Chevron

April 8, 1997

Chevron Products Company
6001 Bollinger Canyon Road
Building L
San Ramon, CA 94583
P.O. Box 6004
San Ramon, CA 94583-0904

Marketing – Sales West
Phone 510 842-9500

Ms. Eva Chu
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: Former Chevron Service Station # 9-1723
9757 San Leandro Blvd.
San Leandro, California

Dear Ms. Chu:

Enclosed is the Draft Tier 2 Risk Based Corrective Action (RBCA) Site Evaluation, that was prepared for the above noted site, by Chevron's Health, Environment and Safety department. This RBCA evaluation includes comments from your office regarding acceptable risk ranges, exposure pathways, site specific parameters and methods of data evaluation for the soil and groundwater analysis for the site.

Site specific target levels (SSTL's) for a 1 x 10-5 health risk for potential onsite commercial workers exposed to benzene vapors from soil and groundwater in indoor air was calculated. Based on the calculated SSTL's, an estimated risk was than calculated for potential onsite commercial workers. The results of this calculation is 1.3 x 10-4, which is above the 1x 10-5 guideline provided by your office.

The soil that is impacted with petroleum hydrocarbons at the site, is predominantly concentrated in the capillary and water saturated zone located approximately 10 feet below the ground surface. Therefore, direct exposure to this impacted soil by the onsite commercial worker would not be expected.

Based on the sampling data at this site, the dissolved hydrocarbon plume can be characterized as a stable to decreasing plume, that has been defined in the downgradient direction.

Based on the site soils and groundwater data and this health risk evaluation, health risk controls will need to be formatted for the development of this site. These controls will be developed in conjunction with input from your office and may range from restricting development above the maximum benzene impacted soil area to proposing that only a parking lot be placed over the benzene impacted soils or placing a vapor barrier beneath any future commercial development at the site. Complete excavation of the impacted soil would be prohibitively expensive and is not recommended as a method to reduce the adverse health risk identified for this site.

If you have any questions, regarding the enclosed report contact Mr. Curtis Peck at (510) 242-7086 or you may contact me at (510) 842-9136.

Sincerely
CHEVRON PRODUCTS COMPANY

Philip R. Briggs
Site Assessment and Remediation Project Manager

Enclosure

cc: Ms. Bette Owen, Chevron

Mr. Curtis Peck, Chevron
CRTC/HES/Richmond, CA/Room 208

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Former Chevron Station #9-1723 Former Chevron Station #9-1723b Identification: 9-1723ra
Site Location: 9757 San Leandro St., Oakland 9757 San Leandro St., Oakland Date Completed: 2/27/96
Completed By: Curt Peck

Software: GSI RBCA Spreadsheet
Version: v 1.0

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

DEFAULT PARAMETERS

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

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

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

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

Surface Parameters	Definition (Units)	Residential	Commercial/Industrial Chronic	Commercial/Industrial Construction
t	Exposure duration (yr)	30	25	1
A	Contaminated soil area (cm^2)	2.2E+06		1.0E+06
W	Length of affected soil parallel to wind (cm)	1.5E+03		1.0E+03
W.gw	Length of affected soil parallel to groundwater (cn	1.5E+03		
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02		
delta	Air mixing zone height (cm)	2.0E+02		
Lss	Definition of surficial soils (cm)	***9.1E+01***		
Pe	Particulate areal emission rate (g/cm^2/s)	2.2E-10		

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	***1.5E+02***
I	Groundwater infiltration rate (cm/yr)	***3.0E-01***
Ugw	Groundwater Darcy velocity (cm/yr)	***3.0E+03***
Ugw.tr	Groundwater Transport velocity (cm/yr)	***3.0E+03***
Ks	Saturated Hydraulic Conductivity(cm/s)	
grad	Groundwater Gradient (cm/cm)	
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
BC	Biodegradation Capacity (mg/L)	
BIO?	Is Bioattenuation Considered	FALSE
phi.eff	Effective Porosity in Water-Bearing Unit	3.0E-01
foc.sat	Fraction organic carbon in water-bearing unit	***1.4E-03***

Soil	Definition (Units)	Value		
hc	Capillary zone thickness (cm)	***1.0E+02***		
hv	Vadose zone thickness (cm)	***2.8E+02***		
rho	Soil density (g/cm^3)	***2.03***		
foc	Fraction of organic carbon in vadose zone	***0.0014***		
phi	Soil porosity in vadose zone	***0.42***		
Lgw	Depth to groundwater (cm)	***3.9E+02***		
Ls	Depth to top of affected soil (cm)	***9.1E+01***		
Lsubs	Thickness of affected subsurface soils (cm)	***2.9E+02***		
pH	Soil/groundwater pH	6.5		
		capillary	vadose	foundation
phi.w	Volumetric water content	***0.378***	***0.133***	***0.133***
phi.a	Volumetric air content	***0.042***	***0.287***	***0.287***

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	0.01	

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

Site Name: Former Chevron Station #9-1723 Completed By: Curt Peck
Site Location: 9757 San Leandro St., Oakland CA Date Completed: 2/27/1996

TIER 2 BASELINE RISK SUMMARY TABLE

	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
EXPOSURE PATHWAY	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
AIR EXPOSURE PATHWAYS										
Complete:	1.3E-4	1.0E-5	0.0E+0	N/A	■	0.0E+0	1.0E+0	0.0E+0	N/A	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
SOIL EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
CRITICAL EXPOSURE PATHWAY (Select Maximum Values From Complete Pathways)										
	1.3E-4	1.0E-5	0.0E+0	N/A	■	0.0E+0	1.0E+0	0.0E+0	N/A	☐

NOTE: Calculated Risk is for Arithmetic Average of Soil (5.8mg/Kg) and Groundwater (0.51 mg/L).

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 8.3**

Site Name: Former Chevron Station #9-1723
Site Location: 9757 San Leandro St., Oakland CA

Completed By: Curt Peck
Date Completed: 2/27/1996

TIER 2 BASELINE RISK SUMMARY TABLE

	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
EXPOSURE PATHWAY	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
AIR EXPOSURE PATHWAYS										
Complete:	2.7E-5	1.0E-5	0.0E+0	N/A	■	0.0E+0	1.0E+0	0.0E+0	N/A	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
SOIL EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
CRITICAL EXPOSURE PATHWAY (Select Maximum Values From Complete Pathways)										
	2.7E-5	1.0E-5	0.0E+0	N/A	■	0.0E+0	1.0E+0	0.0E+0	N/A	☐

NOTE: Calculated Risk is for 95% UCL of Geometic Mean of Soil (1.2 mg/Kg) and Groundwater (0.055 mg/L).

