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R023

partial review 10/24/02

September 5, 2002

Risk Based Corrective Action Report
Former E-Z Serve Location No. 100877
525 West A Street
Hayward, California 95073
ATC Job No. 43.25827.0024

On behalf of Restructure Petroleum Marketing Services of California (RPMS-CA), ATC Associates Inc. (ATC) has prepared this Risk Based Corrective Action Report detailing the procedures, results, and conclusions of the risk based corrective action (RBCA) assessment of the subject site. This RBCA assessment is consistent with the American Society of Testing and Materials Standard Provisional Guide for Risk Based Corrective Action (ASTM, 1998) and current United States Environmental Protection Agency guidelines (U.S. EPA, 1989a; 1996).

Introduction

The RBCA assessment utilized the RBCA Tool Kit for Chemical Releases, in conjunction with site-specific environmental data, to determine risk and associated clean-up goals for the subject site. Various site conceptual models were developed by defining and including possible primary, secondary, and tertiary sources, release mechanisms, exposure routes, and receptors in the RBCA calculations. Based on analysis of exposure routes and the results of the RBCA calculations, key elements such as risk based clean-up objectives, potential remedy selections and possible compliance monitoring were established.

Procedures

Some site specific environmental variables were considered constant because of their physical and chemical properties, and therefore were used in all the various site conceptual models developed for this report. Parameters such as the constituents of concern (COC), namely total petroleum hydrocarbons characterized as gasoline (TPHg), benzene, toluene, ethylbenzene, and xylenes (BTEX), and methyl-tert butyl ether (MTBE), the initial affected groundwater plume size and analytical concentrations, exposure parameters, and transport mechanisms such as volatilization were used in all the site conceptual models. The established chemical data for all the selected COCs including physical property, toxicity, and miscellaneous chemical data is summarized in tabular form in the attached Chemical Data for Selected COCs (pages 1 through 4). The groundwater source zone statistical concentrations, concentration calculator, and raw analytical data based on the most recent groundwater sampling event of May 29, 2002, is also summarized in tabular form in the attached Groundwater Source Zone Concentration

Calculator (pages 1 and 2). Other constants used in the various conceptual models, within the groundwater and exposure parameters and transport mechanisms, can be viewed in the Tier 1 and 2, Pre and Post-Excavation Input Parameter Summarys and Exposure Pathway Flowcharts, respectively.

For the purpose of comparing and contrasting various site conceptual models, the source media including affected surficial and subsurface soil petroleum hydrocarbon concentrations was considered highly variable. By implementing engineering controls, such as excavation of the affected surficial and subsurface source soils and importing clean fill, the source media hydrocarbon concentrations can effectively be changed from the current impacted condition to a state of non-detect. All known current and historical soil sample analytical results compiled during assessment of this project were used to establish the worst-case hydrocarbon impact state of the site. The user-specified COC data used in each of the various models is summarized in the Representative COC Concentrations in Source Media tables.

Four conceptual models were established for the site, using a combination of a Tier 1 or a Tier 2 analysis, and the presence or absense of on-site impacted soil. Tier 1 analyses involve generic risk-based screening levels (RBSLs) for on-site exposure, assuming default exposure factors and site properties. For these analyses, the site is considered to be inclusive of all impacted soil and groundwater, whether it is inside or outside of the property line. Because the site includes residential housing, residential risk standards are used in all phases of the Tier 1 analyses. The pre-excavation model assesses the risk associated with the benzene, TPHg, MTBE, xylene, ethylbenzene and toluene currently present in the soil and groundwater of the site in question. The upper confidence limits (UCL) of the mean concentrations from the most recent soil and groundwater analytical results were used for the assessment. This conceptual model analyzes the risk presented to construction workers and residents in contact with surface soils, the risk presented to residents through air exposure from affected soils, groundwater and surface soils, and the risk presented to residents through volatilization to indoor air from affected soils and groundwater. The post-excavation model uses the same COCs and their respective UCL limits, but with different pathways of exposure. This conceptual model analyzes the risk presented to residents through air exposure from groundwater, and the risk presented to residents through volatilization to indoor air from affected groundwater.

In Tier 2 analyses, the baseline risks and site-specific target levels (SSTLs) for both on- and off-site receptor locations can be evaluated based on site-specific soil, groundwater, and air parameters. A Tier 2 analysis also allows the use of transport models in calculating risks and cleanup standards related to off-site receptors. The site is considered to be inclusive of all impacted soil and groundwater, whether it is inside or outside of the property line. Residential housing exists both on- and off-site, so residential risk standards are used in all phases of the Tier 2 analyses. The pre-excavation model assesses the risk associated with the benzene, TPHg, MTBE, xylene, ethylbenzene and toluene currently present in the soil and groundwater of the site in question. The UCL of the mean concentrations from the most recent soil and groundwater analytical results were used for the assessment. This conceptual model analyzes the risk presented to construction workers and residents in contact with surface soils, the risk presented to residents through air exposure from affected soils, groundwater and surface soils, the risk presented to residents through volatilization to indoor air from affected soils and groundwater, and the risk presented to un-impacted groundwater 300 feet off-site from affected groundwater and leaching soils. The post-excavation model uses the same COCs and their respective UCL limits, but with different pathways of

exposure. This conceptual model analyzes the risk presented to residents through air exposure from groundwater, the risk presented to residents through volatilization to indoor air from affected groundwater, and the risk presented to un-impacted groundwater 300 feet off-site from affected groundwater.

Results

The first and second conceptual models are Tier 1 analyses that represent pre- and post-excavation conditions. In the pre-excavation model, that includes on-site impacted soil, the Baseline Risk Summary output shows that all values for Outdoor Air Exposure, Indoor Air Exposure, and Soil Exposure do not exceed their respective limits. No values are given for Groundwater Exposure Pathways because a Tier 1 model can only analyze what is occurring onsite, and all groundwater on-site is already impacted. For the second model, with post-excavation conditions, the Baseline Risk Summary output shows that all values for Outdoor and Indoor Air Exposure do not exceed their respective limits, and have decreased from their pre-excavation values. No values are listed for Soil Exposure Pathways because this model represents a situation with no contaminated soil.

The third and forth conceptual models are Tier 2 analyses that also represent pre- and post-excavation conditions. These models also calculate the risk of impact to groundwater off-site, 300 feet from the center of the site. This is the approximate distance to non-impacted groundwater under near by residential and commercial buildings. In the Tier 2 pre-excavation model, with on-site impacted soil, the Baseline Risk Summary output shows an Individual COC Risk Maximum Value of 0.000043 that exceeds the Target Risk of 0.000001, a Cumulative COC Risk Value Total Value of 0.000043 that exceeds the Target Risk of 0.00001, a Hazard Quotient Maximum Value of 2.0 that exceeds the limit of 1.0, and a Hazard Index Total Value of 3.2 that exceeds the limit of 1.0 for Groundwater Exposure Pathways. The results also indicate that all values for Outdoor Air Exposure, Indoor Air Exposure, and Soil Exposure do not exceed their respective limits. In post-excavation conditions, without on-site impacted soil, the Baseline Risk Summary output shows an Individual COC Risk Maximum Value of 0.000013 that exceeds the Target Risk of 0.000001, a Cumulative COC Risk Value Total Value of 0.000013 that exceeds the Target Risk of 0.00001, a Hazard Quotient Maximum Value of 0.59 that does not exceed the limit of 1.0, and a Hazard Index Total Value of 0.94 that does not exceed the limit of 1.0 for Groundwater Exposure Pathways. It also shows that all values for Outdoor and Indoor Air Exposure do not exceed their respective limits, and have decreased from their pre-excavation values. No numbers are listed for Soil Exposure Pathways because this model represents a situation with no impacted soil. All risk values are presented in the following table.

Table of Risk

	Individual COC Risk		Cumulative COC Risk		Hazard Quotient		Hazard Index	
	Maximum Value	Target Value	Total Value	Target Risk	Maximum Value	Applicable Limit	Total Value	Applicable Limit
Outdoor Air Exposure Pathways								
Tier 1 Pre-Excavation	7.70E-10	1.00E-06	7.70E-10	1.00E-05	3.80E-05	1.00E+00	7.50E-05	1.00E+00
Tier 1 Post-Excavation	7.20E-10	1.00E-06	7.20E-10	1.00E-05	3.50E-05	1.00E+00	7.00E-05	1.00E+00
Tier 2 Pre-Excavation	7.70E-10	1.00E-06	7.70E-10	1.00E-05	3.80E-05	1.00E+00	7.50E-05	1.00E+00
Tier 2 Post-Excavation	7.20E-10	1.00E-06	7.20E-10	1.00E-05	3.50E-05	1.00E+00	7.00E-05	1.00E+00
Indoor Air Exposure Pathways								
Tier 1 Pre-Excavation	2.50E-07	1.00E-06	2.50E-07	1.00E-05	1.30E-02	1.00E+00	2.50E-02	1.00E+00
Tier 1 Post-Excavation	1.90E-07	1.00E-06	1.90E-07	1.00E-05	9.20E-03	1.00E+00	1.80E-02	1.00E+00
Tier 2 Pre-Excavation	2.50E-07	1.00E-06	2.50E-07	1.00E-05	1.30E-02	1.00E+00	2.50E-02	1.00E+00
Tier 2 Post-Excavation	1.90E-07	1.00E-06	1.90E-07	1.00E-05	9.20E-03	1.00E+00	1.80E-02	1.00E+00
Soil Exposure Pathways								
Tier 1 Pre-Excavation	3.70E-08	1.00E-06	3.70E-08	1.00E-05	5.10E-02	1.00E+00	5.30E-02	1.00E+00
Tier 1 Post-Excavation	NA	NA	NA	NA	NA	NA	NA	NA
Tier 2 Pre-Excavation	3.70E-08	1.00E-06	3.70E-08	1.00E-05	5.10E-02	1.00E+00	5.30E-02	1.00E+00
Tier 2 Post-Excavation	NA	NA	NA	NA	NA	NA	NA	NA
Groundwater Exposure Pathways								
Tier 1 Pre-Excavation	NA	NA	NA	NA	NA	NA	NA	NA
Tier 1 Post-Excavation	NA	NA	NA	NA	NA	NA	NA	NA
Tier 2 Pre-Excavation	4.30E-05	1.00E-06	4.30E-05	1.00E-05	2.00E+00	1.00E+00	3.20E+00	1.00E+00
Tier 2 Post-Excavation	1.30E-05	1.00E-06	1.30E-05	1.00E-05	5.90E-01	1.00E+00	9.40E-01	1.00E+00

Conclusions

The Tier 1 models show that removing impacted soil will result in a definite decrease in Carcinogenic Risk values and Toxic Effect values. Although the Tier 2 models show the same result, more emphasis should be placed on them since they encompass more detail and, therefore, are more accurate representations of the site situation. The Tier 2 analyses show that removing the on-site impacted soil will cause all values, except one, on the Baseline Risk Summary to drop below their respective limits. The Individual COC Risk Maximum Value, for Groundwater Exposure Pathways, is 0.000013 and its Target Risk is 0.000001. There is still a risk of groundwater contamination 300 ft from the site. Looking at the Groundwater Site-Specific Target Levels (SSTL) will show that Benzene and TPHg are the primary constituents of concern (COC) prior to excavation, and Benzene is the primary COC after excavation. After excavation, the risk from Benzene is decreased, but it still exceeds its SSTL, and the TPHg no longer exceeds its SSTL.

Based on the results of the RBCA Site Assessment, ATC believes that excavation is an effective means of remediation for the site in question. Analysis shows that this action will significantly reduce the risk posed by the COCs in the groundwater. Excavation, in itself, will not eliminate all risk, however, so ATC plans to place a layer of Oxygen Release Compound (ORC) on the floor of the excavation, prior to placement of the backfill material. The ORC material will help promote biodegradation of any residual

petroleum hydrocarbon constituents. The details of the excavation remedial alternative are presented in the ATC *Corrective Action Plan*, dated August 29, 2002.

If you have any questions, or if you need any additional information or clarification, please contact me at (858) 569-0692.

Sincerely,

ATC Associates, Inc.

