	1.0E-05					•	Transverse dispersion coefficient (cm)	3.0E+01		
	Calculation Option (1, 2, or 3)	1.0E+00					Vapor	Vertical dispersion coefficient (cm)	4.6E+00		
	RBCA Tier	3						Francusco dispersion Maria de			
		2						Fransverse dispersion coefficient (cm)	1.1E+02		
							dcz \	Vertical dispersion coefficient (cm)	7.6E+01		

© Groundwater Services, Inc. (GSI), 1995. All Rights Reserved.

Total Risk for Each Pathway



		RBCA SIT	E ASSES	SMENT			<u>-</u>	·			÷		•
Site Name: 2 Site Location	Zima Center Corp. (Scenario 1 offsite r n: 2951 High Street, Oakland, CA	es)	Completed to Date Complete	By: Chris Pain eted: 7/25/199	ner 97				-,		Tier 2 Worksh	eet 9.2	
SUB	SURFACE SOIL SSTL (> 3 FT BGS)	VALUES	Target Risk Target	(Class A & B Risk (Class C azard Quotien) 1.0E-6) 1.0E-5			sure limit? sure limit?	The transfer of the same	Cal	culation Option	: 3	1 OF 1
		Representative		SSTL R	esults For Compl	ete Expos	ure P	athways ("x" ii	Complet	9)			
CONSTITUE	NTS OF CONCERN	Concentration	X Soi		Groundwater	X		atilization to	X Sc	il Volatilization to Outdoor Air	Applicable SSTL	SSTL Exceede	i
	Name Benzene	(mg/kg) 2.6E-2	30 feet	(on-site)	Regulatory(MCL): 30 feet	Residen (on-sit		Commercial: (on-site)	Residen	tial: Commercial:		d?	Required CRF Only if "yes" left
100-41-4	Ethylbenzene	1.9E-2	#VALUE!	NA NA	NA NA	1.3E		NA	1.8E-	-1 NA	#VALUE!	>- >-	#VALUE!
###### 108-88-3	Methyl t-Butyl Ether	9.7E-2	#VALUE!	NA	NA NA	6.9E-		NA NA	>Re		#VALUE!	34.34	#VALUE!
	Xylene (mixed isomers)	1.6E-2 2.8E-2	#VALUE!	NA	NA	4.2E-		NA NA	>Re		#VALUE!	34 34	#VALUE!
	Tylenio (mixed isomers)	2.0E-Z	#VALUE!	NA_	NA NA	>Re	s	NA	>Re		#VALUE!	پد پد	#VALUE!
								·					

Software: GSI RBCA Spreadsheet

Serial: G-385-FVX-826

Version: v 1.0

Data-Average of Soil results BH-A,B,C,O,E,MW-2,4,5.

Site Name: Z Site Location	ima Center Corp. (Scenario 1 offsite res : 2951 High Street, Oakland, CA	RBC	Completed I	SESSMENT By: Chris Palm	er					Tier 2 Wo	orksheet 9.	3
	GROUNDWATER SSTL VAI	.UES	Target Ri Targe	eted: 7/25/199 sk (Class A & B) et Risk (Class C) Hazard Quotient	1.0E-6 1.0E-5		posure limit?		Calcu	ilation Option	: 3	1 OF 1
CONSTITUE	NTS OF CONCERN	Representative Concentration	x			Groundy	e Pathways ("x" if o		er Volatilization		SSTL	
CAS No.	Name	(mg/L)	Residential: 30 feet	Groundwater Commercial: (on-site)	Ingestion Regulatory(MCL): 30 feet	Residential:	Commercial:		tdoor Air Commercial:	Applicable SSTL	Exceeded ?	Required CRF
100-41-4	Benzene Ethylbenzene	6.7E-1 2.0E-1	#VALUE!		NA NA	(on-site) 3.4E-2 1.1E+2	(on-site) NA NA	(on-site) NA	(on-site) NA	_#VALUE!	*■* If yes プナテナ	Only if "yes" left #VALUE!
108-88-3		9.5E+0 3.1E-1	#VALUE!	NA NA	NA NA	2.6E+3 4.6E+1	NA	NA NA	NA NA	#VALUE!	***	#VALUE! #VALUE!
1330-20-7	Xylene (mixed isomers)	5.4E-1	#VALUE!	NA	NA NA	>Sol	NA NA	NA NA	NA NA	#VALUE!	*** ***	#VALUE! #VALUE!

Software: GSI RBCA Spreadsheet Version: v 1.0

Serial: G-385-FVX-826

Data-Average of governduates quarterly results wells MW-1, 2, 3, 4, 5, 6; Recommaissance Borry governduates results BH-A, B, C, D, E.

Site Name: Zima Center Corp. (Scenario 1 Job Identification: 3011 Site Location: 2951 High Street, Oakland, Date Completed: 7/25/1997

SUMMARY CALCULATIONS - SSTL BY CUMULATIVE RISK

					SSTI	exce	eded?		Relevant SST	
CAS No.	Constituent	Representative Concentration Groundwater (mg/L)	Representative Concentration Surface Soil (mg/kg)	Representative Concentration Subsurface Soil	Groundwater	Surface Soil	Subsurface Soil	Groundwater (mg/L)	Surface Soil (mg/kg)	Subsurface Soil (mg/kg)
71-43-2	Benzene	6.7E-1	0.0E+0	(mg/kg) 2.6E-2			$\neg \neg$		೫ ೬	nS (m
100-41-4	Ethylbenzene	2.0E-1	0.0E+0		n	0	0	2.0E-1	> 0.0E+0	> 2.6E+0
	Methyl t-Butyl Ether			1.9E-2	n	0	0	1.8E-1	> 0.0E+0	> 1.9E+0
108-88-3	•	9.5E+0	0.0E+0	9.7E-2	n	0	0	8.4E+0	< 0.0E+0	> 9.7E+0
I		3.1E-1	0.0E+0	1.6E-2	n	0	o	2.7E-1		-
	Xylene (mixed isomers)	5.4E-1	0.0E+0	2.8E-2	n	o			> 0.0E+0	> 1.6E+0
	Completed By: Chris Palmer	Cumi	lative Target Risk:	0.0E+0	_ '	U	0	4.7E-1	> 0.0E+0	> 2.8E+0

Cumulative Target Risk: 0.0E+0

Target Hazard Index: 0.0E+0

Software:

GSI RBCA Spreadsheet

Version: v 1.0

© Groundwater Services, Inc. (GSI), 1995. All Rights Reserved.