Serial: g-303-ydx-93
Software: GSI RBCA Spreadsheet
Version: v 1.0

RBCA SITE ASSESSMENT | Input Screen 7

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

(Complete the following table)

CONSTITUENT	Representative COC Concentration in Groundwater value (mg/L)	note	in Surface Soil value (mg/kg)	note	in Subsurface Soil value (mg/kg)	note
Benzene	5.1E-1	AVG			5.8E+0	AVG
Ethylbenzene	1.7E-1	AVG			1.1E+1	AVG
Toluene	3.2E-1	AVG			5.2E+0	AVG
Xylene (mixed isomers)	1.2E+0	AVG			3.2E+1	AVG

Site Name: Former Chevron Station #9-1723
Site Location: 9757 San Leandro St., Oakland CA

Completed By: Curt Peck
Date Completed: 2/27/1996

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 9.2**

Site Name: Former Chevron Station #9-1723
Site Location: 9757 San Leandro St., Oakland CA

Completed By: Curt Peck
Date Completed: 2/27/1996

SUBSURFACE SOIL SSTL VALUES (> 3 FT BGS)

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

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2

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

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater			X	Soil Volatilization to Indoor Air		Soil Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/kg)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)		Residential: (on-site)	Commercial: (on-site)	Residential: (on-site)	Commercial: (on-site)	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	5.8E+0	NA	NA	NA		NA	4.5E-1	NA	NA	4.5E-1	■	1.3E+01
100-41-4	Ethylbenzene	1.1E+1	NA	NA	NA		NA	>Res	NA	NA	>Res	☐	<1
108-88-3	Toluene	5.2E+0	NA	NA	NA		NA	5.3E+1	NA	NA	5.3E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	3.2E+1	NA	NA	NA		NA	>Res	NA	NA	>Res	☐	<1

Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: g-303-ydx-938

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name: Former Chevron Station #9-1723
Site Location: 9757 San Leandro St., Oakland CA

Completed By: Curt Peck
Date Completed: 2/27/1996

GROUNDWATER SSTL VALUES

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

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2

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

CONSTITUENTS OF CONCERN		Representative Concentration		Groundwater Ingestion			X	Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		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		
71-43-2	Benzene	5.1E-1	NA	NA	NA	NA	6.7E+0	NA	NA	6.7E+0	☐	<1		
100-41-4	Ethylbenzene	1.7E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1		
108-88-3	Toluene	3.2E-1	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1		
1330-20-7	Xylene (mixed isomers)	1.2E+0	NA	NA	NA	NA	>Sol	NA	NA	>Sol	☐	<1		

Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: g-303-ydx-938

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 5.5** | **SCREEN 7.3 SUBSURFACE SOILS CONCENTRATION CALCULATOR**

Site Name: Former Chevron Station #9-1723 Completed By: Curt Peck
Site Location: 9757 San Leandro St., Oakland CA Date Completed: 2/27/1996

UC

TIER 2 SUBSURFACE SOIL CONCENTRATION DATA SUMMAR (e.g., >3 FT BGS)

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations			Calculated Distribution of Data	Default Detection Limit (mg/L)	Sample Name
CAS No.	Name	Typical Detection Limit (mg/kg)	No. of Samples	No. of Detects	Maximum Conc. (mg/kg)	Mean Conc. (mg/kg)	UCL on Mean Conc. (mg/kg)			Date Sampled
71-43-2	Benzene	5.0E-03	36	34	9.9E+01	5.7E-01	1.2E+00	Lognormal	0.005	
100-41-4	Ethylbenzene	5.0E-03	36	30	1.5E+02	6.7E-01	1.8E+00	Lognormal	0.005	
108-88-3	Toluene	5.0E-03	36	28	6.8E+01	2.0E-01	5.0E-01	Lognormal	0.005	
1330-20-7	Xylene (mixed isomers)	5.0E-03	36	34	2.6E+02	1.9E+00	4.9E+00	Lognormal	0.005	

Serial: g-303-ydx-938 Software: GSI RBCA Spreadsheet
Version: v 1.0

:L Percentile

95% (must be 0.9 or 0.95)

Analytical Data (Up to 50 Data Points)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SB-1-10	SB-2-10	SB-3-10	SB-4-10	SB-4-15	SB-5-10	SB-6-10	SB-7-5	SB-7-10	SB-8-5	SB-8-10	SB-8-15	SB-9-5	SB-9-15	SB-10-5	SB-10-10	SB-10-15	SB-11-5	SB-11-10	SB-12-5	SB-12-10	SB-13-10
4/2/96	4/1/96	4/1/96	4/1/96	4/1/96	4/1/96	4/3/96	4/1/96	4/1/96	4/4/96	4/4/96	4/4/96	4/1/96	4/1/96	4/4/96	4/4/96	4/4/96	4/4/96	4/4/96	4/3/96	4/3/96	4/3/96
1.4	0.18	0.34	0.59	0.091	2.4	0.57	2.2	1.3	1.6	4.6	0.0054	0.6	3.8	3.7	99	0.01	0.012	1.5	ND	1.1	1.6
8.9	0.79	2.3	0.14	0.029	10	0.42	7.7	7	ND	0.76	ND	0.14	17	9.9	150	ND	0.019	9.7	ND	19	7.4
0.44	0.12	0.66	0.52	0.036	1.4	ND	0.58	1.8	ND	1.1	ND	0.16	7.4	8.9	40	0.0051	0.04	ND	ND	4.1	0.81
26	0.59	3.3	1.1	0.23	4.2	2.3	7.8	27	0.79	2.1	0.042	0.82	69	53	210	0.016	0.056	3.2	ND	85	24

should soil core from 15' not be dropped since it is below GW elevations at all times

23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SB-14-5	SB-14-10	SB-15-5	SB-15-10	SB-16-5	SB-16-10	SB-17-10	SB-18-10	SB-19-10	SB-20-10	SB-21-5	SB-22-5	SB-22-10	SB-23-10		
4/4/96	4/4/96	4/3/96	4/3/96	4/3/96	4/3/96	4/3/96	4/4/96	4/3/96	4/3/96	4/2/96	4/2/96	4/2/96	4/2/96		
0.066	5	0.011	17	0.15	6.2	4.3	5.9	2.3	3.8	ND	0.027	0.72	3.4		
0.007	15	ND	53	0.0069	28	38	2	1.1	17	ND	0.02	4.7	0.66		
0.05	28	0.006	68	ND	1.8	15	4.5	ND	1.5	ND	0.0091	0.47	0.29		
0.067	82	0.15	260	0.026	78	150	5.4	1.5	39	ND	0.015	0.32	4.6		

SCREEN 7.1 GROUNDWATER CONCENTRATION CALCULATOR

Site Name: Former Chevron Station #9-1723 Completed By: Curt Peck
Site Location: 9757 San Leandro St., Oakland (Date Completed: 2/27/1996

Choose

TIER 2 GROUNDWATER CONCENTRATION DATA SUMMARY

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations			Calculated Distribution of Data	Default Detection Limit (mg/L)	Well Name
CAS No.	Name	Typical Detection Limit (mg/L)	No. of Samples	No. of Detects	Maximum Conc. (mg/L)	Mean Conc. (mg/L)	UCL on Mean Conc. (mg/L)			Date Sampled
71-43-2	Benzene	5.0E-04	38	37	2.0E+00	2.9E-02	5.5E-02	Lognormal	0.0005	
100-41-4	Ethylbenzene	5.0E-04	38	28	8.0E-01	7.1E-03	1.4E-02	Lognormal	0.0005	
108-88-3	Toluene	5.0E-04	38	23	2.9E+00	2.5E-03	5.1E-03	Lognormal	0.0005	
1330-20-7	Xylene (mixed isomers)	5.0E-04	38	29	7.9E+00	1.0E-02	2.3E-02	Lognormal	0.0005	

Serial: g-303-ydx-938

Software: GSI RBCA Spreadsheet
Version: v 1.0

s UCL Percentile

95% (must be 0.9 or 0.95)

Analytical Data (Up to 50 Data Points)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SB-11	SB-19	SB-22				MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-6	MW-6	MW-6	MW-6	MW-6
4/4/96	4/3/96	4/2/96				11/2/93	2/10/94	5/12/94	11/11/94	2/1/95	5/18/95	8/2/95	11/1/95	1/31/96	5/16/96	8/1/96	11/2/93	2/10/94	5/12/94	8/26/94	11/11/94
0.21	0.17	0.4				0.043	0.052	0.087	0.018	0.036	0.029	0.0092	0.0056	0.05	0.014	0.0014	0.019	0.01	0.01	0.016	0.0013
0.18	0.021	0.11				0.022	0.05	0.077	0.018	0.021	0.016	0.004	0.0019	0.019	0.017	ND	0.0025	0.002	0.0012	0.0023	ND
0.097	0.03	ND				0.0034	0.003	0.0082	0.001	0.0006	0.001	ND	ND	ND	ND	ND	0.0018	0.0009	0.0011	0.0014	ND
0.4	0.034	0.077				0.012	0.04	0.068	0.011	0.011	0.0096	0.0012	ND	0.029	0.0086	ND	0.005	0.004	0.0031	0.0071	0.001