Bryan Hill, E.I.T.
Staff Engineer

Scott D. Meckstroth, R.C.E. No. 63337
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
SCOTT D. MECKSTROTH
NO. 63337
Exp: 6/30/06
CIVIL
STATE OF CALIFORNIA

Greg A. Vogelpohl, P.E.
Senior Engineer

cc: Jeff Burke, RPMS
Mark Owens, State Water Resources Control Board, UST Cleanup Fund, Sacramento
Amir Gholami, REHS
Vinode Vansal

Attachments:
Chemical Data for Selected COC's (pages 1 through 4)
Groundwater Summary Map (May 29, 2002)
Groundwater Source Zone Concentration Calculator (pages 1 and 2)
Tier 1 and Tier 2, Pre and Post-Excavation Input Parameter Summary and
Exposure Pathway Flowchart

CHEMICAL DATA FOR SELECTED COCs

Physical Property Data

Constituent	CAS Number	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	Diffusion Coefficients in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(L/kg) partition		ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
Benzene	71-43-2	A	78.1	PS	8.80E-02	PS	9.80E-06	PS	1.77	Koc	PS	5.55E-03	2.29E-01	PS	9.52E+01	PS	1.75E+03	PS	-	-	-
TPH - Arom >C08-C10	0-00-0	T	120	T	1.00E-01	T	1.00E-05	T	3.20	Koc	T	1.18E-02	4.86E-01	T	0.00E+00	0	6.50E+01	T	-	-	-
Methyl t-Butyl ether	1634-04-4	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	Koc	A	5.77E-04	2.38E-02	0	2.49E+02	0	4.80E+04	A	-	-	-
Xylene, o-	95-47-6	A	106.2	5	8.70E-02	4	1.00E-05	4	2.11	Koc	29	5.27E-03	2.17E-01	4	7.00E+00	4	1.75E+02	29	-	-	-
Xylene, m-	108-30-3	A	106.16	5	7.00E-02	4	7.80E-06	4	3.20	Koc	29	5.20E-03	2.14E-01	4	8.00E+00	4	1.58E+02	29	-	-	-
Ethylbenzene	100-41-4	A	106.2	PS	7.50E-02	PS	7.80E-06	PS	2.56	Koc	PS	7.88E-03	3.25E-01	PS	1.00E+01	PS	1.69E+02	PS	-	-	-
Toluene	108-88-3	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	Koc	A	6.30E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29	-	-	-

Site Name: Former EZ Serve 100877

Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill

Date Completed: 15-Aug-02

Job ID: 43.25827.0024

CHEMICAL DATA FOR SELECTED COCs

Toxicity Data

Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Reference Dose (mg/kg/day) Dermal RfD_dermal	ref	Reference Conc. (mg/m3) Inhalation RfC_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Slope Factors 1/(mg/kg/day) Dermal SF_dermal	ref	Unit Risk Factor 1/(µg/m3) Inhalation URF_Inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
Benzene	3.00E-03	R	-	-	5.95E-03	R	2.90E-02	PS	2.99E-02	TX	8.29E-06	PS	A	TRUE
TPH - Arom >C08-C10	4.00E-02	T	-	-	2.00E-01	T	-	-	-	-	-	-	D	FALSE
Methyl t-Butyl ether	1.00E-02	31	8.00E-03	TX	3.00E+00	R	-	-	-	-	-	-	-	FALSE
Xylene, o-	2.00E+00	R	1.60E+00	TX	7.00E-01	A	-	-	-	-	-	-	-	FALSE
Xylene, m-	2.00E+00	R	1.60E+00	TX	7.00E-01	A	-	-	-	-	-	-	-	FALSE
Ethylbenzene	1.00E-01	PS	9.70E-02	TX	1.00E+00	PS	-	-	-	-	-	-	D	FALSE
Toluene	2.00E-01	A,R	1.60E-01	TX	4.00E-01	A,R	-	-	-	-	-	-	D	FALSE

Site Name: Former EZ Serve 1C

Site Location: 525 West A St

Miscellaneous Chemical Data

Constituent	Maximum Contaminant Level MCL (mg/L)	ref	Time-Weighted Average Workplace Criteria TWA (mg/m3)	ref	Aquatic Life Prot. Criteria AQL (mg/L)	ref	Biocon-centration Factor (L-wat/kg-fish)
Benzene	5.00E-03	52 FR 25690	3 25E+00	PS	-	-	12.6
TPH - Arom >C08-C10	-	-	-	-	-	-	1
Methyl t-Butyl ether	-	-	6.00E+01	NIOSH	-	-	1
Xylene, o-	1.00E+01	56 FR 3526 (30 Jan 91)	4.35E+02	NIOSH	-	-	1
Xylene, m-	1.00E+01	56 FR 3526 (30 Jan 91)	4 35E+02	NIOSH	-	-	1
Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.35E+02	PS	-	-	1
Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	-	-	70

Site Name: Former EZ Serve 1C

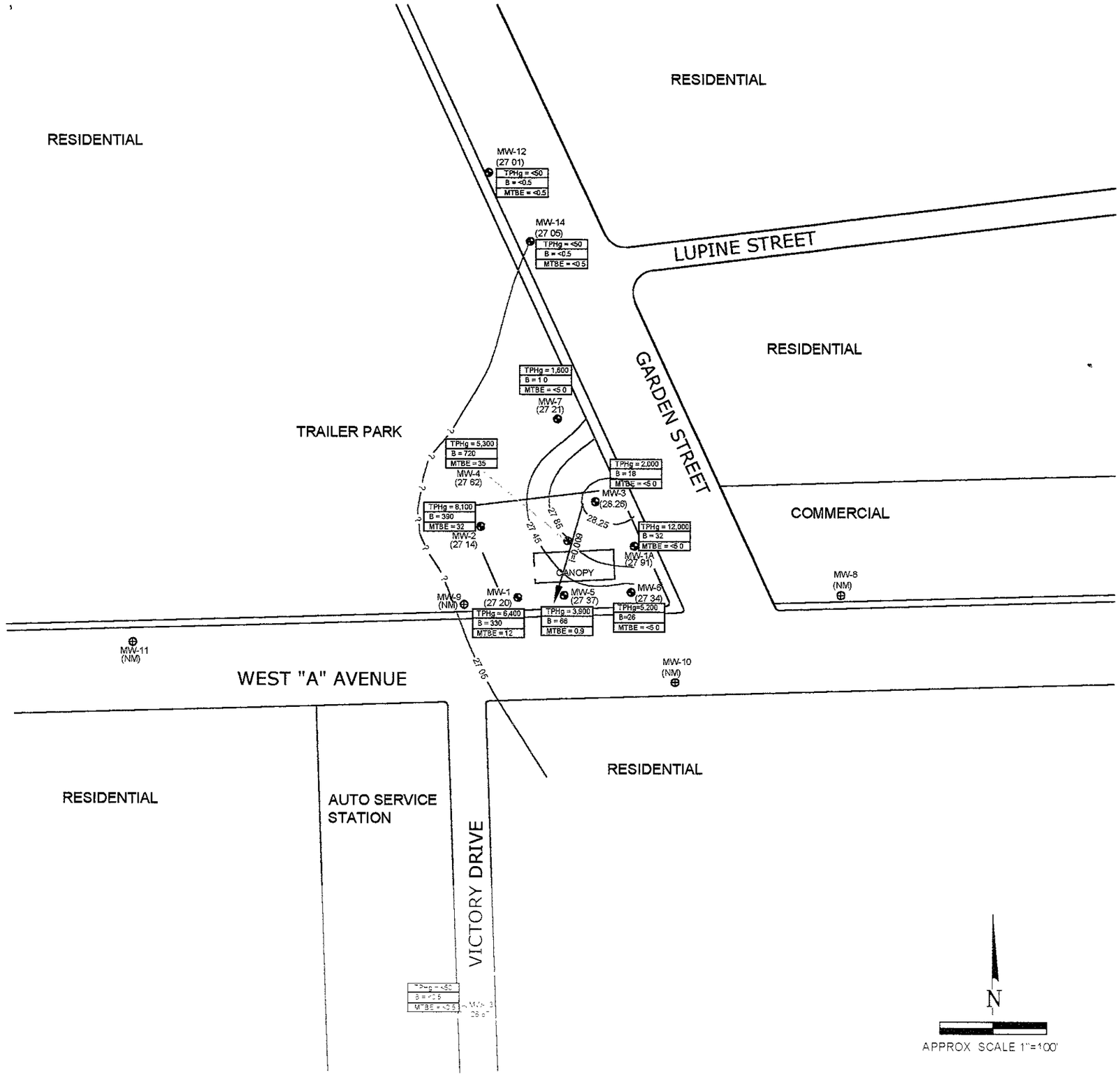
Site Location: 525 West A St

CHEMICAL DATA FOR SELECTED COCs

Miscellaneous Chemical Data

Constituent	Dermal Relative Absorp. Factor (unitless)	Water Dermal Permeability Data: Dermal Permeability Coeff. (cm/hr)	Lag time for Dermal Exposure (hr)	Critical Exposure Time (hr)	Relative Contr of Derm Perm Coeff (unitless)	Water/Skin Derm Adsorp Factor (cm/event)	ref	Detection Limits: Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days): Saturated	Unsaturated	ref
Benzene	0.5	0.021	0.26	0.63	0.013	7.3E-2	D	0.002	C	0.005	S	720	720	H
TPH - Arom >C08-C10	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Methyl t-Butyl ether	0.5	-	-	-	-	-	-	-	-	-	-	360	180	H
Xylene, o-	0.5	-	-	-	-	-	-	0 005	C	0.005	-	360	360	H
Xylene, m-	0.5	0.08	0.39	1.4	0 16	2.9E-1	D	0.005	C	0 005	-	360	360	H
Ethylbenzene	0.5	0.074	0.39	1.3	0.14	2.7E-1	D	0.002	C	0.005	S	228	228	H
Toluene	0.5	0.045	0.32	0.77	0 054	1.6E-1	D	0.002	C	0 005	S	28	28	H

Site Name: Former EZ Serve 1C
Site Location. 525 West A St



LEGEND

- MW-1 — GROUNDWATER MONITOR WELL LOCATION
- (27 60) — APPROXIMATE GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL (AMSL)
- TPHg<50 / B<0.5 / MTBE<0.5 — CONCENTRATIONS OF TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPHg), BENZENE (B), AND METHYL TERT-BUTYL ETHER (MTBE) IN MICROGRAMS PER LITER (ug/L)
- i=0.009 — APPROXIMATE GROUNDWATER FLOW DIRECTION AND GRADIENT (i) IN LINEAR FEET/ VERTICAL FEET
- 28.00 — GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL
- NM — NOT MEASURED, WELLHEAD NOT LOCATED TO RESURVEY, LOCATION PLOTS ARE APPRAXIMATE

NOTE CONTOUR LINES GENERATED BY SURFER 7,® GOLDEN SOFTWARE INC , AUGUST 1999

GROUNDWATER SUMMARY MAP MAY 29, 2002

Former E-Z Serve Location No. 100877
525 West A Street
Hayward, California

PROJECT NO.	43.25827.0024	FIGURE 1
FILE NO.	h:projects/ezserve/100877/fig1 (6-18-02)	

9620 Chesapeake Drive Suite 203
San Diego California 92123
ASSOCIATES INC.

Commands and Options

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Site Name: Former EZ Serve 100877 Job ID: 43.25827.0024
Location: 525 West A St Hayward, CA Date: 15-Aug-02
Compl. By: Bryan Hill