Serial: G-385-FVX-{

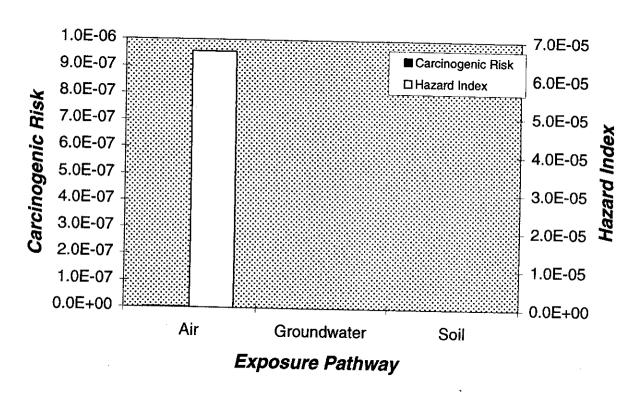
The same of the sa	· · · · · · · · · · · · · · · · · · ·
	1/TIER 2 EVALUATION
KRLA IIEU	TITLED OFWIATION

Output Table 1

		Site Name: Zima Casta								utput Tal	oie i
	Site	Site Name: Zima Cente e Location: 2951 High S	r Corp. (Zima 2)	Job Identification:			Software	e: GSI RBCA Spreadsheet			
		=	oc, Oakiano, CA	Date Completed: Completed By:			Version	n: v 1.0			
					Chilis Paimer						
XDOSUTE		DEFAULT PA	RAMETERS				NOTE: value	es which differ from Tier 1 default values are show	n in bold italies a	benitrehnu hn	
arameter	Definition (Units)		Residentia		Commerc	lal/Industrial					
Тс	Averaging time for carcinogens (yr)	Adult	(1-6yrs)	(1-16 yrs)	Chronic	Constrcto	Surface			Commerc	ial/Industria
Tn	Averaging time for non-carcinogens	70			***************************************	CONSTICUT	Parameters	- Constant	Residentia	Chronic	Construc
W	Body Weight (kg)	s (yr)			25	1	, A	Exposure duration (yr)		25	1
D	Exposure Duration (yr)				70	•	ŵ	Contaminated soil area (cm^2)	2.2E+06		1.0E+0
F	Exposure Frequency (days/yr)				25	1		Length of affected soil parallel to wind (cm)	1 55.00		1.0E+0
F.Dem	Exposure Fragueticy (08/9/9/)				250	180	W.gw	Length of affected soil parallel to proundwater //	× 1.5E+03		1.0=+0
łgw	Exposure Frequency for dermal exp	posure			250	100	Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02		
ls	Ingestion Rate of Water (Vday)				1		delta	Air mixing zone height (cm)	2.0E+02		
ladī	Ingestion Rate of Soil (mg/day)				50		Lss	Definition of surficial soils (cm)	1.0E+02		
la.in	Adjusted soil ing. rate (mg-yr/kg-d)	#DIV/01			#DIV/0!	100	Pe	Particulate areal emission rate (g/cm^2/s)	2.2E-10		
ta.out	Inhalation rate indoor (m^3/day)								4.2E*;U		
14.0UI 4	Inhalation rate outdoor (m^3/day)				20 20		Groundwater	r Definition (Units)	Value		
	Skin surface area (dermal) (cm^2)					10	delta.gw	Groundwater mixing zone depth (cm)	2.0E+02		
Aadj	Adjusted dermal area (cm^2-yr/kg)	#DIV/01			5.8E+03	5.8E+03	Į.	Groundwater infiltration rate (cm/yr)			
	Soil to Skin adherence factor	1			#DIV/0!		Ugw	Groundwater Darcy velocity (cm/yr)	3.0E+01		
AFs .	Age adjustment on soil ingestion	FALSE					Ugw.tr	Groundwater Transport velocity (cm/yr)	4.7E+05		
AFd	Age adjustment on skin surface are:	a FAICE			FALSE		Ks	Saturated Hydraulic Conductivity(cm/s)	1.2E+06		
×	Use EPA tox data for air (or PFI has	sed) TOUR			FALSE		građ	Groundwater Gradient (cm/cm)	1.0E-01		
wMCL?	Use MCL as exposure limit in ground	dwater? FALSE					Sw	Width of groundwater source zone (cm)	1.5E-01		
	•	THESE					Sd	Depth of groundwater source zone (cm)			
							BC	Biodegradation Capacity (mg/L)			
							BIO?	Is Bioattenuation Considered			
							phi.eff	Effective Considered	TRUE		
atrix of Exp	osed Persons to	D					foc.sat	Effective Porosity in Water-Bearing Unit	3.8E-01		
omplete Exp	POSure Pathways	<u>Residentia</u>	<u></u>		Commercia	Mndustrial	100.301	Fraction organic carbon in water-bearing unit	1.0E-03		
roundwater	Pathways:		·····		Chronic	Constrctn	Soil	Definition (Units)			
W.i	Groundwater Ingestion	FALOR					hc		Value	_	
W.v	Volatilization to Outdoor Air	FALSE FALSE			FALSE		hv	Capillary zone thickness (cm)	9.8E+00		
N.b	Vapor Intrusion to Buildings	FALSE			FALSE		rho	Vadose zone thickness (cm)	2.3E+02		
li Pathways	8	FALSE			TRUE			Soil density (g/cm^3)	1.7		
,	Volatiles from Subsurface Soils	ENOF					phi	Fraction of organic carbon in vadose zone	0.01		
.v	Volatiles and Particulate Inhalation	FALSE			FALSE			Soil porosity in vadose zone	0.38		
.d	Direct Ingestion and Dermal Contact	FALSE			FALSE	FALSE		Depth to groundwater (cm)	2.4E+02		
	Leaching to Groundwater from all So				TRUE	FALSE		Depth to top of affected soil (cm)	1.5E+02		
)	Intrusion to Buildings - Subsurface So				FALSE	·/COL	pH	Thickness of affected subsurface soils (cm)	3.0E+02		
	Threaten to buildings - Subsurface So	oils FALSE			TRUE		hu.	Soil/groundwater pH	6.5		
							_L.		capiflary	vadose	foundatio
							phi.w	Volumetric water content	0.342	0.12	0.12
							phi.a	Volumetric air content	0.038	0.12	0.12
							D. H. H.			0.20	0.20
Andre - 4 Th -								Definition (Units)	Residential	Commercial	
иих от масс	otor Distance		Idential		Commercial	/Industrial	Lb	Building volume/area ratio (cm)		3.0E+02	
Irix of Hece 1 Location :	ptor Distance		Watifial				ER j	Building air exchange rate (s~1)		2.3E-04	
Location of	ptor Distance on- or off-site	Res Distance	On-Site		Distance	On Cita		= cut overlande late (2 - 1)			
d Location of	On- or off-site			-	Distance	On-Site	Lork F	Foundation crack thickness (cm)	1.5F+01		
d Location o	Groundwater receptor (cm)				Distance		Lork F	Foundation crack thickness (cm) Foundation crack fraction	1.5E+01 0.005		
Location o	On- or off-site		On-Site	-	Distance	TRUE	Lork F	Foundation crack thickness (cm)	1.5E+01 <i>0.005</i>		
Location o	Groundwater receptor (cm)		On-Site TRUE	-	Distance		Lork p	Foundation crack thickness (cm) Foundation crack fraction			
Location of	Groundwater receptor (cm)		On-Site TRUE		Distance	TRUE	Lork i eta i i i i i i i i i i i i i i i i i i i	Foundation crack thickness (cm) Foundation crack fraction			
Location of	Groundwater receptor (cm)		On-Site TRUE TRUE		Distance	TRUE	Lork is eta is Dispersive Tra	Foundation crack thickness (cm) Foundation crack fraction	0.005		
Location of rix of get Risks	Groundwater receptor (cm) Inhalation receptor (cm)	Distance	On-Site TRUE	-	Distance	TRUE	Lork eta i	Foundation crack thickness (cm) Foundation crack fraction Insport Definition (Units)		Commercial	
Tix of get Risks	Groundwater receptor (cm) Inhalation receptor (cm) Target Risk (class A&B carcinopens)	Distance	On-Site TRUE TRUE		Distance	TRUE	Lork eta i	Foundation crack thickness (cm) Foundation crack fraction Insport Definition (Units)	0.005		
Location of rix of get Risks	Groundwater receptor (cm) Inhalation receptor (cm) Target Risk (class A&B carcinogens) Target Risk (class C carcinogens)	Individual	On-Site TRUE TRUE		Distance	TRUE	Lork eta Dispersive Tra Parameters Groundwater ax	Foundation crack thickness (cm) Foundation crack fraction Insport Definition (Units) Longitudinal dispersion coefficient (cm)	0.005		
I Location of	Groundwater receptor (cm) Inhalation receptor (cm) Target Risk (class A&B carcinogens) Target Risk (class C carcinogens) Target Hazard Quotient	Individuel 1.0E-06 1.0E-05	On-Site TRUE TRUE		Distance	TRUE	Dispersive Tra Parameters C Groundwater ax ay	Foundation crack thickness (cm) Foundation crack fraction Insport Definition (Units) Congitudinal dispersion coefficient (cm) Fransverse dispersion coefficient (cm)	0.005		
d Location of	Groundwater receptor (cm) Inhalation receptor (cm) Target Risk (class A&B carcinogens) Target Risk (class C carcinogens) Target Hazard Quotient Calculation Option (1, 2, or 3)	Individual 1.0E-06 1.0E-05 1.0E+00	On-Site TRUE TRUE		Distance	TRUE	Dispersive Tra Parameters C Groundwater ax ay	Foundation crack thickness (cm) Foundation crack fraction Insport Definition (Units) Longitudinal dispersion coefficient (cm)	0.005		,
Location of rix of get Risks	Groundwater receptor (cm) Inhalation receptor (cm) Target Risk (class A&B carcinogens) Target Risk (class C carcinogens)	Individuel 1.0E-06 1.0E-05	On-Site TRUE TRUE		Distance	TRUE	Dispersive Tra Parameters D Groundwater ax L ay T az V	Foundation crack thickness (cm) Foundation crack fraction Insport Definition (Units) Congitudinal dispersion coefficient (cm) Fransverse dispersion coefficient (cm)	0.005		