23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-8	MW-8	MW-8	MW-8	MW-8	MW-6	MW-8	MW-8	MW-8	MW-8	MW-8		
2/1/95	5/18/95	8/2/95	11/1/95	1/31/96	5/16/96	8/1/96	11/2/93	2/10/94	5/12/94	8/26/94	11/11/94	2/1/95	5/18/95	8/2/95	11/1/95	1/31/96	5/16/96	8/1/96		
0.0019	0.0082	0.0021	ND	0.001	0.0016	0.0008	2	1.2	1.4	0.72	0.25	0.068	0.12	0.15	0.12	0.0053	0.26	0.45		
ND	ND	ND	ND	ND	ND	ND	0.42	0.25	0.8	0.33	0.19	0.0027	0.011	0.02	0.018	ND	0.056	0.0089		
ND	ND	ND	ND	ND	ND	ND	0.44	0.38	2.9	0.2	0.17	0.0026	0.012	0.0097	0.015	ND	0.043	0.0009		
0.0005	ND	ND	ND	ND	ND	ND	1.4	2.9	3.8	0.93	0.65	0.0043	0.023	0.04	0.039	ND	0.13	0.025		

RBCA

SUMMARY REPORT

❑ TIER 1 / ■ TIER 2 RBCA SITE EVALUATION

PREPARED FOR

Former Chevron Station #9-1723
SITE NAME

9757 San Leandro Street, Oakland CA
LOCATION

Chevron Research and Technology Co.,
Curtis A. Peck, Lead Hydrogeologist
PREPARED BY

March 17, 1997
DATE ISSUED

REVIEWED BY _____

DATE _____

Site Name: Former Chevron Station #9-1723 | Date Completed: 3/7/97

Site Location: 9757 San Leandro St., Oakland CA | Completed By: Curt Peck, CRTC Hydrogeologist

TIER 1 / TIER 2 RBCA REPORT INDEX

		■ = ENCLOSED	
		Tier 1	Tier 2
1.0 EXECUTIVE SUMMARY			
1.1 Tier 1 Executive Summary Checklist		❑	
1.2 Tier 2 Executive Summary Checklist	*		■
1.3 Executive Summary Discussion		❑	■ *(u)*
1.4 Baseline Exposure/Control Strategy Flowchart		❑	❑ *(u)*
2.0 SITE HISTORY			
2.1 Site Description		❑	❑ *(u)*
2.2 Site Ownership & Activity Record		❑	❑ *(u)*
2.3 Past Releases or Source Areas		❑	❑ *(u)*
2.4 Summary of Current & Completed Site Activities		❑	❑ *(u)*
2.5 Summary of Potential Near-Term Site Activities		❑	❑ *(u)*
3.0 SITE ASSESSMENT INFORMATION			
3.1 Regional Hydrogeologic Conditions		❑	❑ *(u)*
3.2 Hydrogeologic Site Conditions		❑	❑ *(u)*
3.3 Beneficial Use Summary		❑	❑ *(u)*
3.4 Well Inventory Survey		❑	❑ *(u)*
3.5 Ecological Assessment Summary		❑	❑ *(u)*
4.0 BASELINE EXPOSURE ASSESSMENT			
4.1 Site Classification Summary		❑	❑ *(u)*
4.2 Baseline Exposure Flowchart		❑	■ *(u)*
4.3 Tier 2 Exposure Factor Checklist		❑	❑ *(u)*
4.4 Tier 2 Exposure Pathway Screening	*		■
4.5 Tier 2 Exposure Scenarios & Risk Goals	*		■
5.0 SITE PARAMETERS			
5.1 Site Parameter Checklist for RBSLs		❑	■ *(u)*
5.2 Summary of Media Investigation and Chemical Analyses		❑	❑ *(u)*
5.3 Summary of Source Zone Characteristics		❑	❑ *(u)*
5.4 Surface Soil Concentration Data Summary		❑	❑ *(u)*
5.5 Subsurface Soil Concentration Data Summary		❑	■ *(u)*
5.6 Groundwater Concentration Data Summary		❑	■ *(u)*
5.7 Tier 2 Exposure Pathway Transport Parameters	*		■
6.0 TIER 1 RISK-BASED SCREENING LEVEL EVALUATION			
6.1 Tier 1 RBSL Evaluation: Surface Soil		❑	
6.2 Tier 1 RBSL Evaluation: Subsurface Soil		❑	
6.3 Tier 1 RBSL Evaluation: Groundwater		❑	

* = *Required for Tier 2 Evaluation only* (u) = *For Tier 2, update Tier 1 version as needed.*

Site Name: Former Chevron Station #9-1723 Date Completed: 3/7/97

Site Location: 9757 San Leandro St., CA Completed By: Curt Peck, CRTC

TIER 1 / TIER 2 REPORT INDEX *continued*

■ = ENCLOSED

		Tier 1	Tier 2
7.0 NATURAL ATTENUATION FACTORS			
7.1 Tier 2 NAF Calculation Methods & Results	*		
8.0 TIER 2 BASELINE RISK CALCULATION			
8.1 Tier 2 Exposure Concentration & Intake Calculation	*		■
8.2 Tier 2 Pathway Risk Calculation	*		■
8.3 Tier 2 Baseline Risk Summary Table	*		■
9.0 TIER 2 SSTL EVALUATION			
9.1 Surface Soil SSTL Values	*		❑
9.2 Subsurface Soil SSTL Values	*		■
9.3 Groundwater SSTL Values	*		■
10.0 TIER 1 / TIER 2 CORRECTIVE ACTION ASSESSMENT			
10.1 Exposure Control Flowchart		❑	❑ *(u)*
10.2 Soil Remediation Technology Screening Matrix		❑	❑ *(u)*
10.3 Groundwater Remediation Technology Screening Matrix		❑	❑ *(u)*
ATTACHMENTS			
Figure 1 Site Location Map		❑	■ *(u)*
Figure 2 Extended Site Map		❑	❑ *(u)*
Figure 3 Site Plan View		❑	■ *(u)*
Figure 4 Site Photos		❑	❑ *(u)*
Figure 5 Groundwater Elevation Map		❑	■ *(u)*
Figure 6 Geological Cross-Section(s)		❑	❑ *(u)*
Figure 7 Groundwater Plume Maps	*		■
Figure 8 Time Series Groundwater Data	*		■
APPENDICES			
Appendix A Chemical Analysis Data Tables		❑	■ *(u)*
Appendix B		❑	❑ *(u)*
(SPECIFY)			

* = ***Required for Tier 2 Evaluation only*** ***(u) = For Tier 2, update Tier 1 version as needed.***

Site Name: Former Chevron Station #9-1723 | Date Completed: 3/7/97

Site Location: 9757 San Leandro, St., Oakland CA | Completed By: Curt Peck, CRTC | *Page 1 of 1*

TIER 2 EXECUTIVE SUMMARY CHECKLIST

TIER 2 SSTL CALCULATION METHOD (■ OR ● TO SELECT)

SSTL Calculation Option

- ☐ Option 1: Site-Specific Screening Levels
- ■ Option 2: Individual Constituent SSTL Values
- ☐ Option 3: Cumulative Constituent SSTL Values

NAF Calculation Method

- ☐ Fate and Transport Modeling:
  - ● RBCA Spreadsheet System
  - ○ Other Model(s)
- ☐ Empirical NAF Calculation

SITE DATA INVENTORY

Source Zone Investigation Complete:

- ☐ Surface Soil (e.g., ≥ 3 ft BGS)
- ■ Subsurface Soil (e.g., > 3 ft BGS)
- ■ Groundwater

Exposure Pathway Information Compiled:

- ■ Air Pathway
- ☐ Groundwater Pathway
- ☐ Soil Pathway
- ☐ Surface Water Pathway
- ☐ Land Use Classification (on-site and off-site)

TIER 1 WORKSHEETS 1.3 - 4.2 AND 5.2 - 5.6 HAVE BEEN UPDATED TO INCLUDE NEW TIER 2 INFORMATION.