Groundwater Source Zone Concentration Calculator

Paste Defaults

UCL Percentile: 95%

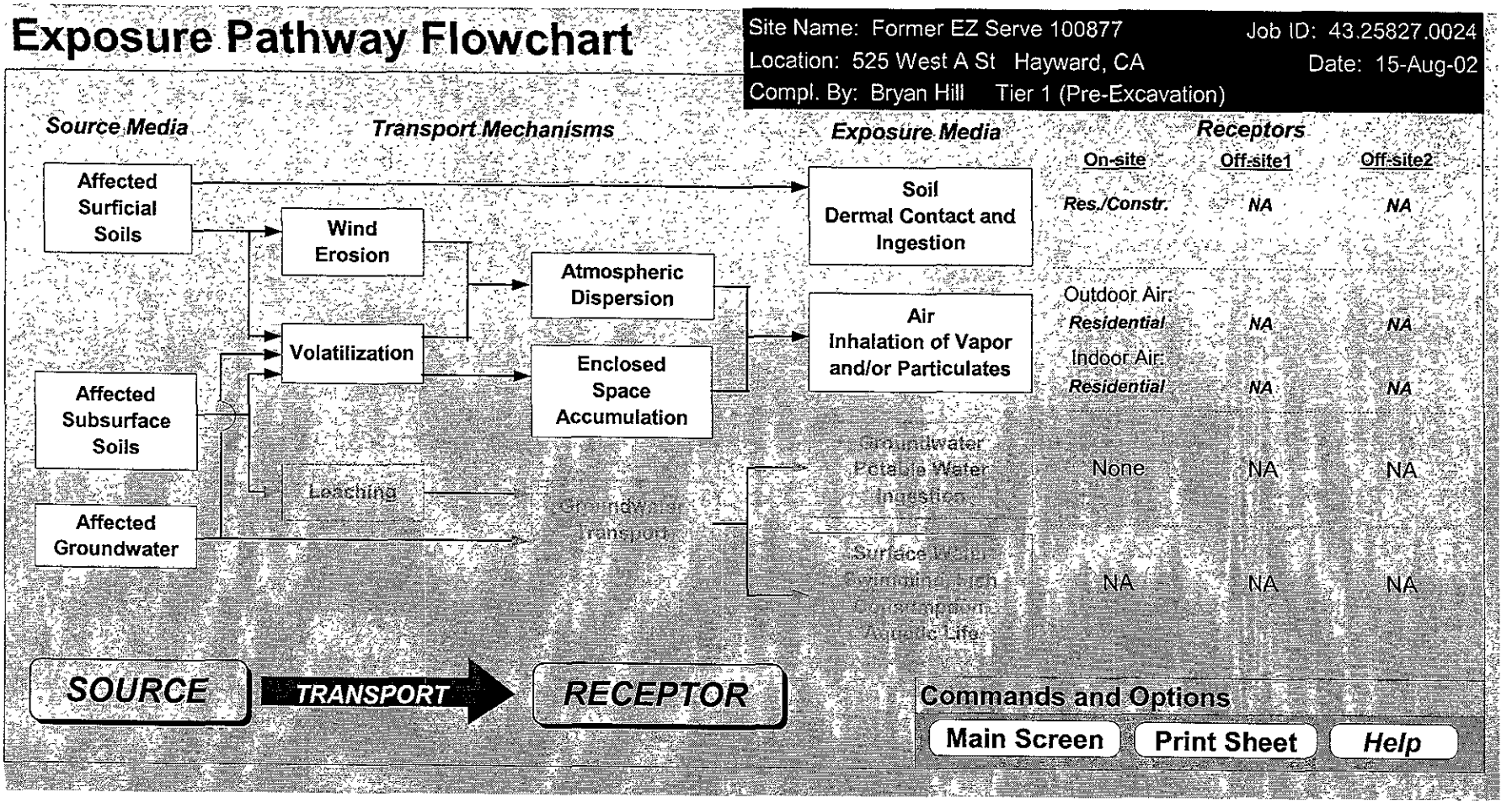
Mean Option

Constituent	Detection Limit	No. of Samples	No. of Detects	Estimated Distribution of Data	Max. Conc.	Mean Conc.	UCL on Mean
Benzene	<0.0005	7	7	Lognormal	7.2E-1	9.9E-2	3.0E-1
TPH - Arom >C08-C10	<0.05	7	7	Normal	1.2E+1	6.1E+0	8.5E+0
Methyl t-Butyl ether	<0.0005	7	7	Lognormal	3.5E-2	7.6E-3	1.9E-2
Xylene, o-	<0.0005	7	7	Lognormal	1.4E+0	9.1E-2	3.7E-1
Xylene, m-	<0.0005	7	7	Lognormal	1.4E+0	9.1E-2	3.7E-1
Ethylbenzene	<0.0005	7	7	Normal	6.0E-1	3.2E-1	5.0E-1
Toluene	<0.0005	7	7	Lognormal	5.7E-2	7.7E-3	2.0E-2

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

Analytical Data

	1	2	3	4	5	6	7	8	9	10	11	12	13
ID	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-1A						
Date	29-May-02	29-May-02	29-May-02	29-May-02	29-May-02	29-May-02	29-May-02						
	3.30E-1	3.90E-1	1.80E-2	7.20E-1	6.60E-2	2.60E-2	3.20E-2						
	6.40E+0	8.10E+0	2.00E+0	5.30E+0	3.90E+0	5.20E+0	1.20E+1						
	1.20E-2	3.20E-2	5.00E-3	3.50E-2	9.00E-4	5.00E-3	5.00E-3						
	2.60E-1	1.40E+0	1.30E-2	2.00E-1	7.40E-3	2.70E-2	2.70E-1						
	2.60E-1	1.40E+0	1.30E-2	2.00E-1	7.40E-3	2.70E-2	2.70E-1						
	2.50E-1	5.60E-1	5.30E-2	6.00E-1	1.10E-1	1.50E-1	5.50E-1						
	1.30E-2	1.60E-2	5.00E-3	5.70E-2	8.00E-4	7.00E-3	5.00E-3						


Exposure Pathway Flowchart
Site Name: Former EZ Serve 100877
Job ID: 43.25827.0024
Location: 525 West A St Hayward, CA
Date: 15-Aug-02
Compl. By: Bryan Hill
Tier 1 (Pre-Excavation)
Source Media
Transport Mechanisms
Exposure Media
Receptors
On-site
Off-site1
Off-site2
Affected Surficial Soils
Wind Erosion
Soil Dermal Contact and Ingestion
Res./Constr.
NA
NA
Atmospheric Dispersion
Air Inhalation of Vapor and/or Particulates
Outdoor Air:
Residential
NA
NA
Volatilization
Indoor Air:
Residential
NA
NA
Affected Subsurface Soils
Enclosed Space Accumulation
Groundwater Potable Water Ingestion
None
NA
NA
Leaching
Groundwater Transport
Affected Groundwater
Surface Water Swimming, Fish Consumption, Aquatic Life
NA
NA
NA
SOURCE
TRANSPORT
RECEPTOR
Commands and Options
Main Screen
Print Sheet
Help

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 1 (Pre-Excavation)
Date Completed 15-Aug-02

Job ID: 43.25827.0024

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
IR_{air-in}	Inhalation rate indoor (m^3/day)	15			20	
$IR_{air-Out}$	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0 05	0 5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0 025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

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

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

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1 0E-6	1 0E-5
TR_c	Target Risk (class C carcinogens)	1 0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1 0E+0

Modeling Options	
RBCA tier	Tier 1
RBCA calculation mode	Forward & Backward
Risk goal calculation option	Individual & Cumulative Constituent Risks
Soil volatilization model option	Surface & subsurface models
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	8.0E+3	NA	(ft^2)
W	Length of source-zone area parallel to wind	2.0E+2	NA	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	2.3E+8		(ft/yr)
δ_{air}	Air mixing zone height	6 6E+0		(ft)
P_a	Areal particulate emission rate	6.9E-14		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	3.3E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	9.5E-1			(ft)
h_v	Vadose zone thickness	1.4E+1			(ft)
ρ_b	Soil bulk density	1.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1 0E-2			(-)
θ_T	Soil total porosity	3.6E-1			(-)
K_{vs}	Vertical hydraulic conductivity	1.0E-1			(ft/yr)
k_v	Vapor permeability	1 1E-16			(ft^2)
L_{gw}	Depth to groundwater	1.5E+1			(ft)
L_s	Depth to top of affected soils	1 5E+1			(ft)
L_{base}	Depth to base of affected soils	2 5E+1			(ft)
L_{subs}	Thickness of affected soils	1.0E+1			(ft)
pH	Soil/groundwater pH	6 9E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0 35	0 34	0 12	(-)
θ_a	Volumetric air content	0.01	0 02	0 26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	6.56E+0	NA	(ft)
A_b	Foundation area	7.53E+2	NA	(cm^2)
X_{crk}	Foundation perimeter	1.12E+2	NA	(ft)
ER	Building air exchange rate	4 42E+3	NA	(1/yr)
L_{crk}	Foundation thickness	4 92E-1	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	4 92E-1	NA	(ft)
η	Foundation crack fraction	1 00E-2	NA	(-)
dP	Indoor/outdoor differential pressure	0 00E+0	NA	(psi)
Q_s	Convective air flow through slab	0 00E+0	NA	(ft^3/yr)

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

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

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

RBCA SITE ASSESSMENT | **User-Specified COC Data**

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (15 - 25 ft)	
	value (mg/L)	note	value (mg/kg)	note
Benzene	3.0E-1		7.1E-2	
TPH - Arom >C08-C10	8.5E+0		5.0E+1	
Methyl t-Butyl ether	1.9E-2		5.0E-3	
Xylene, o-	3.7E-1		1.1E+0	
Xylene, m-	3.7E-1		1.1E+0	
Ethylbenzene	5.0E-1		5.4E-1	
Toluene	2.0E-2		6.0E-2	

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA
Completed By: Bryan Hill Tier 1 (Pre-Excavation)

Date Completed: 15-Aug-02
Job ID: 43.25827.0024

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

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 1 (Pre-Excavation)
Date Completed: 15-Aug-02

TIER 1 BASELINE RISK SUMMARY TABLE

	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk	Hazard Quotient		Hazard Index		Toxicity
EXPOSURE PATHWAY	Maximum Value	Target Risk	Total Value	Target Risk	Limit(s) Exceeded?	Maximum Value	Applicable Limit	Total Value	Applicable Limit	Limit(s) Exceeded?
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	7.7E-10	1.0E-6	7.7E-10	1.0E-5	☐	3.8E-5	1.0E+0	7.5E-5	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	2.5E-7	1.0E-6	2.5E-7	1.0E-5	☐	1.3E-2	1.0E+0	2.5E-2	1.0E+0	☐
SOIL EXPOSURE PATHWAYS										
Complete:	3.7E-8	1.0E-6	3.7E-8	1.0E-5	☐	5.1E-2	1.0E+0	5.3E-2	1.0E+0	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	2.5E-7	*1.0E-6*	*2.5E-7*	*1.0E-5*	☐	*5.1E-2*	*1.0E+0*	*5.3E-2*	*1.0E+0*	☐
	Indoor Air		*Indoor Air*			*Soil*		*Soil*		

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 1 (Pre-Excavati Job ID: 43.25827.0024
Date Completed: 15-Aug-02

Constituent: Benzene **CAS No.: 71-43-2**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		None
RBSLgw (mg/L)	THQ = 1e+0	NA
	TR = 1e-6	NA
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		None
RBSLs (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Surface Soil Inhalation, Ingestion,Dermal Contact		
Receptor Type / Distance (ft)		Res./Constr. / 0
RBSLss (mg/kg)	THQ = 1e+0	7.3E+1
	TR = 1e-6	1.9E+0
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	6.2E+0
	TR = 1e-6	2.9E-1
Soil Volatilization/Particulates to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	>1.4E+3
	TR = 1e-6	>1.4E+3
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>1.8E+3
	TR = 1e-6	4.1E+2
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	6.2E+0
	TR = 1e-6	2.9E-1
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLs (mg/kg)	THQ = 1e+0	2.6E+1
	TR = 1e-6	1.2E+0
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	3.3E+1
	TR = 1e-6	1.6E+0

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	7.8E+1	PS
Sol	(mg/L)	1.8E+3	PS
P_{vap}	(mmHg)	9.5E+1	PS
H_{atm}	(atm-m^3/mol)	5.6E-3	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	1.8E+0	PS
D_{air}	(cm^2/sec)	8.8E-2	PS
D_{wat}	(cm^2/sec)	9.8E-6	PS
Toxicity Data			
Wt of Evd		A	
SF_o	(1/[mg/kg/day])	2.9E-2	PS
SF_d	(1/[mg/kg/day])	3.0E-2	TX
URF_i	(1/[µg/m^3])	8.3E-6	PS
RfD_o	(mg/kg/day)	3.0E-3	R
RfD_d	(mg/kg/day)	-	-
RfC_i	(mg/m^3)	6 0E-3	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	2.1E-2	
tau_d	(hr/event)	2 6E-1	
t_{cnt}	(hr)	6.3E-1	
B	(-)	1 3E-2	
Regulatory Standards			
MCL	(mg/L)	5.0E-3	*
TWA	(mg/m^3)	3 3E+0	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	C
ADL_s	(mg/kg)	5.0E-3	S
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = 52 FR 25690