© Groundwater Services, Inc. (GSI), 1995. All Rights Reserved.

Total Risk for Each Pathway



Site Name:	Zima Center Corp. Scen 2 comm bldg	RBCA SIT		·						Tier 2 Worksh	eet 9.2	
Site Location	n: 2951 High St., Oakland, CA			By: Chris Paln eted: 7/25/199			-					
SUB	SURFACE SOIL SSTL (> 3 FT BGS)	VALUES	Target Risk Target	(Class A & B Risk (Class C azard Quotien) 1.0E-5) 1.0E-5	☐ MCL exp			Calc	ulation Option	: 1	1 OF 1
		Representative		SSTL R	esults For Comple	ete Exposure l	Pathways ("x" i	Complete)				
CONSTITUE	NTS OF CONCERN	Concentration		Leaching to	Groundwater	X Soil Vo	platilization to	Soil Vo	latilization to	Applicable SSTL	SSTL Exceede	1
CAS No.	Name	(mg/kg)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)		Residential:	Commercial:			Required CRF
	Benzene	2.6E-2	NA	NA	NA	NA NA	(on-site) 5.2E-1	(on-site) NA	(on-site)	(mg/kg)	If yes	Only if "yes" left
	Ethylbenzene	1.9E-2	NA	NA	NA	NA NA			2.3E+2	5.2E-1	<u> </u>	<1
#######	Methyl t-Butyl Ether	9.7E-2	NA	NA	NA NA	NA NA	>Res	NA NA	>Res	>Res	ļ <u>D</u>	<1
108-88-3	Toluene	2.1E-2	NA	NA.			1.2E+3	NA	>Res	1.2E+3	L	<1
#######	Xylene (mixed isomers)	2.8E-2	NA		NA NA	NA	1.1E+2	NA_	>Res	1.1E+2	ū	<1
	<u> </u>	1 2.02-2	NA	NA NA	NA NA	NA	>Res	NA	>Res	>Res	u -	<1

Software: GSI RBCA Spreadsheet

Serial: G-385-FVX-826

Version: v 1.0

Data: Soil data of BH-A,B,C,D,E and MW-2,4,5 averaged.

Site Name: Z	ima Center Corp. Scen 2 comm bldc			ESSMENT by: Chris Palmo			÷			Tier 2 Wo	orksheet 9.3	\$
	: 2951 High St., Oakland, CA	,		eted: 7/25/1997								1 OF 1
<u> </u>	GROUNDWATER SSTL V	ALUES	Targe	sk (Class A & B) t Risk (Class C) Hazard Quotient	1.0E-5	MCL expo	osure limit? sure limit?		Calcu	lation Option	: 1	
				SST	L Results For Con	piete Exposure	Pathways ("x" If (omplete)				
CONSTITUE	VTS OF CONCERN	Representative Concentration		Groundwater		Groundwa	ater Volatilization Indoor Air	Groundwat	er Volatilization atdoor Air	Applicable SSTL	SSTL Exceeded	Required CRF
	Name	(mg/L)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	■ If ves	Only if "yes" left
	Benzene	1.2E+1	NA	NA	NA	NA	1.4E+0	NA	3.2E+2	1.4E+0		9.0E+00
	Ethylbenzene	8.9E-1	NA	NA	NA NA	NA	>Sol	NA	>Sol	>Soi	<u> </u>	<1
	Methyl t-Butyl Ether	3.8E+1	NA	NA	NA	NA	6.7E+3	NA	>Sol	6.7E+3		<1
108-88-3	<u> </u>	5.8E+0	NA	NA	NA	NA	1.6E+2	NA	>Sol	1.6E+2		<1
1330-20-7	Xylene (mixed isomers)	5.8E+0	NA	NA	NA	NA	>Sol	NA	>Sol	>Sol	1	<1