TASKS COMPLETED

- ☐ Tier 1 Evaluation
- ☐ Tier 1 Interim Corrective Action
- ■ Tier 2 Evaluation
- ☐ Tier 2 Interim Corrective Action
- ☐ Tier 2 Final Corrective Action
- ☐ Tier 3 Evaluation

CURRENT SITE CLASSIFICATION

Classification No.	Scenario Description	Prescribed Interim Action	Date Implemented

TIER 2 CORRECTIVE ACTION CRITERIA

Affected Medium	Tier 2 SSTL Exceeded ?		Applicable Excess Risk Limits (specify value)				Other Applicable Exposure Limit
	Yes	No	Indiv. Risk	Total Risk	Hazard Index	Hazard Quotent	*(specify, if any)*
• Surface Soil (≤ 3ft BGS)	☐	☐					
• Subsurface Soil (>3ft BGS)	☐	■	10^{-5}	10^{-5}	1.0		
• Groundwater	☐	■	10^{-5}	10^{-5}	1.0		

Soil SSTLs over exceeded

PROPOSED ACTION

- ☐ ***No Action:*** Tier 2 SSTLs not exceeded. Apply for closure.
- ☐ ***Interim Corrective Action:*** Address principal, near-term risks sources.
- ■ ***Final Corrective Action:*** Remediate/control site to meet Tier 2 criteria.
- ☐ ***Tier 3 Evaluation:*** Improve baseline risk and SSTL estimates.

NOTE:

Rationale for proposed action documented on Worksheets 1.3 and 10.1-10.3.

ALL WORKSHEETS ENCLOSED IN THIS REPORT ARE IDENTIFIED ON THE TABLE OF CONTENTS FORM

Site Name: Former Chevron Station #9-1723 Date Completed: 3/17/97

Site Location: 9757 San Leandro St., Oakland CA Completed By: Curt Peck, CRTC

EXECUTIVE SUMMARY DISCUSSION

Instructions: ***Provide brief description of site history, hydrogeologic conditions, ecological assessment, possible exposure pathways, RBSL / SSTL results, and the scope of work for proposed corrective action activity. Address proposed methods, implementation schedule, cost, and anticipated risk reduction at or near the site.***

SITE DESCRIPTION AND HISTORY

• **Worksheets 2.1 - 2.5** • **Figures 1 - 4**

Briefly discuss site chronology, operations, features of potential concern, and future plans for site use.

N/A

SITE ASSESSMENT INFORMATION

GEOLOGIC AND HYDROGEOLOGIC SUMMARY

• **Worksheets 3.1 - 3.4** • **Figures 5 and 6**

Briefly describe regional site features, climate, vadose zone soils, and groundwater depth, quality, and use.

N/A

BASELINE EXPOSURE ASSESSMENT

COMPLETE EXPOSURE PATHWAYS AND APPLICABLE RECEPTORS

• **Worksheets 4.1 - 4.5**

Discuss current or potentially complete pathways for human or ecological exposure to site constituents.

There are no current complete exposure pathways. Potentially complete future exposure pathways include:
1) Onsite commercial worker inhalation of indoor air (Vapor intrusion to buildings from subsurface soil)
2) Onsite commercial worker inhalation of indoor air (Vapor intrusion to buildings from groundwater)

There are no identified complete ecological exposure pathways

ECOLOGICAL ASSESSMENT SUMMARY

• **Worksheet 3.5**

Discuss potentially sensitive ecological receptors and habitat in the vicinity of site, if any.

Potentially sensitive ecological receptors are not known.

Site Name: Former Chevron Station #9-1723 Date Completed: 3/17/97

Site Location: 9757 San Leandro St., Oakland CA Completed By: Curt Peck, CRTC

EXECUTIVE SUMMARY DISCUSSION Continued

TIER 1 RBSL OR TIER 2 SSTL EVALUATION

COMPARISON TO SOURCE MEDIA CONCENTRATIONS

- **Worksheets 5.1 - 5.7** - **Figures 7 and 8**

For complete pathways, compare representative source concentrations to applicable RBSL or SSTL values.

Calculated SSTL soil concentration at a 1 x 10^{-5} risk level for exposure to benzene vapors from soil was 0.45 mg/Kg. The calculated SSTL groundwater concentration at a 1 x 10^{-5} risk level for exposure to benzene vapors from groundwater was 6.7 mg/L. Representative arithmetic soil benzene concentration of 5.8 mg/Kg exceeded the SSTL for soil. The representative arithmetic groundwater benzene concentration of 0.137 mg.L was below the SSTL for groundwater.

QUALITATIVE UNCERTAINTY ASSESSMENT

- **Worksheets 4.2, 4.4, and 5.1 - 5.7**

Discuss uncertainty / conservatism of the site data and calculation methods used in deriving RBSL or SSTL values.

The potential for human health or ecological exposure to hydrocarbon impacted soil, air and groundwater is minimal at this site because the calculated SSTL values maintain a degree of conservatism that would be protective of human health and the environment. The SSTL values were calculated for a 1 x 10^{-5} Target Risk (commercial worker) and it is very unlikely that this property would ever be residential. The vapor inhalation equations contained in this software package tend to err on the conservative side of default parameters and it is likely that generated values represent maximum expected risks. The arithmetic average of the soils data is highly biased by the 99 mg/Kg sample result in SB-10 and is one of the main reasons that the site exceeds the 1 x 10^{-5} Target Risk value.

can the 99 ppm be eliminated from calculation?

PROPOSED CORRECTIVE ACTION

- **Worksheets 10.1 - 10.3**

Describe rationale for proposed action (i.e., no action, interim action, final action, or tier upgrade), considering site classification and land use. Discuss basis for remedy selection, if applicable.

Based on the results of this risk based site review, the vapors from benzene in the capillary zone of the site soils may pose a potential future health threat to future commercial workers at the site. Because excavation of the site is not warranted, it is recommended that the site have institutional controls placed on it to reduce the future commercial worker exposure to calculated benzene vapors from site soils. These controls may range from limiting development directly over the impacted soils to placement of a vapor barrier beneath any future site development. In addition, the groundwater monitoring data indicates a stable to shrinking BTEX plume and the residual groundwater contamination does not pose a health threat to potential future occupants through the vapor inhalation pathway. Additionally, natural attenuation of residual hydrocarbons will continue to decrease contaminant concentrations.

Continued groundwater monitoring on a semi-annual to annual basis of site wells MW-2, -5, -6, -8, -9 and MW-11 is recommended.