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NC	NA	NA
VFsamb	(kg-soil/L-air)	1.8E-7	NA	NA
VFwamb	(L-wat/L-air)	7 2E-7	NA	NA
VFsesp	(kg-soil/L-air)	2.4E-4	NA	NA
VFwesp	(L-wat/L-air)	1.9E-4	NA	NA
LF	(kg-soil/L-wat)	NA		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.3E-1
K_{sw}	(L-wat/kg-soil)	1.3E+0
C_{sat}	(mg/kg-soil)	1.4E+3
$C_{sat,vap}$	(µg/m^3-air)	4 0E+5
$D_{eff,s}$	(cm^2/sec)	1.1E-5
$D_{eff,crk}$	(cm^2/sec)	6.9E-3
$D_{eff,csp}$	(cm^2/sec)	1 0E-5
$D_{eff,ws}$	(cm^2/sec)	1.1E-5
R_{sat}	(-)	
R_{unsat}	(-)	3.9E+0
Z	(cm/event)	7 3E-2

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Site Name. Former EZ Serve 100877
Site Location 525 West A St Hayward, CA

Completed By Bryan Hill Tier 1 (Pre-Excavation)
Date Completed: 15-Aug-02

Job ID 43 25827.0024

SOIL (15 - 25 ft) RBSL VALUES

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

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

				Soil Leaching to Groundwater Ingestion / Discharge to Surface Water			X Soil Vol to Indoor Air	X Soil Volatilization and Surface Soil Particulates to Outdoor Air				X Surface Soil Inhalation, Ingestion,Dermal Contact		Applicable RBSL	RBSL Exceeded ?	Required CRF
CONSTITUENTS OF CONCERN		Representative Concentration		On-site (0 ft)	NA	NA	On-site (0 ft)	On-site (0 ft)		NA	NA	On-site (0 ft)				Only if "yes" left
CAS No.	Name	(mg/kg)		None	NA	NA	Residential	Residential	Construction Worker	NA	NA	Residential	Construction Worker	(mg/kg)	"■" if yes	
71-43-2	Benzene	7.1E-2		NA	NA	NA	1.2E+0	>1.4E+3	NA	NA	NA	1.9E+0	1.1E+2	1.2E+0	☐	<1
0-00-0	TPH - Arom >C08-C10	5.0E+1		NA	NA	NA	>1.0E+3	>1.0E+3	NA	NA	NA	9.7E+2	1.9E+3	9.7E+2	☐	<1
1634-04-4	Methyl t-Butyl ether	5.0E-3		NA	NA	NA	9.3E+2	>1.5E+4	NA	NA	NA	2.0E+2	3.8E+2	2.0E+2	☐	<1
95-47-6	Xylene, o-	1.1E+0		NA	NA	NA	>2.6E+2	>2.6E+2	NA	NA	NA	3.9E+4	7.6E+4	3.9E+4	☐	<1
108-30-3	Xylene, m-	1.1E+0		NA	NA	NA	>2.5E+3	>2.5E+3	NA	NA	NA	3.9E+4	7.6E+4	3.9E+4	☐	<1
100-41-4	Ethylbenzene	5.4E-1		NA	NA	NA	>6.5E+2	>6.5E+2	NA	NA	NA	2.4E+3	4.6E+3	2.4E+3	☐	<1
108-88-3	Toluene	6.0E-2		NA	NA	NA	>8.0E+2	>8.0E+2	NA	NA	NA	3.9E+3	7.6E+3	3.9E+3	☐	<1

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

RBCA SITE ASSESSMENT

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 1 (Pre-Excavation)
Date Completed: 15-Aug-02

Job ID: 43.25827.0024

GROUNDWATER RBSL VALUES

Target Risk (Class A & B) 1 0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

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

CONSTITUENTS OF CONCERN		Representative Concentration	Groundwater Ingestion / Discharge to Surface Water			X GW Vol. to Indoor Air	X Groundwater Volatilization to Outdoor Air			Applicable RBSL	RBSL Exceeded ?	Required CRF
			On-site (0 ft)	NA	NA	On-site (0 ft)	On-site (0 ft)	NA	NA			Only if "yes" left
CAS No.	Name	(mg/L)	None	NA	NA	Residential	Residential	NA	NA	(mg/L)	"■" if yes	
71-43-2	Benzene	3.0E-1	NA	NA	NA	1.6E+0	4.1E+2	NA	NA	1.6E+0	☐	<1
0-00-0	TPH - Arom >C08-C10	8.5E+0	NA	NA	NA	>6.5E+1	>6.5E+1	NA	NA	>6.5E+1	☐	NA
1634-04-4	Methyl t-Butyl ether	1.9E-2	NA	NA	NA	2.9E+3	>4.8E+4	NA	NA	2.9E+3	☐	<1
95-47-6	Xylene, o-	3.7E-1	NA	NA	NA	>1.8E+2	>1.8E+2	NA	NA	>1.8E+2	☐	NA
108-30-3	Xylene, m-	3.7E-1	NA	NA	NA	>1.6E+2	>1.6E+2	NA	NA	>1.6E+2	☐	NA
100-41-4	Ethylbenzene	5.0E-1	NA	NA	NA	>1.7E+2	>1.7E+2	NA	NA	>1.7E+2	☐	NA
108-88-3	Toluene	2.0E-2	NA	NA	NA	>5.2E+2	>5.2E+2	NA	NA	>5.2E+2	☐	NA

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

RBCA SITE ASSESSMENT | **TPH Criteria RBSL Worksheet**

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

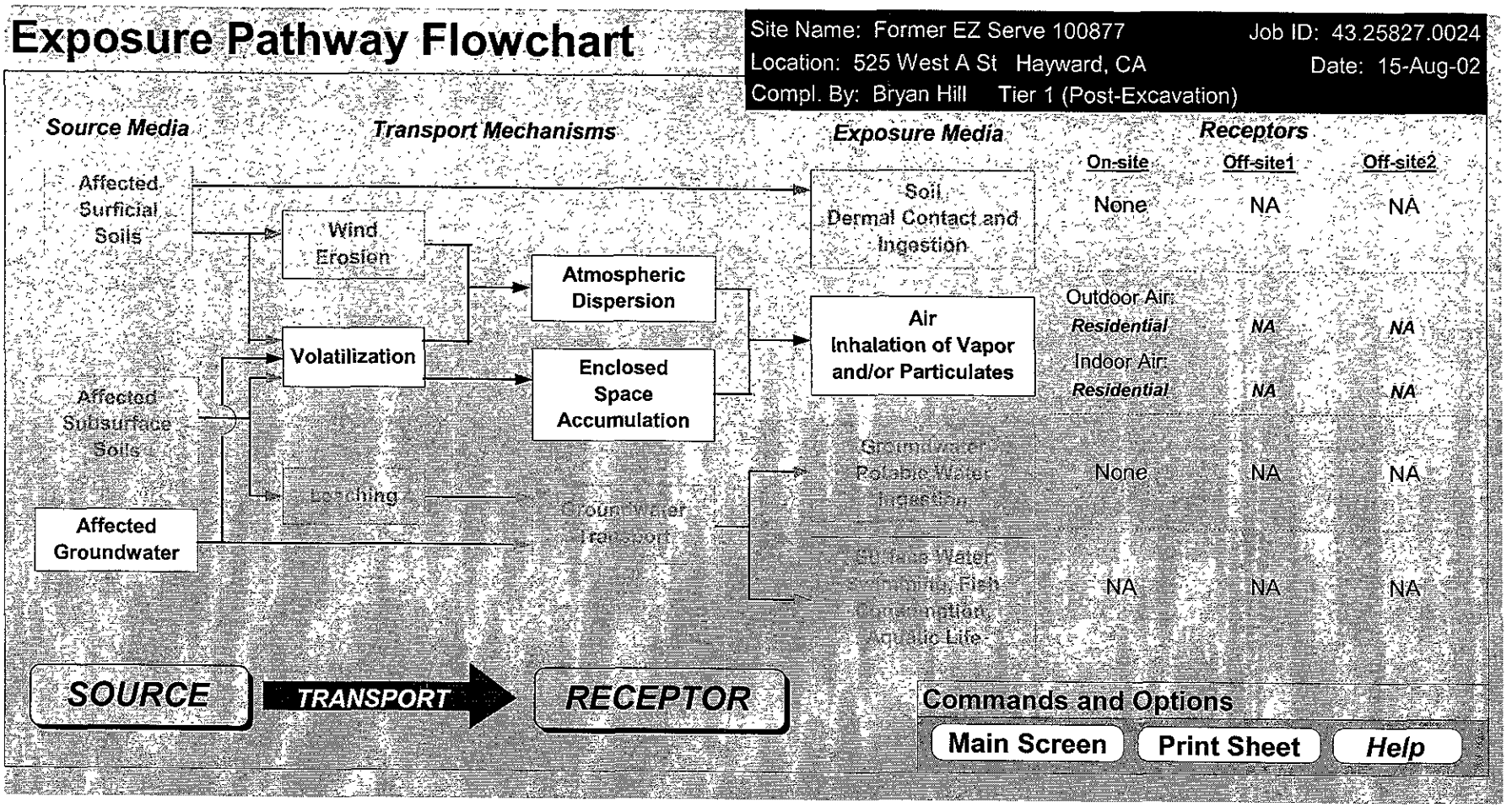
Completed By: Bryan Hill Tier 1 (Pre-Excavation)
Date Completed: 15-Aug-02

Job ID: 43.25827.0024

CALCULATION OF RBSL VALUES FOR TPH

		Mass Fractions		Representative Concentrations		Calculated Concentration Limits		Appilcable SSTL Values	
CONSTITUENTS OF CONCERN		Soil	Groundwater	Soil	Groundwater	Residual Soil Concentration	Solubility	Soils (15 - 25 ft)	Groundwater
CAS No.	Name	(-)	(-)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)
0-00-0	TPH - Arom >C08-C10	1.0E+0	1.0E+0	5.0E+1	8.5E+0	1.0E+3	6.5E+1	9.7E+2	>6.5E+1
	Total	1.0E+0	1.0E+0				Total TPH SSTL value		

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


Exposure Pathway Flowchart
Site Name: Former EZ Serve 100877
Job ID: 43.25827.0024
Location: 525 West A St Hayward, CA
Date: 15-Aug-02
Compl. By: Bryan Hill
Tier 1 (Post-Excavation)
Source Media
Transport Mechanisms
Exposure Media
Receptors
On-site
Off-site1
Off-site2
Affected Surficial Soils
Wind Erosion
Volatilization
Affected Subsurface Soils
Affected Groundwater
Leaching
Groundwater Transport
Atmospheric Dispersion
Enclosed Space Accumulation
Soil
Dermal Contact and Ingestion
Air
Inhalation of Vapor and/or Particulates
Groundwater
Potable Water Ingestion
Surface Water
Recreation, Fish Consumption, Aquatic Life
None
NA
NA
Outdoor Air:
Residential
NA
NA
Indoor Air:
Residential
NA
NA
None
NA
NA
NA
NA
NA
SOURCE
TRANSPORT
RECEPTOR
Commands and Options
Main Screen
Print Sheet
Help

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former EZ Serve 100877
Site Location 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 1 (Post-Excavation)
Date Completed 15-Aug-02

Job ID: 43.25827.0024

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
IR_{air-in}	Inhalation rate indoor (m^3/day)	15			20	
$IR_{air-Out}$	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0 025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