Software: GSI RBCA Spreadsheet

Serial: G-385-FVX-826

Version: v 1.0

Data: Average of quarterly monitoring wells MW-1, 2, 3, 4, 5,6

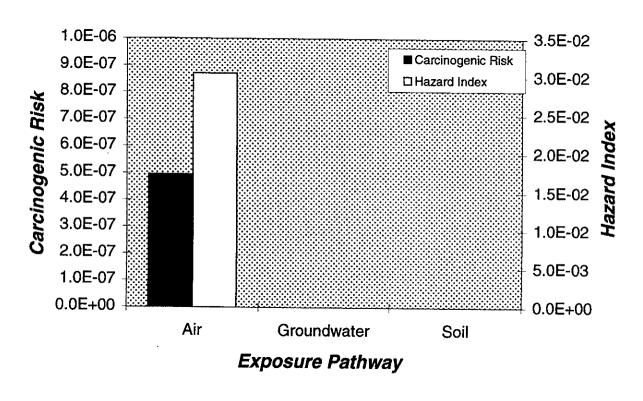
RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

									U	itput (a)	DIE 1
	Site N	ame: Zima Center Co	rp. Scen 3 conJe	orldentification:	3011	· · · · · · · · · · · · · · · · · · ·	Software	e: GSI RBCA Spreadsheet			
	Site Loca	ition: 2951 High Street	et, Oakland, CAD	ate Completed:	7/25/97		Varein	e: GSt HBCA Spreadsheet n: v 1.0			
				Completed By:	Chris Palmer		• 013101	** * 124			
	ne	EEAIU T DANA	METERS				NOTE: value	es which differ from Tier 1 default values are shown	in books to a		
XDOSUTE	DE	FAULT PARA						Allowing Allowing Agency Agency and Sulowing	m pola italies ai	nd underlined.	
Parameter	Definition (Units)	A -1 -1-	Residential			al/industrial	Surface				
Tc	Averaging time for carcinogens (yr)	Adult	(1-6yrs)	(1-16 yrs)	Chronic	Constrctn		Definition (Units)	D1-1		ciel/industri
NTn	Averaging time for non-carcinogens (yr)	70					t	Exposure duration (yr)	Residential		Constru
3W	Body Weight (kg)				25	1	Ä	Contaminated soil area (cm^2)	0.05.44	25	1
ED	Exposure Duration (vr)				70		w	Length of affected soil parallel to wind (cm)	2.2E+06		1.0 E +0
F	Exposure Frequency (days/yr)				25	1	W.gw	Length of affected soil parallel to groundwater (cr	1.5E+03		1.0E+0
F.Derm	Exposure Frequency for dermal exposure	_			250	180	Uair	Ambient air velocity in mixing zone (cm/s)			
Rgw	Ingestion Rate of Water (Vday)	9			250		delta	Air mixing zone height (cm)	2.3E+02		
Rs	Ingestion Rate of Soil (mg/day)				1		Lss	Definition of surficial soils (cm)	2.0E+02		
Radi	Adjusted soil ing. rate (mg·yr/kg·d)	utor eres			50	100	Pe	Particulate areal emission rate (g/cm^2/s)	1.0E+02		
Ra.in	Inhalation rate indoor (m^3/day)	#DIV/0I			#DIV/0I		· -	· criticolate creat enhission rate (grant-2/s)	2.2E-10		
Ra.out	Inhalation rate outdoor (m^3/day)				20		Groundwate	r Definition (Units)			
SA	Skin surface area (dermal) (cm/2)				20	10	delta.gw	Groundwater mixing zone depth (cm)	Value	_	
Aadi	Adjusted dermal area (cm^2*yr/kg)	450.2741			5.8E+03	5.8E+03	1	Groundwater infiltration rate (cm/yr)	2.0E+02		
, /	Soil to Skin adherence factor	#DIV/01			#DIV/0I		Ugw	Groundwater Darcy velocity (cm/yr)	3.0€+01		
AFs	Age adjustment on soil ingestion	1					Ugw.tr	Groundwater Transport velocity (cm/yr)			
AFd	Age adjustment on skin surface area	FALSE			FALSE		Ks	Saturated Hydraulic Conductivity(cm/s)			
ox	Use EPA tox data for air (or PEL based)	FALSE			TRUE		grad	Groundwater Gradient (cm/cm)			
wMCL?	Use MCL as exposure limit in groundwate	TRUE					Sw	Width of groundwater course			
	ose INCL as exposure timit in groundwate	er? FALSE					Sd	Width of groundwater source zone (cm)			
							BC	Depth of groundwater source zone (cm)			
							BIO?	Biodegradation Capacity (mg/L) Is Bioattenuation Considered	_		
							phi.eff	Effective Process in the Process of	FALSE		
lately of Eve	osed Persons to						foc.sat	Effective Porosity in Water-Bearing Unit	3.8E-01		
omniete Eve	osure Pathways	Residential			Commercia	l/Industrial	ioc.sai	Fraction organic carbon in water-bearing unit	1.0E-03		
roundwater	Pothways				Chronic	Constrctn	Soil	Definition (Units)			
SW.j	Groundwater Ingestion						hc	Capillary zone thickness (cm)	Value	_	
aW.v	Volatilization to Outdoor Air	FALSE			FALSE		hv	Vadose zone thickness (cm)	5.0E+00		
SW.b	Vapor Intrusion to Buildings	FALSE			TRUE		rho	Soil density (q/cm^3)	6.0E+02		
oll Pathways	vapor mirrosion to Bullidings	FALSE			FALSE		foc		1.7		
6.v	Volatiles from Subsurface Soils	_					phi	Fraction of organic carbon in vadose zone Soil porosity in vadose zone	0.01		
SS.v	Volatiles and Bestignists to be less	FALSE			TRUE		Lgw	Depth to groundwater (cm)	0.38		
SS.d	Volatiles and Particulate Inhalation	FALSE			TRUE	TRUE	Ls		6.0E+02		
1.6	Direct Ingestion and Dermal Contact	FALSE			TRUE	TRUE	Lsubs	Depth to top of affected soil (cm)	1.0E+02		
5.b	Leaching to Groundwater from all Soils	FALSE			FALSE		pH	Thickness of affected subsurface soils (cm)	2.0E+02		
~	Intrusion to Buildings - Subsurface Soils	FALSE			FALSE		ווק	Soil/groundwater pH	6.5		
					·		phi.w	Valumetric water and a	capillary	vadose	foundatio
							*	Volumetric water content	0.342	0.12	0.12
							pan.a	Volumetric air content	0.038	0.26	0.26
							Building	Dofficialism (Links)			_
striv of Book	ptor Distance							Definition (Units)	Residential	Commercial	
		Reside			Commercial	Andustriei		Building volume/area ratio (cm)	2.0E+02	3.0E+02	
in tocation o	n- or off-site	Distance	On-Site	-	Distance	On-Site		Building air exchange rate (s^-1)	1.4E-04	2.3E-04	
N	Comment of the commen					017-31E	Lcrk	Foundation crack thickness (cm)	1.5E+01		
	Groundwater receptor (cm)		TRUE			TRUE	eta	Foundation crack fraction	0.01		
	Inhalation receptor (cm)		TRUE			TRUE					
defenda						INVE	Diame				
trix of							Dispersive Tra	ensport			
rget Risks		Individual	Cumulative				Parameters	Definition (Units)	Residential	Commercial	
							Groundwater				
ab	Target Risk (class A&B carcinogens)	1.0E-06					ax I	Longitudinal dispersion coefficient (cm)			
c	Target Risk (class C carcinogens)	1.0E-05					ay '	Transverse dispersion coefficient (cm)			
Q	Target Hazard Quotient	1.0E+00					az '	Vertical dispersion coefficient (cm)			
ŧ	Calculation Option (1, 2, or 3)	1					Vapor				
		,						Tanana			
er	RBCA Tier	2					dcy dcz v	Transverse dispersion coefficient (cm) Vertical dispersion coefficient (cm)			