REFERENCE DOCUMENTS

- **Appendices**

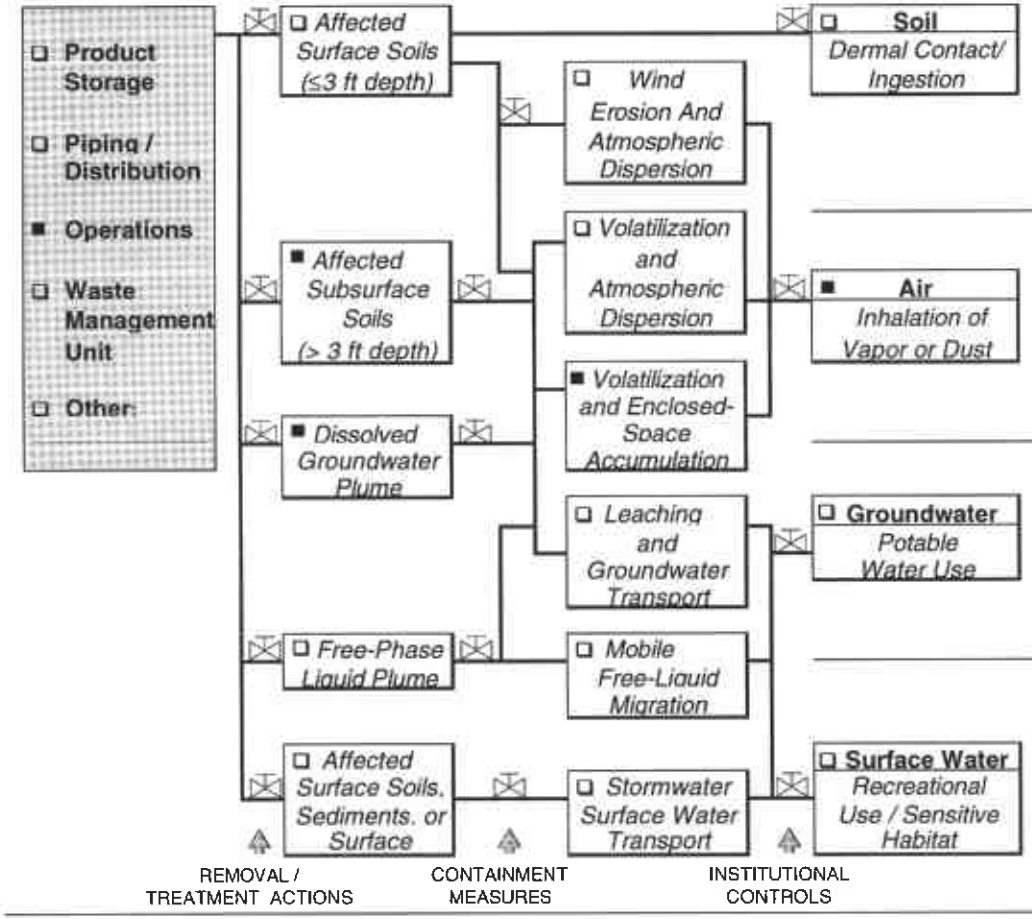
List the document sources for the data cited in this report.

1) Blaine Tech Groundwater Monitoring Reports - submitted 1/24/97
2) Fluor-Daniel GTI Soil Analytical Results - 5/15/96 Report
3) Fluor-Daniel GTI Soil Physical Parameter Results - 5/15/96 Report
4) Arithmetic Groundwater Concentration Calculations - C. Peck 3/97

Site Name: Former Chevron Station #9-1723 | Date Completed: 3/7/97
Site Location: 9757 San Leandro St., Oakland CA | Completed By: Curt Peck, CRTC

EXPOSURE CONTROL FLOWCHART

Instructions: *Identify remedial measures to be implemented to prevent exposure, as follows:* • Step 1 – *Baseline Exposure*: *Identify applicable sources, transport mechanisms, and receptors as shown on Worksheet 4.2 (■ = applicable to site).* • Step 2 – *Remedial Measures*: *Fill in shut-off valves (⋈) to indicate removal / treatment action, containment measure, or institutional controls to be used to "shut off" exposure pathway.* • Step 3 – *Remedial Technology Options*: *For each complete pathway, identify category of corrective measure to be applied and list possible technology options in space provided (see options list in RBCA Guidance Manual).*



POTENTIAL RECEPTORS

Exposed Receptors

On-Site: ☐ Residential ☐ Non-Resid. ☐ N/A ☐ Sensitive ☐ Recreation Habitat

Off-Site: ☐ Residential ☐ Non-Resid. ☐ N/A ☐ Sensitive ☐ Recreation Habitat

Exposed Persons

On-Site: ☐Residential ■ Non-Resid. ☐ N/A

Off-Site: ☐Residential ☐ Non-Resid. ☐ N/A

Groundwater Users

On-Site: ☐Residential ☐ Non-Resid. ☐ N/A

Off-Site: ☐Residential ☐ Non-Resid. ☐ N/A

Surface Water Users

On-Site: ☐ Residential ☐ Non-Resid. ☐ N/A ☐ Sensitive ☐ Recreation Habitat

Off-Site: ☐ Residential ☐ Non-Resid. ☐ N/A ☐ Sensitive ☐ Recreation Habitat

REMEDIAL ACTION TECHNOLOGY OPTIONS

☐ Complete Pathway: ○ *Current* ○ *Potential*
⋈ Action Required: ☐Yes ☐ No
If yes, list technology options for ⋈:

☐ Complete Pathway: ○ *Current* ● *Potential*
⋈ Action Required: ☐Yes ■ No
If yes, list technology options for ⋈:

☐ Complete Pathway: ○ *Current* ○ *Potential*
⋈ Action Required: ☐Yes ☐ No
If yes, list technology options for ⋈:

☐ Complete Pathway: ○ *Current* ○ *Potential*
⋈ Action Required: ☐Yes ☐ No
If yes, list technology options for ⋈:

(■ OR ● OR ⋈ TO SELECT)

Site Name: Former Chevron Station #9-1723 | Date Completed: 3/7/97

Site Location: 9757 San Leandro St., Oakland CA | Completed by: Curt Peck, CRTC

BASELINE EXPOSURE FLOWCHART

Instructions: *To characterize baseline exposure conditions, check boxes to identify applicable primary sources, secondary sources (affected media), potential transport mechanisms, and current or potential exposure pathways and receptors (■ = applicable to site). Identify types(s) of both on-site and off-site receptors, if applicable. Provide detailed information on complete pathways, exposure factors, and risk goals on Worksheets 4.3 - 4.5.*

PRIMARY SOURCES	SECONDARY SOURCES	TRANSPORT MECHANISMS	EXPOSURE PATHWAY	POTENTIAL RECEPTORS	COMPLETE PATHWAY?
❑ Product Storage ❑ Piping / Distribution ■ Operations ❑ Waste Management Unit ❑ Other:	❑ Affected Surface Soils (≤3 ft depth)	❑ Wind Erosion and Atmospheric Dispersion	❑ Soil Dermal Contact/ Ingestion	**Exposed Receptors** On-Site: ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation Off-Site: ❑ Residential ❑ Non-Resid. ■ ❑ Sensitive Habitat ❑ Recreation	■ No ❑ Yes ○ Current ○ Potential ■ No ❑ Yes ○ Current ○ Potential
	■ Affected Subsurface Soils (> 3 ft depth)	❑ Volatilization and Atmospheric Dispersion	■ Air Inhalation of Vapor or Dust	**Exposed Persons** On-Site: ❑ Residential ■ Non-Resid. ❑ N/A Off-Site: ❑ Residential ❑ Non-Resid. ■ N/A	❑ No ■ Yes ○ Current ■ Potential ■ No ❑ Yes ○ Current ○ Potential
	■ Dissolved Groundwater Plume	■ Volatilization and Enclosed-Space Accumulation			
		❑ Leaching and Groundwater Transport	❑ Groundwater Potable Water Use	**Groundwater Users** On-Site: ❑ Residential ❑ Non-Resid. ■ N/A Off-Site: ❑ Residential ❑ Non-Resid. ■ N/A	■ No ❑ Yes ○ Current ○ Potential ■ No ❑ Yes ○ Current ○ Potential
	❑ Free-Phase Liquid Plume	❑ Mobile Free-Liquid Migration			
	❑ Affected Surface Soils, Sediments, or Surface Water	❑ Stormwater/ Surface Water Transport	❑ Surface Water Recreational Use / Sensitive Habitat	**Surface Water Users** On-Site: ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation Off-Site: ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation	■ No ❑ Yes ○ Current ○ Potential ■ No ❑ Yes ○ Current ○ Potential