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

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

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1 0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 1
RBCA calculation mode	Forward & Backward
Risk goal calculation option	Individual & Cumulative Constituent Risks
Soil volatilization model option	NA
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	8 0E+3	NA	(ft^2)
W	Length of source-zone area parallel to wind	2.0E+2	NA	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	2 3E+8		(ft/yr)
δ_{air}	Air mixing zone height	6 6E+0		(ft)
P_a	Areal particulate emission rate	NA		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	NA		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	9 5E-1			(ft)
h_v	Vadose zone thickness	1 4E+1			(ft)
ρ_s	Soil bulk density	1 7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1 0E-2			(-)
θ_T	Soil total porosity	3.6E-1			(-)
K_{vs}	Vertical hydraulic conductivity	1 0E-1			(ft/yr)
k_v	Vapor permeability	1 1E-16			(ft^2)
L_{gw}	Depth to groundwater	1 5E+1			(ft)
L_s	Depth to top of affected soils	NA			(ft)
L_{base}	Depth to base of affected soils	NA			(ft)
L_{subs}	Thickness of affected soils	NA			(ft)
pH	Soil/groundwater pH	6.9E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.35	0.34	0.12	(-)
θ_a	Volumetric air content	0.01	0.02	0 26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	6.56E+0	NA	(ft)
A_b	Foundation area	7 53E+2	NA	(cm^2)
X_{crk}	Foundation perimeter	1.12E+2	NA	(ft)
ER	Building air exchange rate	4 42E+3	NA	(1/yr)
L_{crk}	Foundation thickness	4 92E-1	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	4 92E-1	NA	(ft)
η	Foundation crack fraction	1 00E-2	NA	(-)
dP	Indoor/outdoor differential pressure	0.00E+0	NA	(psi)
Q_s	Convective air flow through slab	0 00E+0	NA	(ft^3/yr)

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

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

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

RBCA SITE ASSESSMENT | **User-Specified COC Data**

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (15 - 25 ft)	
	value (mg/L)	note	value (mg/kg)	note
Benzene	3.0E-1		7.1E-2	
TPH - Arom >C08-C10	8.5E+0		5.0E+1	
Methyl t-Butyl ether	1.9E-2		5.0E-3	
Xylene, o-	3.7E-1		1.1E+0	
Xylene, m-	3.7E-1		1.1E+0	
Ethylbenzene	5.0E-1		5.4E-1	
Toluene	2.0E-2		6.0E-2	

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA
Completed By: Bryan Hill Tier 1 (Post-Excavation)

Date Completed: 15-Aug-02
Job ID: 43.25827.0024

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

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 1 (Post-Excavation)
Date Completed: 15-Aug-02

TIER 1 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK: Individual COC Risk – Maximum Value	Individual COC Risk – Target Risk	Cumulative COC Risk – Total Value	Cumulative COC Risk – Target Risk	Risk Limit(s) Exceeded?	BASELINE TOXIC EFFECTS: Hazard Quotient – Maximum Value	Hazard Quotient – Applicable Limit	Hazard Index – Total Value	Hazard Index – Applicable Limit	Toxicity Limit(s) Exceeded?
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	7.2E-10	1.0E-6	7.2E-10	1.0E-5	☐	3.5E-5	1.0E+0	7.0E-5	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	1.9E-7	1.0E-6	1.9E-7	1.0E-5	☐	9.2E-3	1.0E+0	1.8E-2	1.0E+0	☐
SOIL EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	1.9E-7	*1.0E-6*	*1.9E-7*	*1.0E-5*	☐	*9.2E-3*	*1.0E+0*	*1.8E-2*	*1.0E+0*	☐
	Indoor Air		*Indoor Air*			*Indoor Air*		*Indoor Air*		

RBCA SITE ASSESSMENT

Chemical-Specific Tier 1 Cleanup Summary

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 1 (Post-Excavat Job ID: 43.25827.0024
Date Completed: 15-Aug-02

Constituent: Benzene **CAS No.: 71-43-2**

Risk-Based Screening Level (RBSL) Concentrations

		On-site
Groundwater Ingestion		
Receptor Type / Distance (ft)		None
RBSLgw (mg/L)	THQ = 1e+0	NA
	TR = 1e-6	NA
Soil Leaching to Groundwater Ingestion		
Receptor Type / Distance (ft)		None
RBSLs (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Surface Soil Ingestion and Dermal Contact		
Receptor Type / Distance (ft)		None
RBSLss (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	6.2E+0
	TR = 1e-6	2.9E-1
Soil Volatilization/Particulates to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		None
RBSLs (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Groundwater Volatilization to Outdoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	>1.8E+3
	TR = 1e-6	4.1E+2
Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBELair (µg/m3)	THQ = 1e+0	6.2E+0
	TR = 1e-6	2.9E-1
Soil Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		None
RBSLs (mg/kg)	THQ = 1e+0	NA
	TR = 1e-6	NA
Groundwater Volatilization to Indoor Air Inhalation		
Receptor Type / Distance (ft)		Residential / 0
RBSLgw (mg/L)	THQ = 1e+0	3.3E+1
	TR = 1e-6	1.6E+0

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	7.8E+1	PS
Sol	(mg/L)	1 8E+3	PS
P_{vap}	(mmHg)	9.5E+1	PS
H_{atm}	(atm-m^3/mol)	5 6E-3	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
log(K_{oc})	(log[L/kg])	1.8E+0	PS
D_{air}	(cm^2/sec)	8 8E-2	PS
D_{wat}	(cm^2/sec)	9.8E-6	PS
Toxicity Data			
Wt of Evd.		A	
SF_o	(1/[mg/kg/day])	2.9E-2	PS
SF_d	(1/[mg/kg/day])	3.0E-2	TX
URF_i	(1/[µg/m^3])	8 3E-6	PS
RfD_o	(mg/kg/day)	3.0E-3	R
RfD_d	(mg/kg/day)	-	-
RfC_i	(mg/m^3)	6.0E-3	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	2.1E-2	
tau_d	(hr/event)	2.6E-1	
t_{crit}	(hr)	6.3E-1	
B	(-)	1.3E-2	
Regulatory Standards			
MCL	(mg/L)	5.0E-3	*
TWA	(mg/m^3)	3.3E+0	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	C
ADL_s	(mg/kg)	5 0E-3	S
$t_{1/2,sat}$	(d)		H
$t_{1/2,unsat}$	(d)		H

* MCL ref = 52 FR 25690

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VFss	(kg-soil/L-air)	NA	NA	NA
VFsamb	(kg-soil/L-air)	NA	NA	NA
VFwamb	(L-wat/L-air)	7.2E-7	NA	NA
VFsesp	(kg-soil/L-air)	NA	NA	NA
VFwesp	(L-wat/L-air)	1.9E-4	NA	NA
LF	(kg-soil/L-wat)	NA		NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.3E-1
K_{sw}	(L-wat/kg-soil)	1.3E+0
C_{sat}	(mg/kg-soil)	1.4E+3
$C_{sat,vap}$	(µg/m^3-air)	4.0E+5
$D_{eff,s}$	(cm^2/sec)	1.1E-5
$D_{eff,crk}$	(cm^2/sec)	6.9E-3
$D_{eff,cap}$	(cm^2/sec)	1.0E-5
$D_{eff,ws}$	(cm^2/sec)	1.1E-5
R_{sat}	(-)	
R_{unsat}	(-)	3.9E+0
Z	(cm/event)	7.3E-2

NA = Not applicable; NC = Not calculated.

Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Site Name: Former EZ Serve 100877 | Completed By: Bryan Hill Tier 1 (Post-Excavation) | Job ID: 43.25827.0024

Site Location: 525 West A St Hayward, CA | Date Completed: 15-Aug-02

GROUNDWATER RBSL VALUES

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

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

CONSTITUENTS OF CONCERN		Representative Concentration	Groundwater Ingestion / Discharge to Surface Water			X GW Vol. to Indoor Air	X Groundwater Volatilization to Outdoor Air			Applicable RBSL	RBSL Exceeded ?	Required CRF
			On-site (0 ft)	NA	NA	On-site (0 ft)	On-site (0 ft)	NA	NA			Only if "yes" left
CAS No.	Name	(mg/L)	None	NA	NA	Residential	Residential	NA	NA	(mg/L)	"■" if yes	
71-43-2	Benzene	3.0E-1	NA	NA	NA	1.6E+0	4.1E+2	NA	NA	1.6E+0	☐	<1
0-00-0	TPH - Arom >C08-C10	8.5E+0	NA	NA	NA	>6.5E+1	>6.5E+1	NA	NA	>6.5E+1	☐	NA
1634-04-4	Methyl t-Butyl ether	1.9E-2	NA	NA	NA	2.9E+3	>4.8E+4	NA	NA	2.9E+3	☐	<1
95-47-6	Xylene, o-	3.7E-1	NA	NA	NA	>1.8E+2	>1.8E+2	NA	NA	>1.8E+2	☐	NA
108-30-3	Xylene, m-	3.7E-1	NA	NA	NA	>1.6E+2	>1.6E+2	NA	NA	>1.6E+2	☐	NA
100-41-4	Ethylbenzene	5.0E-1	NA	NA	NA	>1.7E+2	>1.7E+2	NA	NA	>1.7E+2	☐	NA
108-88-3	Toluene	2.0E-2	NA	NA	NA	>5.2E+2	>5.2E+2	NA	NA	>5.2E+2	☐	NA

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

RBCA SITE ASSESSMENT | **TPH Criteria RBSL Worksheet**

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 1 (Post-Excavation)
Date Completed: 15-Aug-02

Job ID: 43.25827.0024

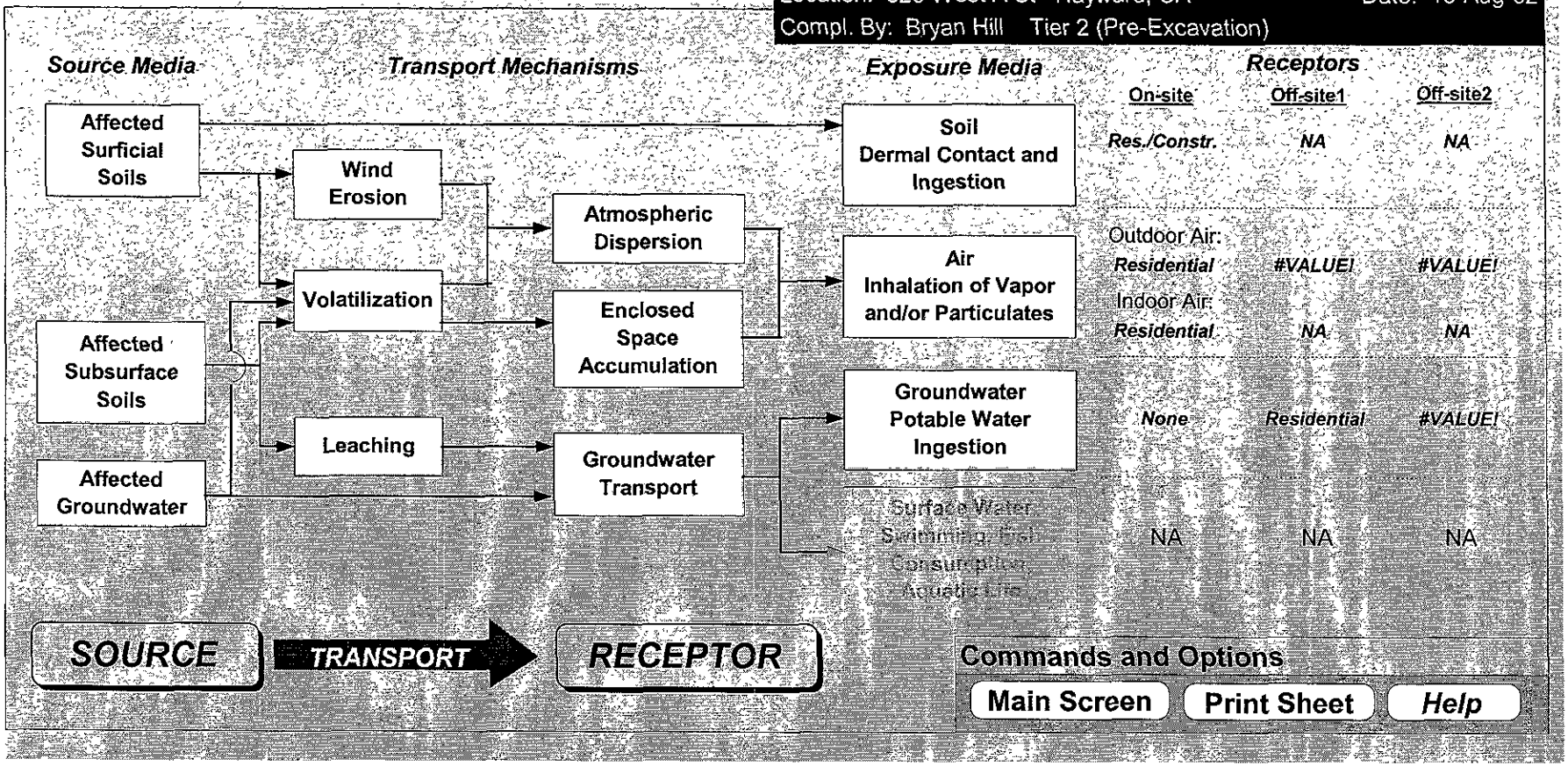
CALCULATION OF RBSL VALUES FOR TPH

		Mass Fractions		Representative Concentrations		Calculated Concentration Limits		Applicable SSTL Values	
CONSTITUENTS OF CONCERN		Soil	Groundwater	Soil	Groundwater	Residual Soil Concentration	Solubility	Soils	Groundwater
CAS No.	Name	(-)	(-)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)
0-00-0	TPH - Arom >C08-C10	1.0E+0	1.0E+0		8.5E+0		6.5E+1		>6.5E+1
	Total	1.0E+0	1.0E+0				Total TPH SSTL value		