@ Groundwater Services, Inc. (GSI), 1995. All Rights Reserved.

Total Risk for Each Pathway



0'4 N		RBCA SITE	ASSES	SMENT						lier 2 Worksh	aat 0 2	
Site Name: A	Zima Center Corp. Scen 3 con worker n: 2951 High Street, Oakland, CA			By: Chris Palm eted: 7/25/199						/		
SUB	SURFACE SOIL SSTL (> 3 FT BGS)	VALUES	Target Risk Target	(Class A & B) Risk (Class C) azard Quotient	1.0E-6 1.0E-5	☐ MCL expo		- 1000	Calc	ulation Option	: 1	1 <u>Q</u> F 1
					esuits For Comple	ete Exposure P	athways ("x" if	Complete)				
CONSTITUE	NTS OF CONCERN	Representative Concentration	Soil Leaching to Groundwater		Soil Vo	latilization to	Soil Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceede d?	Required CRF	
	Name	(mg/kg)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential: (on-site)	Commercial:		1	
	Benzene	1.7E+1	NA	NA	NA NA	NA	NA	NA	(on-site) 3.4E+1	(mg/kg)	"■" It yes	Only if "yes" left
	Ethylbenzene	3.9E+1	NA	NA	NA	NA NA	NA.	NA NA	I	3.4E+1	- '	<1
#######	Methyl t-Butyl Ether	7.6E+0	NA	NA NA	NA NA	NA NA			>Res	>Res	ļ <u>!</u>	<1
108-88-3	Toluene	6.9E+1	NA.	NA NA	NA NA		NA NA	NA	>Res	>Res_	<u> </u>	<1
	Xylene (mixed isomers)	1.7E+2	NA NA			NA	NA NA	NA	>Res	>Res		<1
	- y (mixed Roomers)	1.7 572	IVA	NA NA	NA NA	NA	NA NA	NA	>Res	>Res		<1

Software: GSI RBCA Spreadsheet

Serial: G-385-FVX-826

Version: v 1.0

Data: Average of soil samples MW-505; BH-AC5

		RBC	A SITE ASS	ESSMENT						Tier 2 Wo	rksheet 9.3	3
	Tima Center Corp. Scen 3 con worker : 2951 High Street, Oakland, CA		•	y: Chris Palme ted: 7/25/1997			· · · · · · · · · · · · · · · · · · ·					1 OF 1
	GROUNDWATER SSTL V	ALUES	Targe	k (Class A & B) t Risk (Class C) lazard Quotient	1.0E-5	MCL expx			Calcu	lation Option	: 1	
ı		" -		SST	L Results For Com	plete Exposure	Pathways ("x" If C	omplete)	· · · · · · · · · · · · · · · · · · ·			
CONSTITUE	NTS OF CONCERN	Representative Concentration		Groundwater	Ingestion		ater Volatilization Indoor Air		er Volatilization	Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	"" If yes	Only if "yes" left
	Benzene	1.2E+1	NA	NA	NA	NA	NA	NA	2.1E+1	2.1E+1	J J	<1
	Ethylbenzene	8.9E-1	NA	NA NA	NA .	NA	NA	NA	>Sol	>Sol	Tu T	<1
	Methyl t-Butyl Ether	3.8E+1	NA	NA	NA	NA	NA	NA	>Sol	>Sol		<1
	Toluene	5.8E+0	NA	NA	NA	NA	NA	NA	>Sol	>Sol	15-	<1
1330-20-7	'Xylene (mixed isomers)	5.8E+0	NA	NA	NA	NA	NA	NA	>Sol	>Sol	Ū	<1