(■ OR ● TO SELECT)

MAKE ZAPF NOT ITALICS

Site Name: Former Chevron Station #9-1723 | Date Completed: 3/7/97

Site Location: 9757 San Leandro St., Oakland CA | Completed By: Curt Peck, CRTC

TIER 2 EXPOSURE PATHWAY SCREENING

Instructions: ***Exposure pathways screening involves the following steps:***

1) ***Source Medium:*** *Compare maximum constituent concentration in relevant source medium to applicable Tier 1 RBSL value for designated pathway.*

2) ***Transport Mechanism:*** *Transport is active at site if: a) relevant source medium is affected, b) exposure medium or receptor exists, and c) constituent transport from source to receptor could occur under current or anticipated future use.*

3) ***Exposure Medium:*** *For pathways under steady-state transport conditions (e.g., air), compare measured COC concentration at POE to applicable Tier 1 exposure limit for air, groundwater, or soil. Surface water concentrations should be compared to applicable state or federal water quality criteria.*

4) ***Complete Pathway:*** *For screening, pathway considered complete if "Yes" reported in Column A and either Column B or C.*

Notes:

RBSL = Risk-Based Screening Level

POE = Point of Exposure

COC = Constituent of Concern

NM = Not Measured

PATHWAY	A) SOURCE MEDIUM: Type	A) SOURCE MEDIUM: Pathway Tier 1 RBSL Exceeded?	B) TRANSPORT MECHANISM: Type	B) TRANSPORT MECHANISM: Active at Site?	C) EXPOSURE MEDIUM: Type	C) EXPOSURE MEDIUM: Exposure Limit Exceeded at POE?	COMPLETE PATHWAY? (Check if yes & specify status)
AIR EXPOSURE PATHWAYS (■ TO SELECT)							
1) ***Surface Soils:*** Vapor Inhalation and Dust Ingestion	Surface Soil	☐ Yes ☐ No	Volatilization /Dust Transport	■ No ☐ Yes - Current ☐ Yes - Future	Ambient Air	■ NM ☐ No ☐ Yes	☐ Current ☐ Potential
2) ***Subsurface Soils:*** Volatilization to Ambient Air	Subsurface Soil	☐ Yes ☐ No	Volatilization	■ No ☐ Yes - Current ☐ Yes - Future	Ambient Air	■ NM ☐ No ☐ Yes	☐ Current ☐ Potential
3) ***Subsurface Soils:*** Volatilization to Enclosed Space	Subsurface Soil	☐ Yes ■ No	Volatilization	☐ No ☐ Yes - Current ■ Yes - Future	Indoor Air	☐ NM ■ No ☐ Yes	☐ Current ■ Potential
4) ***Groundwater:*** Volatilization to Ambient Air	Groundwater	☐ Yes ☐ No	Volatilization	■ No ☐ Yes - Current ☐ Yes - Future	Ambient Air	■ NM ☐ No ☐ Yes	☐ Current ☐ Potential
5) ***Groundwater:*** Volatilization to Enclosed Space	Groundwater	☐ Yes ■ No	Volatilization	☐ No ☐ Yes - Current ■ Yes - Future	Indoor Air	☐ NM ■ No ☐ Yes	☐ Current ■ Potential
GROUNDWATER EXPOSURE PATHWAYS							
6) ***Soil:*** Leaching to Groundwater: Ingestion	Surface or Subsurface Soils	☐ Yes ☐ No	Leaching /Groundwater Flow	■ No ☐ Yes - Current ☐ Yes - Future	Groundwater	■ NM ☐ No ☐ Yes	☐ Current ☐ Potential
7) ***Dissolved or Free-Phase Groundwater Plume:*** Ingestion	Groundwater	☐ Yes ☐ No	Groundwater Flow	■ No ☐ Yes - Current ☐ Yes - Future	Groundwater	■ NM ☐ No ☐ Yes	☐ Current ☐ Potential
SOIL EXPOSURE PATHWAY							
8) ***Surface Soils:*** Dermal Contact /Ingestion	Surface Soil	☐ Yes ☐ No	Direct Contact	☐ No ☐ Yes - Current ■ Yes - Future	Soil	■ NM ☐ No ☐ Yes	☐ Current ☐ Potential

Site Name: Former Chevron Station #9-1723 Date Completed: 3/7/97

Site Location: 9757 San Leandro St., Oakland CA Completed By: Curt Peck, CRTC

TIER 2 EXPOSURE PATHWAY SCREENING *CONTINUED*

PATHWAY	A) SOURCE MEDIUM: Type	Pathway Tier 1 RBSL Exceeded?	B) TRANSPORT MECHANISM: Type	Active at Site?	C) EXPOSURE MEDIUM: Type	Exposure Limit Exceeded at POE?	COMPLETE PATHWAY? (Check if yes & specify status)
SURFACE WATER PATHWAYS							
9) *Soil:* Leaching to Groundwater /Discharge to Surface Water: Recreation or Fish	Surface or Subsurface Soils	☐ Yes ■ No	Leaching /Groundwater Flow	■ No ☐ Yes - Current ☐ Yes - Future	Surface Water	■ NM ☐ No ☐ Yes	☐ Current ☐ Potential
10) *Groundwater Plume:* Discharge to Surface Water: Recreation or Fish	Groundwater	☐ Yes ■ No	Groundwater Flow	■ No ☐ Yes - Current ☐ Yes - Future	Surface Water	■ NM ☐ No ☐ Yes	☐ Current ☐ Potential
11) *Soil :* Leaching to Stormwater / Discharge to Surface Water: Recreation or Fish	Surface Soils	☐ Yes ■ No	Overland Flow	■ No ☐ Yes - Current ☐ Yes - Future	Surface Water	■ NM ☐ No ☐ Yes	☐ Current ☐ Potential

Additional Information: ***Provide necessary background discussion for data provided above. Also, if ecological exposure pathway identified on Worksheet 3.5, identify relevant source medium, transport mechanism, exposure medium, and receptor type below.***

Site Name: Former Chevron Station #9-1723 | Date Completed: 3/7/97

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TIER 2 EXPOSURE SCENARIOS AND RISK GOALS

Instructions: ***For each exposure pathway, indicate i) Point of Exposure (POE) location (on-site, off-site, or both), ii) applicable exposure scenario at each POE (residential or commercial / industrial), and iii) applicable risk goals. Distance from source corresponds to shortest lateral distance to applicable POE from point of maximum COC concentration in source medium along possible migration pathway. Provide exposure limit information if applicable (e.g., OSHA Limits, MCLs, etc.).*** *(■ TO SELECT)*