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

Exposure Pathway Flowchart

Site Name: Former EZ Serve 100877 Job ID: 43.25827.0024
Location: 525 West A St Hayward, CA Date: 15-Aug-02
Compl. By: Bryan Hill Tier 2 (Pre-Excavation)



RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 2 (Pre-Excavation)
Date Completed: 15-Aug-02

Job ID: 43 25827.0024

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
IR_{air-in}	Inhalation rate indoor (m^3/day)	15			20	
$IR_{air-Out}$	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

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

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	300	NA	(ft)
Soil leaching to groundwater receptor	NA	300	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1 0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1 0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
RBCA calculation mode	Forward & Backward
Risk goal calculation option	Individual & Cumulative Constituent Risks
Soil volatilization model option	Surface & subsurface models
Use soil attenuation model (SAM) for leachate?	No
Air dilution factor	NA
Groundwater dilution-attenuation factor	Domenico model w/ biodeg

NOTE NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	8.0E+3	NA	(ft^2)
W	Length of source-zone area parallel to wind	2 0E+2	NA	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	2.0E+2		(ft)
U_{air}	Ambient air velocity in mixing zone	2.3E+8		(ft/yr)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	6.9E-14		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	3.3E+0		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	9.5E-1			(ft)
h_v	Vadose zone thickness	1.4E+1			(ft)
ρ_s	Soil bulk density	1.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.0E-2			(-)
θ_T	Soil total porosity	3.6E-1			(-)
K_{vs}	Vertical hydraulic conductivity	1.0E-1			(ft/yr)
k_v	Vapor permeability	1.1E-16			(ft^2)
L_{gw}	Depth to groundwater	1 5E+1			(ft)
L_s	Depth to top of affected soils	1 5E+1			(ft)
L_{base}	Depth to base of affected soils	2 5E+1			(ft)
L_{subs}	Thickness of affected soils	1.0E+1			(ft)
pH	Soil/groundwater pH	6.9E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0.35	0 34	0.12	(-)
θ_a	Volumetric air content	0.01	0 02	0.26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	6.56E+0	NA	(ft)
A_b	Foundation area	7.53E+2	NA	(cm^2)
X_{crk}	Foundation perimeter	1.12E+2	NA	(ft)
ER	Building air exchange rate	4 42E+3	NA	(1/yr)
L_{crk}	Foundation thickness	4 92E-1	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	4.92E-1	NA	(ft)
η	Foundation crack fraction	1 00E-2	NA	(-)
dP	Indoor/outdoor differential pressure	0 00E+0	NA	(psi)
Q_s	Convective air flow through slab	0 00E+0	NA	(ft^3/yr)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	1 0E+1	(ft)
I_f	Net groundwater infiltration rate	1 8E-1	(in/yr)
U_{gw}	Groundwater Darcy velocity	7 4E+1	(ft/yr)
V_{gw}	Groundwater seepage velocity	1 9E+2	(ft/yr)
K_s	Saturated hydraulic conductivity	8 2E+3	(ft/yr)
i	Groundwater gradient	9 0E-3	(-)
S_w	Width of groundwater source zone	2 0E+2	(ft)
S_d	Depth of groundwater source zone	1 0E+1	(ft)
θ_{eff}	Effective porosity in water-beaning unit	3 8E-1	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	0 0E+0	(-)
pH_{sat}	Groundwater pH	0.0E+0	(-)
	Biodegradation considered?	1st Order	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	1.4E+1	NA	1.4E+1	NA	(ft)
α_y	Transverse dispersivity	1.4E+0	NA	1.4E+0	NA	(ft)
α_z	Vertical dispersivity	1.4E-1	NA	1 4E-1	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

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

RBCA SITE ASSESSMENT | **User-Specified COC Data**

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (15 - 25 ft)	
	value (mg/L)	note	value (mg/kg)	note
Benzene	3.0E-1		7.1E-2	
TPH - Arom >C08-C10	8.5E+0		5.0E+1	
Methyl t-Butyl ether	1.9E-2		5.0E-3	
Xylene, o-	3.7E-1		1.1E+0	
Xylene, m-	3.7E-1		1.1E+0	
Ethylbenzene	5.0E-1		5.4E-1	
Toluene	2.0E-2		6.0E-2	

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA
Completed By: Bryan Hill Tier 2 (Pre-Excavation)

Date Completed: 15-Aug-02
Job ID: 43.25827.0024

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

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 2 (Pre-Excavation)
Date Completed: 15-Aug-02

TIER 2 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK: Individual COC Risk – Maximum Value	Individual COC Risk – Target Risk	Cumulative COC Risk – Total Value	Cumulative COC Risk – Target Risk	Risk Limit(s) Exceeded?	BASELINE TOXIC EFFECTS: Hazard Quotient – Maximum Value	Hazard Quotient – Applicable Limit	Hazard Index – Total Value	Hazard Index – Applicable Limit	Toxicity Limit(s) Exceeded?
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	7.7E-10	1.0E-6	7.7E-10	1.0E-5	☐	3.8E-5	1.0E+0	7.5E-5	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	2.5E-7	1.0E-6	2.5E-7	1.0E-5	☐	1.3E-2	1.0E+0	2.5E-2	1.0E+0	☐
SOIL EXPOSURE PATHWAYS										
Complete:	3.7E-8	1.0E-6	3.7E-8	1.0E-5	☐	5.1E-2	1.0E+0	5.3E-2	1.0E+0	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	4.3E-5	1.0E-6	4.3E-5	1.0E-5	■	2.0E+0	1.0E+0	3.2E+0	1.0E+0	■
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	4.3E-5	*1.0E-6*	*4.3E-5*	*1.0E-5*	■	*2.0E+0*	*1.0E+0*	*3.2E+0*	*1.0E+0*	■
	Groundwater		*Groundwater*			*Groundwater*		*Groundwater*		

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 2 (Pre-Excavatic Job ID: 43.25827.0024
Date Completed: 15-Aug-02

Constituent: Benzene **CAS No.: 71-43-2**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		None	Residential / 300	#VALUE!
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	NA	2 6E-1	#VALUE!
	TR = 1e-6	NA	6.9E-3	#VALUE!
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		None	Residential / 300	#VALUE!
$SSTL_s$ (mg/kg)	THQ = 1e+0	NA	4.9E+1	#VALUE!
	TR = 1e-6	NA	1.3E+0	#VALUE!
Surface Soil Inhalation, Ingestion,Dermal Contact				
Receptor Type / Distance (ft)		Res./Constr. / 0	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	7.3E+1		
	TR = 1e-6	1.9E+0		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	#VALUE!	#VALUE!
$RBEL_{air}$ (µg/m³)	THQ = 1e+0	6 2E+0	#VALUE!	#VALUE!
	TR = 1e-6	2.9E-1	#VALUE!	#VALUE!
Soil Volatilization/Particulates to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	#VALUE!	#VALUE!
$SSTL_s$ (mg/kg)	THQ = 1e+0	>1.4E+3	#VALUE!	#VALUE!
	TR = 1e-6	>1.4E+3	#VALUE!	#VALUE!
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	#VALUE!	#VALUE!
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>1.8E+3	#VALUE!	#VALUE!
	TR = 1e-6	4.1E+2	#VALUE!	#VALUE!
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$RBEL_{air}$ (µg/m³)	THQ = 1e+0	6.2E+0		
	TR = 1e-6	2.9E-1		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	2.6E+1		
	TR = 1e-6	1.2E+0		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	3.3E+1		
	TR = 1e-6	1.6E+0		

Chemical Parameters

		Units	Value	Reference
Physical Properties				
MW		(g/mol)	7.8E+1	PS
Sol		(mg/L)	1 8E+3	PS
P_{vap}		(mmHg)	9.5E+1	PS
H_{atm}		(atm-m³/mol)	5 6E-3	PS
pK_a		(log[mol/mol])	-	-
pK_b		(log[mol/mol])	-	-
$\log(K_{oc})$		(log[L/kg])	1.8E+0	PS
D_{air}		(cm²/sec)	8.8E-2	PS
D_{wat}		(cm²/sec)	9.8E-6	PS
Toxicity Data				
Wt of Evd.			A	
SF_o		(1/[mg/kg/day])	2.9E-2	PS
SF_d		(1/[mg/kg/day])	3.0E-2	TX
URF_i		(1/[µg/m³])	8.3E-6	PS
RfD_o		(mg/kg/day)	3 0E-3	R
RfD_d		(mg/kg/day)	-	-
RfC_i		(mg/m³)	6.0E-3	R
Dermal Exposure Parameters				
RAF_d		(mg/mg)	5.0E-1	D
K_p		(cm/hr)	2.1E-2	
tau_d		(hr/event)	2.6E-1	
t_{crit}		(hr)	6.3E-1	
B		(-)	1 3E-2	
Regulatory Standards				
MCL		(mg/L)	5.0E-3	*
TWA		(mg/m³)	3.3E+0	PS
AQL		(mg/L)	-	-
Miscellaneous Parameters				
ADL_{gw}		(mg/L)	2 0E-3	C
ADL_s		(mg/kg)	5.0E-3	S
$t_{1/2,sat}$		(d)	7.2E+2	H
$t_{1/2,unsat}$		(d)	7.2E+2	H

* MCL ref = 52 FR 25690

		Units	Residential	Commercial	Construction
Cross-Media Transfer Factors					
VF_{ss}		(kg-soil/L-air)	NC	NA	NA
VF_{samb}		(kg-soil/L-air)	1.8E-7	NA	NA
VF_{wamb}		(L-wat/L-air)	7.2E-7	NA	NA
VF_{sasp}		(kg-soil/L-air)	2.4E-4	NA	NA
VF_{wesp}		(L-wat/L-air)	1.9E-4	NA	NA
LF		(kg-soil/L-wat)	All exposures: 5.2E-3		NA

		Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors					
DAFgw		(-)	NA	2.3E+0	NA
DAFs/gw		(-)	NA	2.3E+0	NA

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.3E-1
K_{sw}	(L-wat/kg-soil)	1.3E+0
C_{sat}	(mg/kg-soil)	1 4E+3
$C_{sat,vap}$	(µg/m³-air)	4.0E+5
$D_{eff,s}$	(cm²/sec)	1.1E-5
$D_{eff,crk}$	(cm²/sec)	6.9E-3
$D_{eff,cap}$	(cm²/sec)	1.0E-5
$D_{eff,ws}$	(cm²/sec)	1.1E-5
R_{sat}	(-)	1.0E+0
R_{unsat}	(-)	3.9E+0
Z	(cm/event)	7.3E-2