Software: GSI RBCA Spreadsheet

Serial: G-385-FVX-826

Version: v 1.0

Data: Average & quantaly sampling results wells MW-1, 2, 3, 4, 5

											iipui rat	лет
	Si	ite Name: Zin	na Center (Corp. Scen 4 con	attidentification:	3011		C.6	CCIPROLO			
	Site	Location: 29:	51 High St.	Oakland, CA	Date Completed:	7/25/97		Sonware	e: GSI RBCA Spreadsheet			
			-		Completed By:			Version	E V 1.0			
		DECAL	T		•			NOTE: value	s which differ from Tier 1 detault and the service	(a. b a		
Exposure		DEFAUL	LIPAR	AMETERS					s which differ from Tier 1 default values are shown	m bold italies a	nd underlined.	
Parameter	Definition (Units)			Residential		Commerc	lal/Industrial	Surface				
ATc	Averaging time for carcinogens (yr)		Adult	(1-6утв)	(1-16 yrs)	Chronic	Constrctn		Definition (Units)			ial/Industrial
ATn	Averaging time for non-carcinogens	(-A	70					1	Exposure duration (yr)	Residential		Construction
BW	Body Weight (kg)	(yr)				25	1	Α	Contaminated soil area (cm^2)	0.05.00	25	1
ED	Exposure Duration (yr)					70		W	Length of affected soil parallel to wind (cm)	2.2E+06		1.0E+06
EF	Exposure Frequency (days/yr)					25	1	W.gw	Length of affected soil parallel to groundwater (cr	1.5E+03		1.0E+03
EF.Dem	Exposure Frequency for dermal expo	001170				250	180	Uair	Ambient air velocity in mixing zone (cm/s)	1.5E+03		
IRgw	Ingestion Rate of Water (Vday)	OSUIG				250		delta	Air mixing zone height (cm)	2.3E+02		
IRs	Ingestion Rate of Soil (mg/day)					1		Lss	Definition of surficial soils (cm)	2.0E+02		
lRadj	Adjusted soil ing. rate (mg-yr/kg-d)		#DILLIO			50	100	Pe	Particulate areal emission rate (g/cm^2/s)	1.0E+02		
lRa.in	Inhalation rate indoor (m/3/day)		#DIV/0I			#DIV/01			· and one and an assistant late (great 2/5)	2.2E-10		
iRa.out	Inhalation rate outdoor (m^3/day)					20		Groundwater	Definition (Units)	15.45		
SA	Skin surface area (dermal) (cm^2)					20	10	delta.gw	Groundwater mixing zone depth (cm)	Value	_	
SAadj	Adjusted dermal area (cm^2=yr/kg)		#5# (for			5.8E+03	5.8E+03	1	Groundwater infiltration rate (cm/yr)	2.0E+02		
M	Soil to Skin adherence factor		#DIV/0!			#DIV/0!		Ugw	Groundwater Darcy velocity (cm/yr)	3.0E+01		
AAFs	Age adjustment on soil ingestion		1		•			Ugw.tr	Groundwater Transport velocity (cm/yr)	4.4E+03		
AAFd	Age adjustment on skin surface area		FALSE			FALSE		Ks	Saturated Hydraulic Conductivity(cm/s)	1.8E+04		
lox	Use EPA tox data for air (or PEL bas		FALSE			FALSE		grad	Groundwater Gradient (cm/cm)	1.0E-02		
gwMCL?	Lies MCL as expensed limit is account	Sed)	TRUE					Sw		1.4E-02		
gonoci	Use MCL as exposure limit in ground	dwater?	FALSE					Sd	Width of groundwater source zone (cm) Depth of groundwater source zone (cm)			
								BC	Biodegradation Capacity (mg/L)			
								BIQ?	Is Bioattenuation Considered			
										TRUE		
Matrix of Eve	osed Persons to							foc.sat	Effective Porosity in Water-Bearing Unit	2.5E-01		
	posed Persons to posure Pathways	Re	esidential			Commercia	si/Industrial	IOC.SEL	Fraction organic carbon in water-bearing unit	1.0E-03		
Groundwater	Posure Pathways	·				Chronic	Constrcts	Soli	Definition (Units)			
GW.i	Groundwater Ingestion							hc	Capillary zone thickness (cm)	Value	_	
GW.v	Volatilization to Outdoor Air		FALSE			FALSE			Vadose zone thickness (cm)	9.8E+00		
GW.b	Vapor Intrusion to Buildings		FALSE			FALSE			Soil density (g/cm^3)	5.4E+02		
Soil Pathway	Ashor unnasion to DhiidiUâz		FALSE			TRUE			Fraction of organic carbon in vadose zone	1.7		
5.v	Volatiles from Subsurface Soils							phi	Soil peresity in vadose zone	0.01		l
SS.v	Volatiles and Particulate Inhalation		FALSE			TRUE		F	Depth to groundwater (cm)	0.38		
SS.d	Direct Insection and Demot Occurrent	i	FALSE			FALSE	FALSE	•	Depth to top of affected soil (cm)	5.5E+02		i
5.1 5.1	Direct Ingestion and Dermal Contact		FALSE			TRUE	FALSE		Thickness of effected subserfers and (cm)	1.5E+02		
S.b	Leaching to Groundwater from all Soil	iis !	FALSE			FALSE			Thickness of affected subsurface soils (cm) Soil/groundwater pH	3.0E+02		ļ
J.D	Intrusion to Buildings - Subsurface So	olis I	FALSE			TRUE		μ	Solvgroundwater pri	6.5		
	•							phi.w	Volumetric water content	capillary	vadose	foundation
								*	Volumetric water content Volumetric air content	0.342	0.12	0.12
								prii.a	voidillettic all content	0.038	0.26	0.26
								Building	Definition (Units)	Barta et a		j
Astrix of Rece	eptor Distance								Building volume/area ratio (cm)	Residential	Commercial	1
nd Location	on- or off-site		Resid	dential	<u>.</u>	Commercia	i/Industrial		Building air exchange rate (s^-1)		3.0E+02	
	017- 01 011-3116	D	istance	On-Site		Distance	On-Site		Foundation crack thickness (cm)		2.3E-04	ł
ew .	Groundwater reseater ()								Foundation crack fraction	1.5E+01		į
•••	Groundwater receptor (cm)			TRUE			TRUE	ola I	roundation crack traction	<u>0.005</u>		
	Inhalation receptor (cm)			TRUE			TRUE					
atrix of								Dispersive Tra	Ingnort			
arget Risks									Definition (Units)			
- Ant thorp	·	Inc	dividual	Cumulative	•			Groundwater	Deministration (BINES)	Residential	Commercial	}
Rab	Toront Diets (alean 100								ongitudinal diagonalism as 10 s			
nau Re	Target Risk (class A&B carcinogens)		0E <u>-05</u>					_	Longitudinal dispersion coefficient (cm)			
1Q	Target Risk (class C carcinogens)		.0E-05					ay 1	Transverse dispersion coefficient (cm)			ŀ
	Target Hazard Quotient	1.	0E+00					az \	Vertical dispersion coefficient (cm)			[
pt er	Calculation Option (1, 2, or 3)		1					Vapor	Parameter at a second s			1
<u> </u>	RBCA Tier		2					doy 1	Fransverse dispersion coefficient (cm)			
								doz \	Vertical dispersion coefficient (cm)			i i

022-11	Tima Center Corp. Scen 2 comm bldg	RBCA SITE	E ASSES	SMENT	•				··				
Site Location	Completed I	By: Chris Pain eted: 7/25/199	ner 17	··· ··· ··· ···				Tier 2 Worksh	eet 9.2				
SUBSURFACE SOIL SSTL (> 3 FT BGS)		VALUES Target Risk (Class A & B) Target Risk (Class C) Target Hazard Quotient			1.0E-5 1.0E-5	☐ MCL expo	osure limit? osure limit?		Calculation Option: 1				
		Representative			esults For Comp!	ete Exposure P	athways ("x" if	Complete)					
CONSTITUENTS OF CONCERN		Concentration	Soil Leaching to Groundwater			X Inc	latilization to	X Soil Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceede	1	
	Name Benzene	(mg/kg) 2.6E-2	(on-site)	(on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential:		(mg/kg)	d?	Required CRF	
100-41-4	Ethylbenzene	1.9E-2	NA NA	NA NA	NA NA	NA NA	5.2E-1	NA NA	2.3E+2	5.2E-1	i yes	Only if "yes" left	
###### 108-88-3	Methyl t-Butyl Ether	9.7E-2	NA	NA NA	NA NA	NA NA	>Res 1.2E+3	NA NA	>Res >Res	>Res	<u> </u>	<1	
	Xylene (mixed isomers)	2.1E-2 2.8E-2	NA NA	NA	NA	NA	1.1E+2	NA NA	>Res	1.2E+3 1.1E+2		<1 <1	
		2.02-2	NA .	NA NA	NA NA	NA	>Res	NA	>Res	>Res	ā	<1	

Software: GSI RBCA Spreadsheet

Serial: G-385-FVX-826

Version: v 1.0

Data: Soil average of samples from BH-A,B,C,D, E and MW-5.

Scenario 4. Proposed Commercial Building over MW-5 (at 10⁻⁵).