EXPOSURE PATHWAY	DISTANCE FROM SOURCE	EXPOSURE SCENARIO AT POE	TARGET RKSKS AT POE: Individual Constituent Effects — Indiv. Risk	Individual Constituent Effects — HQ	Cumulative Constituent Effects — Additive Risk	Cumulative Constituent Effects — HI	Other Exposure Limit (specify if applicable)
AIR EXPOSURE PATHWAYS	■ COMPLETE (provide data)	❑ NOT COMPLETE (skip to next pathway)					
■ On-Site POE	0 ft	❑ Residential / ■ Commercial /Industrial	10^{-5}	1.0			❑ PEL/TLV
❑ Off-Site POE	____ ft	❑ Residential / Commercial /Industrial					❑ PEL/TLV
GROUNDWATER EXPOSURE PATHWAYS	■ COMPLETE (provide data)	❑ NOT COMPLETE (skip to next pathway)					
■ On-Site POE	0 ft	❑ Residential / ❑ Commercial /Industrial					❑ MCL
❑ Off-Site POE	____ ft	❑ Residential / Commercial /Industrial					❑ MCL
SOIL EXPOSURE PATHWAY	❑ COMPLETE (provide data)	■ NOT COMPLETE (skip to next pathway)					
■ On-Site POE: (at source)		❑ Residential / ■ Commercial /Industrial	10^{-5}	1.0			❑ ____
❑ Off-Site POE (at source)		❑ Residential / Commercial /Industrial					❑ ____
SURFACE WATER EXPOSURE PATHWAYS	❑ COMPLETE (provide data)	■ NOT COMPLETE (skip to next pathway)					
❑ On-Site POE:	____ ft	❑ Recreational / Ecological *(specify exp. limit only)*					❑ ____
❑ Off-Site POE	____ ft	❑ Recreational / Ecological *(specify exp. limit only)*					❑ ____

ADDITIONAL INFORMATION:

If exposure limit is specified, provide reference for concentration limits to be applied to each COC (e.g., OSHA limits, water quality criteria, etc.):

Site Name: Former Chevron Station #9-1723 | Date Completed: 3/7/97

Site Location: 9757 San Leandro St., Oakland CA | Completed By: Curt Peck, CRTC | *Page 1 of 1*

SITE PARAMETER CHECKLIST FOR RISK-BASED SCREENING LEVELS

Instructions: *For Tier 1 evaluation (generic screening levels), review specified default parameters (*) to ensure values are conservative for site. For Tier 2 Option 1 SSTL calculation (site-specific screening levels), provide site-specific values for sensitive parameters (§). Indicate parameter value used in evaluation by completing check box (■).*

Note: * **Confirm conservatism of these values for Tier 1 evaluation.**

§ **Provide site-specific measurement or estimate for Tier 2 evaluation.**

			Default Value Used		*Site-Specific Value Used*	
Soil Parameters						
	soil type	❑	sandy soil	■	sandy clay/ silt	*§
Θ_T	Soil porosity	❑	0.38 (dim)	■	0.42	§
Θ_{ws}	water content - vadose zone	❑	0.12 (dim)	■	0.133	§
Θ_{as}	air content - vadose zone ($= \Theta_T - \Theta_{ws}$)	❑	0.26 (dim)	■	0.287	
Θ_{wcap}	water content - capillary fringe	❑	0.342 (dim)	■	0.378	
Θ_{acap}	air content - capillary fringe ($= \Theta_T - \Theta_{wcap}$)	❑	0.038 (dim)	■	0.042	
ρ_s	Soil density	❑	1.7 g/cm^3	■	2.03	§
foc	mass fraction of organic carbon in soil	❑	0.01 (dim)	■	0.0014	§
Ls	Depth to contaminated soil	❑	100 cm	■	91 cm	§
Lgw	Depth to groundwater	❑	300 cm	■	280 cm	§
h_{cap}	capillary zone thickness	❑	5 cm	■	28 cm	
hv	vadose zone thickness (= Lgw - hc)	❑	295 cm	■	252 cm	
pH	Soil/water pH	■	6.5	❑		
Groundwater Parameters						
I	Water infiltration rate	■	30 cm/yr	❑		§
V_{gw}	groundwater velocity	■	82.0 ft/yr	❑		*§
δ_{gw}	groundwater mixing zone depth	■	200 cm	❑		*§
DF	aquifer dilution factor ($= 1 + V_{gw}\,\delta_{gw}/(IW)$)	■	12.1	❑		
Surface Parameters						
U_{air}	Amb. air velocity in mixing zone	■	225 cm/s	❑		*§
δ_{air}	Mixing zone height	■	200 cm	❑		*§
A	Contaminated Area	■	2250000 cm^2	❑		
W	Width of Contaminated Area	■	1500 cm	❑		§
d	Thickness of Surficial Soils	■	100 cm	❑		§
Pe	Particulate areal emission rate	■	2.17E-10 g/cm^2-s	❑		§
Building Parameters						
L_{crack}	Foundation crack thickness	■	15 cm	❑		
η	Foundation crack fraction	■	0.01 (dim)	❑		
Lb_r	Building Volume/Foundation Area Ratio (res.)	❑	200 cm	❑		
Lb_c	Building Volume/Foundation Area Ratio (com./ind.)	■	300 cm	❑		
ER_r	Building vapor volume exchange rate (res.)	■	12 dy^{-1}	❑		
ER_c	Building vapor volume exchange rate (com./ind.)	■	20 dy^{-1}	❑		

Discussion: *Provide rationale for default parameter revision; discuss additional site-specific features of note; etc.*

(continue on next page if needed)

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 5.5** | **SCREEN 7.3 SUBSURFACE SOILS CONCENTRATION CALCULATOR**

Site Name: Former Chevron Station #9-1723 Completed By: Curt Peck
Site Location: 9757 San Leandro St., Oakland CA Date Completed: 2/27/1996

UC

TIER 2 SUBSURFACE SOIL CONCENTRATION DATA SUMMAR (e.g., >3 FT BGS)

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations			Calculated Distribution of Data	Default Detection Limit (mg/L)
CAS No.	Name	Typical Detection Limit (mg/kg)	No. of Samples	No. of Detects	Maximum Conc. (mg/kg)	Mean Conc. (mg/kg)	UCL on Mean Conc. (mg/kg)		
71-43-2	Benzene	5.0E-03	36	34	9.9E+01	5.7E-01	1.2E+00	Lognormal	0.005
100-41-4	Ethylbenzene	5.0E-03	36	30	1.5E+02	6.7E-01	1.8E+00	Lognormal	0.005
108-88-3	Toluene	5.0E-03	36	28	6.8E+01	2.0E-01	5.0E-01	Lognormal	0.005
1330-20-7	Xylene (mixed isomers)	5.0E-03	36	34	2.6E+02	1.9E+00	4.9E+00	Lognormal	0.005

Sample Name
Date Sampled

Serial: g-303-ydx-938 Software: GSI RBCA Spreadsheet

 Version: v 1.0

L Percentile

95% (must be 0.9 or 0.95)

Analytical Data (Up to 50 Data Points)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SB-1-10	SB-2-10	SB-3-10	SB-4-10	SB-4-15	SB-5-10	SB-6-10	SB-7-5	SB-7-10	SB-8-5	SB-8-10	SB-8-15	SB-9-5	SB-9-15	SB-10-5	SB-10-10	SB-10-15	SB-11-5	SB-11-10	SB-12-5	SB-12-10	SB-13-10
4/2/96	4/1/96	4/1/96	4/1/96	4/1/96	4/1/96	4/4/96	4/1/96	4/1/96	4/4/96	4/4/96	4/4/96	4/1/96	4/1/96	4/4/96	4/4/96	4/4/96	4/4/96	4/4/96	4/3/96	4/3/96	4/3/96
1.4	0.18	0.54	0.59	0.091	2.4	0.57	2.2	1.3	1.6	4.6	0.0054	0.6	3.6	3.7	99	0.01	0.012	1.5	ND	1.1	1.8
8.9	0.79	2.3	0.14	0.029	10	0.42	7.7	7	ND	0.76	ND	0.14	17	9.9	150	ND	0.019	9.7	ND	19	7.4
0.44	0.12	0.66	0.52	0.036	1.4	ND	0.58	1.8	ND	1.1	ND	0.16	7.4	8.9	40	0.0051	0.04	ND	ND	4.1	0.81
28	0.52	3.3	1.1	0.23	4.9	2.3	7.9	27	0.79	2.1	0.042	0.82	69	53	210	0.018	0.056	3.2	ND	85	24