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Site Name. Former EZ Serve 100677 | Completed By: Bryan Hill Tier 2 (Pre-Excavation) | Job ID: 43 25827 0024

Site Location 525 West A St Hayward, CA | Date Completed 15-Aug-02

SOIL (15 - 25 ft) SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1 0E-5
Target Hazard Quotient 1 0E+0

Groundwater DAF Option Domenico - First Order (One-directional vert. dispersion)

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

CONSTITUENTS OF CONCERN		Representative Concentration	X Soil Leaching to Groundwater Ingestion			X Soil Vol. to Indoor Air	X Soil Volatilization and Surface Soil Particulates to Outdoor Air				X Surface Soil Inhalation, Ingestion,Dermal Contact		Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 ft)	Off-site 1 (300 ft)	Off-site 2 (0 ft)	On-site (0 ft)	On-site (0 ft)		Off-site 1 (D ft)	Off-site 2 (0 ft)	On-site (0 ft)				Only if "yes" left
CAS No.	Name	(mg/kg)	None	Residential	#VALUE!	Residential	Residential	Construction Worker	#VALUE!	#VALUE!	Residential	Construction Worker	(mg/kg)	"■" if yes	
71-43-2	Benzene	7.1E-2	NA	1.3E+0	NA	1 2E+0	>1.4E+3	NA	NA	NA	1.9E+0	1.1E+2	1.2E+0	☐	<1
0-00-0	TPH - Arom >C08-C10	5.0E+1	NA	>1.0E+3	NA	>1.0E+3	>1.0E+3	NA	NA	NA	9 7E+2	1.9E+3	9.7E+2	☐	<1
1634-04-4	Methyl t-Butyl ether	5.0E-3	NA	1.1E+2	NA	9 3E+2	>1.5E+4	NA	NA	NA	2.0E+2	3.8E+2	1.1E+2	☐	<1
95-47-6	Xylene, o-	1.1E+0	NA	>2.6E+2	NA	>2 6E+2	>2.6E+2	NA	NA	NA	3 9E+4	7.6E+4	3.9E+4	☐	<1
108-30-3	Xylene, m-	1.1E+0	NA	>2.5E+3	NA	>2 5E+3	>2.5E+3	NA	NA	NA	3.9E+4	7.6E+4	3.9E+4	☐	<1
100-41-4	Ethylbenzene	5.4E-1	NA	>6.5E+2	NA	>6.5E+2	>6.5E+2	NA	NA	NA	2 4E+3	4.6E+3	2.4E+3	☐	<1
108-88-3	Toluene	6.0E-2	NA	>8.0E+2	NA	>8.0E+2	>8.0E+2	NA	NA	NA	3 9E+3	7.6E+3	3.9E+3	☐	<1

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

RBCA SITE ASSESSMENT

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 2 (Pre-Excavation)
Date Completed: 15-Aug-02

Job ID. 43.25827.0024

GROUNDWATER SSTL VALUES

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

Groundwater DAF Option Domenico - First Order (One-directional vert. dispersion)

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

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X GW Vol. to Indoor Air	X Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
			On-site (0 ft)	Off-site 1 (300 ft)	Off-site 2 (0 ft)	On-site (0 ft)	On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)			Only if "yes" left
CAS No.	Name	(mg/L)	None	Residential	#VALUE!	Residential	Residential	#VALUE!	#VALUE!	(mg/L)	"■" if yes	
71-43-2	Benzene	3.0E-1	NA	6.9E-3	NA	1.6E+0	4.1E+2	NA	NA	6.9E-3	■	4.3E+1
0-00-0	TPH - Arom >C08-C10	8.5E+0	NA	4.3E+0	NA	>6.5E+1	>6.5E+1	NA	NA	4.3E+0	■	2.0E+0
1634-04-4	Methyl t-Butyl ether	1.9E-2	NA	1.4E+0	NA	2.9E+3	>4.8E+4	NA	NA	1.4E+0	□	<1
95-47-6	Xylene, o-	3.7E-1	NA	>1.8E+2	NA	>1.8E+2	>1.8E+2	NA	NA	>1.8E+2	□	NA
108-30-3	Xylene, m-	3.7E-1	NA	>1.6E+2	NA	>1.6E+2	>1.6E+2	NA	NA	>1.6E+2	□	NA
100-41-4	Ethylbenzene	5.0E-1	NA	2.5E+1	NA	>1.7E+2	>1.7E+2	NA	NA	2.5E+1	□	<1
108-88-3	Toluene	2.0E-2	NA	>5.2E+2	NA	>5.2E+2	>5.2E+2	NA	NA	>5.2E+2	□	NA

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

RBCA SITE ASSESSMENT | **TPH Criteria SSTL Worksheet**

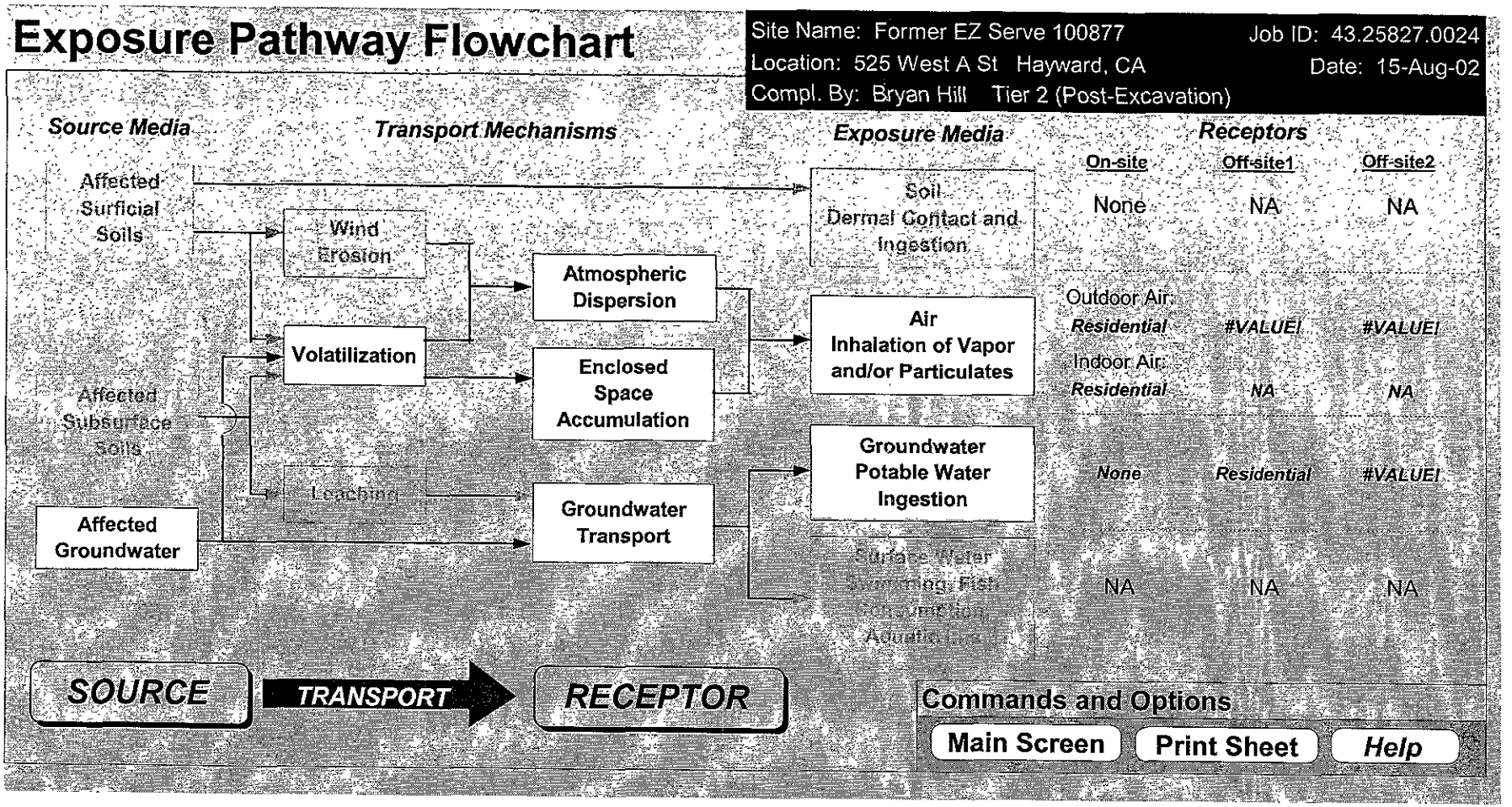
Site Name: Former EZ Serve 100877 | Completed By: Bryan Hill Tier 2 (Pre-Excavation) | Job ID: 43.25827.0024

Site Location: 525 West A St Hayward, CA | Date Completed: 15-Aug-02

CALCULATION OF SSTL VALUES FOR TPH

CONSTITUENTS OF CONCERN		Mass Fractions		Representative Concentrations		Calculated Concentration Limits		Appilcable SSTL Values	
		Soil	Groundwater	Soil	Groundwater	Residual Soil Concentration	Solubility	Soils (15 - 25 ft)	Groundwater
CAS No.	Name	(-)	(-)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)
0-00-0	TPH - Arom >C08-C10	1.0E+0	1.0E+0	5.0E+1	8.5E+0	1.0E+3	6.5E+1	9.7E+2	4.3E+0
	Total	1 0E+0	1.0E+0				Total TPH SSTL value		

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


Exposure Pathway Flowchart
Site Name: Former EZ Serve 100877
Job ID: 43.25827.0024
Location: 525 West A St Hayward, CA
Date: 15-Aug-02
Compl. By: Bryan Hill Tier 2 (Post-Excavation)
Source Media
Transport Mechanisms
Exposure Media
Receptors
On-site
Off-site1
Off-site2
Affected Surficial Soils
Wind Erosion
Soil Dermal Contact and Ingestion
None
NA
NA
Atmospheric Dispersion
Volatilization
Air Inhalation of Vapor and/or Particulates
Outdoor Air:
Residential
#VALUE!
#VALUE!
Indoor Air:
Residential
NA
NA
Enclosed Space Accumulation
Affected Subsurface Soils
Leaching
Groundwater Potable Water Ingestion
None
Residential
#VALUE!
Affected Groundwater
Groundwater Transport
Surface Water Swimming, Fish Consumption, Aquatic
NA
NA
NA
SOURCE
TRANSPORT
RECEPTOR
Commands and Options
Main Screen
Print Sheet
Help

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 2 (Post-Excavation)
Date Completed: 15-Aug-02

Job ID: 43.25827.0024

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
IR_{air-in}	Inhalation rate indoor (m^3/day)	15			20	
$IR_{air-Out}$	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0 05	0 5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

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

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	300	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ab}	Target Risk (class A&B carcinogens)	1 0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1 0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
RBCA calculation mode	Forward & Backward
Risk goal calculation option	Individual & Cumulative Constituent Risks
Soil volatilization model option	NA
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	Domenico model w/ biodeg.