Site Name: Z	ima Center Corp. Scen 4 comm bldg	RBC		SESSMENT By: Chris Palm							Tier 2 Wo	orksheet 9.:	3
SHE ECCABON.	: 2951 High St., Oakland, CA		Date Comple	eted: 7/25/199	7								1 OF 1
<u> </u>	GROUNDWATER SSTL V						sure limit? sure limit?		Calculation Option: 1				
		Representative		SST	L Results For Corr	nplete l	xposure	Pathways ("x" If C	omplete)				
CONSTITUEN	CONSTITUENTS OF CONCERN			Groundwater Ingestion		Groundwater Volatiliza to Indoor Air		iter Volatilization	Groundwat	ter Volatilization Applicable		SSTL Exceeded	
	Name Benzene	(mg/L) 1.2E+1	Residential: (on-site)	(on-site)	Regulatory(MCL): (on-site)	(0)	idential: n-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)		"E" If yes	Required CRF Only if "yes" left
	Ethylbenzene	8.9E-1	NA NA	NA NA	NA NA		NA	1.4E+0	NA	NA	1.4E+0	1,00	8.0E+00
1634-04-4	Methyl t-Butyl Ether	3.8E+1	NA NA	NA NA	NA NA		NA.	>Sol	NA	NA	>Sol	<u> </u>	<1
108-88-3		5.8E+0	NA NA	NA NA	NA NA	_	NA .	7.3E+3	NA NA	NA	7.3E+3	J	<1
1330-20-7	Xylene (mixed isomers)	5.8E+0	NA NA	NA NA	NA NA		VA.	1.7E+2	NA NA	NA	1.7E+2		<1
				147	144	!	NA	>Sol	NA	NA NA	>Sol		<1

Software: GSI RBCA Spreadsheet

Serial: G-385-FVX-826

Version: v 1.0

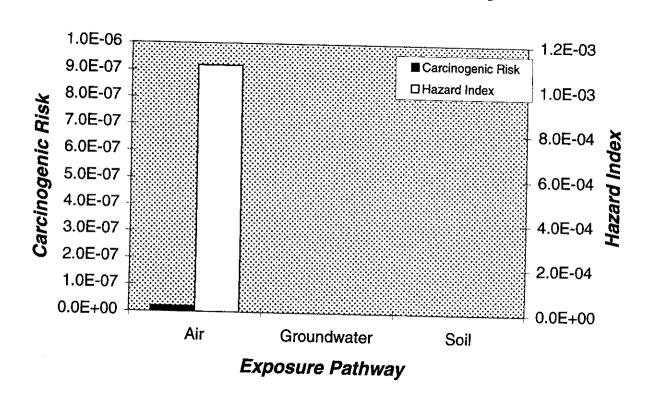
Data: Average of groundwater quarterly results wells MW-1, 2, 3, 4, 5, 6.

Sec. 25.5

									U	itput Tal	DIE 1
	Si	te Name: Zima Center C	orp. Scen 4 cor	white tide time tion:	3011		Software	a. GSI PBCA Secretal			
	Site	Location: 2951 High St.	Oakland, CA	Date Completed:	7/25/97		ouiwan Vareiw	e: GSI RBCA Spreadsheet n: v 1.0			
				Completed By:			1613101	11. 9 1.0			
		DEFAULT PARA	AMETERA				NOTE: value	es which differ from Tier 1 default values are shown	in hold italian -	naf unafort =	
xposure		DELACE! PAR		_				TO STORE TO STORE	i iii bolo lianes a	na unaeriinea.	
Parameter	Definition (Units)	Adult	Residentia (1-6yrs)		Commerci	si/Industrial	Surface				
ATc	Averaging time for carcinogens (vr)	70	(1-0318)	(1-16 yrs)	Chronic	Constrctn	Parameters	Definition (Units)	Residential		cial/industrial
.Tn	Averaging time for non-carcinogens	(vr)			••		t	Exposure duration (yr)	(POSICIOI ILISI	25	Constructi
3W	Body Weight (kg)	(J-7			25	1	Α	Contaminated soil area (cm^2)	2.2E+06	23	1.0E+06
D	Exposure Duration (yr)				70	_	W	Length of affected soil parallel to wind (cm)	1.5E±03		1.0E+06
F	Exposure Frequency (days/yr)				25	1	W.gw	Length of affected soil parallel to groundwater (co	r 1.5E+03		1.0E+03
F.Derm	Exposure Frequency for dermal expo	Sure			250 250	180	Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02		
ggw	Ingestion Rate of Water (I/day)				290 1		delta	Air mixing zone height (cm)	2.0E+02		
Ris Radi	Ingestion Rate of Soil (mg/day)				50	100	Lss	Definition of surficial soits (cm)	1.0E+02		
taoj Ra.in	Adjusted soil ing. rate (mg*yr/kg*d)	#DIV/0I			#DIV/0I	100	Pe	Particulate areal emission rate (g/cm^2/s)	2.2E-10		
na.m Ra.out	Inhalation rate indoor (m^3/day)				20		O	.			
na.out SA	Inhalation rate outdoor (m^3/day)				20	10	dolla av	er Definition (Units)	Value	_	
Aadi	Skin surface area (dermal) (cm^2)				5.8E+03	5.8E+03	delta.gw	Groundwater mixing zone depth (cm)	2.0E+02	•	
- 	Adjusted dermal area (cm^2+yr/kg) Soil to Skin adherence factor	#DIV/0!			#DIV/01	J. 042 100	Ugw	Groundwater infiltration rate (cm/yr)	3.0E+01		
AFs	Ane adjustment on sell-	_ 1					Ugw.tr	Groundwater Darcy velocity (cm/yr)	4.4E+Q3		
AFd .	Age adjustment on soil ingestion Age adjustment on skin surface area	FALSE			FALSE		Ks	Groundwater Transport velocity (cm/yr)	1.8E+04		
ox .	Use EPA tox data for air (or PEL base	FALSE			FALSE		grad	Saturated Hydraulic Conductivity(cm/s) Groundwater Gradient (cm/cm)	1.0E-02		
wMCL?	Use MCL as exposure limit in ground	ed) TRUE					Sw	Width of groundwater source zone (cm)	1.4E-02		
	er as exposure mint in Blothid	water? FALSE					Sd	Depth of groundwater source zone (cm)			
							BC	Biodegradation Capacity (mg/L)			
							BIO?	Is Bioattenuation Considered	TRUE		
							phi.eff	Effective Porosity in Water-Bearing Unit	2.5E-01		
latrix of Expo	sed Persons to	Residential			_		foc.sat	Fraction organic carbon in water-bearing unit	2.5E-01 1.0E-03		
omplete Exp	osure Pathways	- Hannasitti		 .	Commercia			a	1.00403		
roundwater					Chronic	Constrctn	Soil	Definition (Units)	Value		
SW.i	Groundwater Ingestion	FALSE			FALSE		hc	Capillary zone thickness (cm)	9.8E+00	_	
W.v	Volatifization to Outdoor Air	FALSE			FALSE		hv +-	Vadose zone thickness (cm)	5.4E+02		
W.b oil Pathways	Vapor Intrusion to Buildings	FALSE			TRUE		rho for	Soil density (g/cm/3)	1.7		
ou Pathways .v							foc phi	Fraction of organic carbon in vadose zone	0.01		
.v S.v	Volatiles from Subsurface Soils	FALSE			TRUE		•	Soil porosity in vadose zone	0.38		
S.d	Volatiles and Particulate Inhalation	FALSE			FALSE	FALSE	l.gw Ls	Depth to groundwater (cm)	5.5E+02		
i.l	Direct Ingestion and Dermal Contact	FALSE			TRUE	FALSE	Lsubs	Depth to top of affected soil (cm)	1.5E+02		
.b	Leaching to Groundwater from all Soil Intrusion to Buildings - Subsurface So				FALSE		pH	Thickness of affected subsurface soils (cm)	3.0E+02		
-	**************************************	ils FALSE			TRUE		pre	Soil/groundwater pH	6.5		
							phi,w	Volumetric water content	capillary	vadose	foundation
					•		* .	Volumetric air content	0.342	0.12	0.12
							F	- STATE OF THE CONTROL OF	0.038	0.26	0.26
							Building	Definition (Units)	Donisland	•	
atrix of Rece	ptor Distance	Resid	antial		_			Building volume/area ratio (cm)	Residential	Commercia!	
d Location o		Nesid			Commercial		ER	Building air exchange rate (s^-1)		3.0E+02	
		~ NOTALICE	On-Site		Distance	On-Site	Lcrk	Foundation crack thickness (cm)	1.5E+01	2.3E-04	
₩	Groundwater receptor (cm)		TRUE					Foundation crack fraction	0.005		
	Inhalation receptor (cm)		TRUE			TRUE			A-AA3		
	. , ,		INUE			TRUE					
trix of							Dispersive Tra				
get Risks		Individual	Cumulative	-			Parameters	Definition (Units)	Residential	Commercial	
				-			Groundwater			- vinnoroidi	
ab	Target Risk (class A&B carcinogens)	1.0E-06					ax	Longitudinal dispersion coefficient (cm)			
C	Target Risk (class C carcinogens)	1.0E-05					ay -	Transverse dispersion coefficient (cm)			
	Target Hazard Quotient	1.0E+00					az '	Vertical dispersion coefficient (cm)			
t .	Calculation Option (1, 2, or 3)	1					Vapor				
er	RBCA Tier	2					dcy	Transverse dispersion coefficient (cm) Vertical dispersion coefficient (cm)			
							dcz \				

@ Groundwater Services, Inc. (GSI), 1995. All Rights Reserved.

Total Risk for Each Pathway



		RBCA SIT	E ASSES	SMENT	<u>.</u>									
Site Name: A	Zima Center Corp. Scen 4 comm bldg n: 2951 High St., Oakland, CA	over MW5	Completed i	By: Chris Pair eted: 7/25/199	ner 97					**		Tier 2 Worksh	eet 9.2	
SUBSURFACE SOIL SSTL (> 3 FT BGS)		VALUES	Target Risk (Class A & B) 1.0E-6 Target Risk (Class C) 1.0E-5 Target Hazard Quotient 1.0E+0			☐ MCL exposure limit? ☐ PEL exposure limit?			Calculation Option: 1					1 OF 1
		Representative	1	SSTL R	esuits For Comple	ete Ex	(posure P	athways ("x" if	Com	plete)				
CONSTITUENTS OF CONCERN		Concentration	Soil Leaching to Groundwater				Soil Volatilization to			Soil Volatilization to		Applicable SSTL	SSTL Exceede	·)
	Name Benzene	(mg/kg) 2.6E-2	(on-site)	(on-site)	Regulatory(MCL): (on-site)		sidential: n-site)	Commercial: (on-site)	Res	sidential; n-site)	Commercial:		d?	Required CRF
100-41-4	Ethylbenzene	1.9E-2	NA NA	NA NA	NA NA	 	NA	5.2E-2		NA	2.3E+1	(mg/kg) 5.2E-2	ir yes	Only if "yes" left
#######	Methyl t-Butyl Ether	9.7E-2	NA NA	NA NA	NA NA		NA	>Res		NA	>Res	>Res	<u> </u>	<1
108-88-3	Toluene	2.1E-2	NA NA	NA NA	NA NA		NA	1.2E+3		NA	>Res	1.2E+3	Ü	<1
_######	Xylene (mixed isomers)	2.8E-2	NA NA	NA NA	NA NA		NA NA	1.1E+2		NA	>Res	1.1E+2		<1
		·		1101	INA		NA	>Res	· · _	NA	>Res	>Res		<1
			-											

Software: GSI RBCA Spreadsheet

Serial: G-385-FVX-826

Version: v 1.0

Data: Average of soil samples BH-A,B,C,D,E and MW-5

> Scenario 4. Disposed Commercial Building over MW-5 (at 10-6)

Site Name: Z	ima Center Corp. Scen 4 comm bldg	RBC		SESSMENT by: Chris Palm						Tier 2 W	orksheet 9.	3	
Site Location	: 2951 High St., Oakland, CA		eted: 7/25/199								1 OF 1		
	GROUNDWATER SSTL VA	Targe	sk (Class A & B) It Risk (Class C) Hazard Quotient	1.0E-5	_	posure limit? posure limit?		Calculation Option: 1					
		Representative		SS1	L Results For Con	plete Exposur	e Pathways ("x" If C	omplete)					
CONSTITUE	CONSTITUENTS OF CONCERN		Groundwater Ingestion			Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded	Required CRF	
CAS No.	Name Benzene	(mg/L)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(ma/L	If yes	Only if "yes" left	
	Ethylbenzene	1.2E+1	NA NA	NA NA	NA NA	NA	1.4E-1	NA	NA	1.4E-1	1 763	8.4E+01	
1634-04-4	Methyl t-Butyl Ether	8.9E-1	NA NA	NA	NA	NA_	>So!	NA	NA	>Sol	J	<1	
108-88-3		3.8E+1	NA NA	NA_	NA	NA	7.3E+3	NA	NA	7.3E+3	u	<1	
	Xylene (mixed isomers)	5.8E+0	NA	NA	NA NA	NA	1.7E+2	NA	NA	1.7E+2	ū	<1	
	prysene (mixed isomers)	5.8E+0	NA	NA	NA NA	NA	>Sol	NA	NA	>Sol		<1	

Software: GSI RBCA Spreadsheet

Serial: G-385-FVX-826

Version: v 1.0

Data: Average of groundwaterquarterly results MW-1, 2, 3, 4, 5,6

Scenario 4. Proposed Commercial Building over MW-5 (at 10-6)