NOTE: NA = Not applicable

Surface Parameters		General	Construction	(Units)
A	Source zone area	0.0E+0	NA	(ft^2)
W	Length of source-zone area parallel to wind	0 0E+0	NA	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	2 3E+8		(ft/yr)
δ_{air}	Air mixing zone height	6 6E+0		(ft)
P_a	Areal particulate emission rate	NA		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	NA		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	9 5E-1			(ft)
h_v	Vadose zone thickness	1 4E+1			(ft)
ρ_s	Soil bulk density	1.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1 0E-2			(-)
θ_T	Soil total porosity	3.6E-1			(-)
K_{vs}	Vertical hydraulic conductivity	1 0E-1			(ft/yr)
k_v	Vapor permeability	1 1E-16			(ft^2)
L_{gw}	Depth to groundwater	1.5E+1			(ft)
L_s	Depth to top of affected soils	NA			(ft)
L_{base}	Depth to base of affected soils	NA			(ft)
L_{subs}	Thickness of affected soils	NA			(ft)
pH	Soil/groundwater pH	6 9E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	0 35	0 34	0 12	(-)
θ_a	Volumetric air content	0 01	0 02	0 26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	6.56E+0	NA	(ft)
A_b	Foundation area	7.53E+2	NA	(cm^2)
X_{crk}	Foundation perimeter	1.12E+2	NA	(ft)
ER	Building air exchange rate	4.42E+3	NA	(1/yr)
L_{crk}	Foundation thickness	4.92E-1	NA	(ft)
Z_{crk}	Depth to bottom of foundation slab	4.92E-1	NA	(ft)
η	Foundation crack fraction	1.00E-2	NA	(-)
dP	Indoor/outdoor differential pressure	0 00E+0	NA	(psi)
Q_s	Convective air flow through slab	0 00E+0	NA	(ft^3/yr)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	NA	(ft)
I_f	Net groundwater infiltration rate	NA	(in/yr)
U_{gw}	Groundwater Darcy velocity	7.4E+1	(ft/yr)
V_{gw}	Groundwater seepage velocity	1 9E+2	(ft/yr)
K_s	Saturated hydraulic conductivity	8.2E+3	(ft/yr)
i	Groundwater gradient	9 0E-3	(-)
S_w	Width of groundwater source zone	2.0E+2	(ft)
S_d	Depth of groundwater source zone	1.0E+1	(ft)
θ_{eff}	Effective porosity in water-bearing unit	3.8E-1	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	0 0E+0	(-)
pH_{sat}	Groundwater pH	0 0E+0	(-)
	Biodegradation considered?	1st Order	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	3.0E+1	NA	NA	NA	(ft)
α_y	Transverse dispersivity	9.9E+0	NA	NA	NA	(ft)
α_z	Vertical dispersivity	1.5E+0	NA	NA	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

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

RBCA SITE ASSESSMENT | **User-Specified COC Data**

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

CONSTITUENT	Representative COC Concentration			
	Groundwater		Soils (0 - 0 ft)	
	value (mg/L)	note	value (mg/kg)	note
Benzene	3.0E-1		7.1E-2	
TPH - Arom >C08-C10	8.5E+0		5.0E+1	
Methyl t-Butyl ether	1.9E-2		5.0E-3	
Xylene, o-	3.7E-1		1.1E+0	
Xylene, m-	3.7E-1		1.1E+0	
Ethylbenzene	5.0E-1		5.4E-1	
Toluene	2.0E-2		6.0E-2	

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA
Completed By: Bryan Hill Tier 2 (Post-Excavation)

Date Completed: 15-Aug-02
Job ID: 43.25827.0024

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

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 2 (Post-Excavation)
Date Completed: 15-Aug-02

TIER 2 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK: Individual COC Risk – Maximum Value	Individual COC Risk – Target Risk	Cumulative COC Risk – Total Value	Cumulative COC Risk – Target Risk	Risk Limit(s) Exceeded?	BASELINE TOXIC EFFECTS: Hazard Quotient – Maximum Value	Hazard Quotient – Applicable Limit	Hazard Index – Total Value	Hazard Index – Applicable Limit	Toxicity Limit(s) Exceeded?
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	7.2E-10	1.0E-6	7.2E-10	1.0E-5	☐	3.5E-5	1.0E+0	7.0E-5	1.0E+0	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	1.9E-7	1.0E-6	1.9E-7	1.0E-5	☐	9.2E-3	1.0E+0	1.8E-2	1.0E+0	☐
SOIL EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	1.3E-5	1.0E-6	1.3E-5	1.0E-5	■	5.9E-1	1.0E+0	9.4E-1	1.0E+0	☐
SURFACE WATER EXPOSURE PATHWAYS										
Complete:	NA	NA	NA	NA	☐	NA	NA	NA	NA	☐
CRITICAL EXPOSURE PATHWAY (Maximum Values From Complete Pathways)										
	1.3E-5	*1.0E-6*	*1.3E-5*	*1.0E-5*	■	*5.9E-1*	*1.0E+0*	*9.4E-1*	*1.0E+0*	☐
	Groundwater		*Groundwater*			*Groundwater*		*Groundwater*		

RBCA SITE ASSESSMENT

Chemical-Specific Tier 2 Cleanup Summary

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 2 (Post-Excavati Job ID: 43.25827.0024
Date Completed: 15-Aug-02

Constituent: Benzene **CAS No.: 71-43-2**

Site-Specific Target Level (SSTL) Concentrations

		On-site	Off-site1	Off-site2
Groundwater Ingestion				
Receptor Type / Distance (ft)		None	Residential / 300	#VALUE!
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	NA	8 7E-1	#VALUE!
	TR = 1e-6	NA	2.3E-2	#VALUE!
Soil Leaching to Groundwater Ingestion				
Receptor Type / Distance (ft)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1e+0	NA	NA	NA
	TR = 1e-6	NA	NA	NA
Surface Soil Ingestion and Dermal Contact				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_{ss}$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	#VALUE!	#VALUE!
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	6.2E+0	#VALUE!	#VALUE!
	TR = 1e-6	2.9E-1	#VALUE!	#VALUE!
Soil Volatilization/Particulates to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		None	None	None
$SSTL_s$ (mg/kg)	THQ = 1e+0	NA	NA	NA
	TR = 1e-6	NA	NA	NA
Groundwater Volatilization to Outdoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	#VALUE!	#VALUE!
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	>1.8E+3	#VALUE!	#VALUE!
	TR = 1e-6	4.1E+2	#VALUE!	#VALUE!
Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$RBEL_{air}$ ($\mu g/m^3$)	THQ = 1e+0	6.2E+0		
	TR = 1e-6	2.9E-1		
Soil Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		None	No Off-site Receptors	
$SSTL_s$ (mg/kg)	THQ = 1e+0	NA		
	TR = 1e-6	NA		
Groundwater Volatilization to Indoor Air Inhalation				
Receptor Type / Distance (ft)		Residential / 0	No Off-site Receptors	
$SSTL_{gw}$ (mg/L)	THQ = 1e+0	3.3E+1		
	TR = 1e-6	1.6E+0		

	Units	Residential	Commercial	Construction
Cross-Media Transfer Factors				
VF_{ss}	(kg-soil/L-air)	NA	NA	NA
VF_{samb}	(kg-soil/L-air)	NA	NA	NA
VF_{wamb}	(L-wat/L-air)	7.2E-7	NA	NA
VF_{sesp}	(kg-soil/L-air)	NA	NA	NA
VF_{wesp}	(L-wat/L-air)	1.9E-4	NA	NA
LF	(kg-soil/L-wat)	NA		NA

	Units	On-Site	Off-Site1	Off-Site2
Lateral Transport Factors				
DAFgw	(-)	NA	8.0E+0	NA
DAFs/gw	(-)	NA	NA	NA

Chemical Parameters

	Units	Value	Reference
Physical Properties			
MW	(g/mol)	7.8E+1	PS
Sol	(mg/L)	1 8E+3	PS
P_{vap}	(mmHg)	9.5E+1	PS
H_{atm}	(atm-m^3/mol)	5.6E-3	PS
pK_a	(log[mol/mol])	-	-
pK_b	(log[mol/mol])	-	-
$\log(K_{oc})$	(log[L/kg])	1.8E+0	PS
D_{air}	(cm^2/sec)	8.8E-2	PS
D_{wat}	(cm^2/sec)	9.8E-6	PS
Toxicity Data			
Wt of Evd.		A	
SF_o	(1/[mg/kg/day])	2 9E-2	PS
SF_d	(1/[mg/kg/day])	3.0E-2	TX
URF_i	(1/[$\mu g/m^3$])	8.3E-6	PS
RfD_o	(mg/kg/day)	3.0E-3	R
RfD_d	(mg/kg/day)	-	-
RfC_i	(mg/m^3)	6.0E-3	R
Dermal Exposure Parameters			
RAF_d	(mg/mg)	5.0E-1	D
K_p	(cm/hr)	2.1E-2	
tau_d	(hr/event)	2.6E-1	
t_{cnt}	(hr)	6.3E-1	
B	(-)	1.3E-2	
Regulatory Standards			
MCL	(mg/L)	5.0E-3	*
TWA	(mg/m^3)	3 3E+0	PS
AQL	(mg/L)	-	-
Miscellaneous Parameters			
ADL_{gw}	(mg/L)	2.0E-3	C
ADL_s	(mg/kg)	5 0E-3	S
$t_{1/2,sat}$	(d)	7.2E+2	H
$t_{1/2,unsat}$	(d)	7.2E+2	H

* MCL ref = 52 FR 25690

	Units	Value
Derived Parameters		
H	(L-wat/L-air)	2.3E-1
K_{sw}	(L-wat/kg-soil)	1 3E+0
C_{sat}	(mg/kg-soil)	1.4E+3
$C_{sat,vap}$	($\mu g/m^3$-air)	4.0E+5
$D_{eff,s}$	(cm^2/sec)	1.1E-5
$D_{eff,crk}$	(cm^2/sec)	6.9E-3
$D_{eff,cap}$	(cm^2/sec)	1 0E-5
$D_{eff,ws}$	(cm^2/sec)	1.1E-5
R_{sat}	(-)	1.0E+0
R_{unsat}	(-)	3.9E+0
Z	(cm/event)	7.3E-2

Notes: 1) NA = Not applicable; NC = Not calculated.

2) Definitions and references presented on page 8 of 8.

RBCA SITE ASSESSMENT

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 2 (Post-Excavation)
Date Completed: 15-Aug-02

Job ID: 43.25827.0024

GROUNDWATER SSTL VALUES

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

Groundwater DAF Option: Domenico - First Order (One-directional vert dispersion)

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

CONSTITUENTS OF CONCERN		Representative Concentration	X	Groundwater Ingestion			X	GW Vol. to Indoor Air	X	Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
				On-site (0 ft)	Off-site 1 (300 ft)	Off-site 2 (0 ft)		On-site (0 ft)		On-site (0 ft)	Off-site 1 (0 ft)	Off-site 2 (0 ft)			Only if "yes" left
CAS No.	Name	(mg/L)		None	Residential	#VALUE!		Residential		Residential	#VALUE!	#VALUE!	(mg/L)	"■" If yes	
71-43-2	Benzene	3.0E-1		NA	2.3E-2	NA		1.6E+0		4.1E+2	NA	NA	2.3E-2	■	1.3E+1
0-00-0	TPH - Arom >C08-C10	8.5E+0		NA	1.4E+1	NA		>6.5E+1		>6.5E+1	NA	NA	1.4E+1	☐	<1
1634-04-4	Methyl t-Butyl ether	1.9E-2		NA	4.7E+0	NA		2.9E+3		>4.8E+4	NA	NA	4.7E+0	☐	<1
95-47-6	Xylene, o-	3.7E-1		NA	>1.8E+2	NA		>1.8E+2		>1.8E+2	NA	NA	>1.8E+2	☐	NA
108-30-3	Xylene, m-	3.7E-1		NA	>1.6E+2	NA		>1.6E+2		>1.6E+2	NA	NA	>1.6E+2	☐	NA
100-41-4	Ethylbenzene	5.0E-1		NA	7.7E+1	NA		>1.7E+2		>1.7E+2	NA	NA	7.7E+1	☐	<1
108-88-3	Toluene	2.0E-2		NA	>5.2E+2	NA		>5.2E+2		>5.2E+2	NA	NA	>5.2E+2	☐	NA

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

RBCA SITE ASSESSMENT | **TPH Criteria SSTL Worksheet**

Site Name: Former EZ Serve 100877
Site Location: 525 West A St Hayward, CA

Completed By: Bryan Hill Tier 2 (Post-Excavation)
Date Completed: 15-Aug-02

Job ID: 43.25827.0024

CALCULATION OF SSTL VALUES FOR TPH

CONSTITUENTS OF CONCERN		Mass Fractions		Representative Concentrations		Calculated Concentration Limits		Appilcable SSTL Values	
		Soil	Groundwater	Soil	Groundwater	Residual Soil Concentration	Solubility	Soils	Groundwater
CAS No.	Name	(-)	(-)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)
0-00-0	TPH - Arom >C08-C10	1.0E+0	1.0E+0		8.5E+0		6.5E+1		1.4E+1
	Total	1.0E+0	1.0E+0				Total TPH SSTL value		

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