23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SB-14-5	SB-14-10	SB-15-5	SB-15-10	SB-16-5	SB-16-10	SB-17-10	SB-18-10	SB-19-10	SB-20-10	SB-21-5	SB-22-5	SB-22-10	SB-23-10		
4/4/96	4/4/96	4/3/96	4/3/96	4/3/96	4/3/96	4/3/96	4/4/96	4/3/96	4/3/96	4/2/96	4/2/96	4/2/96	4/2/96		
0.066	5	0.011	17	0.15	6.2	4.3	5.9	2.3	3.8	ND	0.027	0.72	3.4		
0.097	16	ND	53	0.0069	28	38	2	1.1	17	ND	0.02	4.7	0.66		
0.05	28	0.006	68	ND	1.8	15	4.5	ND	1.5	ND	0.0091	0.47	0.29		
0.067	82	0.15	260	0.028	78	150	5.4	1.5	39	ND	0.015	0.39	4.8		

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 5.6** | **SCREEN 7.1 GROUNDWATER CONCENTRATION CALCULATOR**

Site Name: Former Chevron Station #9-1723 Completed By: Curt Peck
Site Location: 9757 San Leandro St., Oakland C Date Completed: 2/27/1996

Choose

TIER 2 GROUNDWATER CONCENTRATION DATA SUMMARY

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations			Calculated Distribution of Data	Default Detection Limit (mg/L)
CAS No.	Name	Typical Detection Limit (mg/L)	No. of Samples	No. of Detects	Maximum Conc. (mg/L)	Mean Conc. (mg/L)	UCL on Mean Conc. (mg/L)		
71-43-2	Benzene	5.0E-04	38	37	2.0E+00	2.9E-02	5.5E-02	Lognormal	0.0005
100-41-4	Ethylbenzene	5.0E-04	38	28	8.0E-01	7.1E-03	1.4E-02	Lognormal	0.0005
108-88-3	Toluene	5.0E-04	38	23	2.9E+00	2.5E-03	5.1E-03	Lognormal	0.0005
1330-20-7	Xylene (mixed isomers)	5.0E-04	38	29	7.9E+00	1.0E-02	2.3E-02	Lognormal	0.0005

Well Name
Date Sampled

Serial: g-303-ydx-938 Software: GSI RBCA Spreadsheet

 Version: v 1.0

UCL Percentile

95% (must be 0.9 or 0.95)

Analytical Data (Up to 50 Data Points)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
SB-11	SB-19	SB-22				MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5	MW-5
4/4/96	4/3/96	4/2/96				11/2/93	2/10/94	5/12/94	11/11/94	2/1/95	5/18/95	8/2/95	11/1/95	1/31/96	5/16/96	8/1/96	11/2/93	2/10/94	5/12/94	8/26/94	11/11/94
0.21	0.17	0.4				0.043	0.062	0.087	0.018	0.036	0.029	0.0092	0.0056	0.05	0.014	0.0014	0.019	0.01	0.01	0.016	0.0013
0.18	0.021	0.11				0.022	0.05	0.077	0.018	0.021	0.016	0.004	0.0019	0.019	0.017	ND	0.0025	0.002	0.0012	0.0023	ND
0.097	0.03	ND				0.0034	0.003	0.0062	0.001	0.0006	0.001	ND	ND	ND	ND	ND	0.0016	0.0009	0.0011	0.0014	ND
0.4	0.034	0.077				0.012	0.04	0.066	0.011	0.011	0.0098	0.0012	ND	0.029	0.0086	ND	0.005	0.004	0.0031	0.0071	0.001

23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-6	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8	MW-8		
2/1/95	5/18/95	8/2/95	11/1/95	1/31/96	5/16/96	8/1/96	11/2/93	2/10/94	5/12/94	8/26/94	11/11/94	2/1/95	5/18/95	8/2/95	11/1/95	1/31/96	5/16/96	8/1/96		
0.0019	0.0082	0.0023	ND	0.001	0.0016	0.0008	2	1.2	1.4	0.72	0.25	0.068	0.12	0.15	0.12	0.0053	0.26	0.45		
ND	ND	ND	ND	ND	ND	ND	0.42	0.25	0.8	0.33	0.19	0.0027	0.011	0.02	0.016	ND	0.056	0.0089		
ND	ND	ND	ND	ND	ND	ND	0.44	0.36	2.9	0.2	0.17	0.0029	0.012	0.0097	0.015	ND	0.043	0.0009		
0.0005	ND	ND	ND	ND	ND	ND	1.4	7.9	3.8	0.93	0.65	0.0043	0.023	0.04	0.039	ND	0.13	0.025		

Site Name: Former Chevron Station #9-1723 | Date Completed: 3/7/97

Site Location: 9757 San Leandro St., Oakland CA | Completed By: Curt Peck, CRTC

TIER 2 EXPOSURE PATHWAY TRANSPORT PARAMETERS

Instructions: ***For complete exposure pathways, provide site-specific values for transport parameters. In absence of direct measurements, default values may be selected for some parameters, as shown below. If no default value shown, site-specific value must be provided.***

TRANSPORT PARAMETER		SITE-SPECIFIC VALUE (INPUT VALUE BELOW)	DEFAULT VALUE (■ TO SELECT)
AIR PARAMETERS			
δ_{air}	Air mixing zone height (cm)		■ 200
U_{air}	Ambient air velocity in mixing zone (cm/sec)		■ 225
Pe	Soil particulate areal emission rate (g/cm^2-sec)		■ 2.17E-10
σ_y	Transverse air dispersion coeff. (m)		■ 100
σ_z	Vertical air dispersion coeff. (m)		■ 10
GROUNDWATER PARAMETERS			
δ_{gw}	Groundwater mixing zone depth (cm)	150 cm	❑ 200
I	Water infiltration rate (cm/yr)	0.3	❑ 30
V_{gw}	Groundwater Darcy velocity (ft/yr)	100	
K	Saturated hydraulic conductivity (cm/sec)		
i_{grad}	Lateral groundwater flow gradient (dim)		
$(BC)_i$	Available biodegradation capacity of electron acceptors for constituent *i*		
x	Distance to POE from point of maximum COC concentration in groundwater (ft)	0	
α_x	Longitudinal groundwater dispersion coeff. (cm)		■ 10% of x
α_y	Transverse groundwater dispersion coeff. (cm)		■ 33% of α_x
α_z	Vertical groundwater dispersion coeff. (cm)		■ 5% of α_z
SOIL PARAMETERS			
h_{cap}	Capillary zone thickness (cm)	28 cm	❑ 5
h_v	Vadose zone thickness (cm)	252 cm	
ρ_s	Soil bulk density (g/cm^3)	2.03	❑ 1.7
foc_s	Fraction organic carbon in soil leaching zone (dir	0.0014	❑ 0.01
foc_{gw}	Fraction organic carbon in water-bearing unit (di	0.0014	❑ 0.001
Lgw	Depth to groundwater (cm)	280 cm	
Θ_T	Soil porosity (dim)	0.42	❑ 0.38
	Soil volumetric water content (dim)	0.133	
Θ_{wcap}	• Capillary zone	0.378	❑ 0.342
Θ_{ws}	• Vadose zone	0.133	❑ 0.12
Θ_{wcrack}	• Foundation crack	0.133	❑ 0.12

Site Name: Date Completed:

Site Location: Completed By: *Page 2 of 2*

TIER 2 EXPOSURE PATHWAY TRANSPORT PARAMETERS *CONTINUED*

TRANSPORT PARAMETER		SITE-SPECIFIC VALUE (INPUT VALUE BELOW)	DEFAULT VALUE (■ TO SELECT)	
SOIL PARAMETERS (Continued)				
	Soil volumetric air content (dim)	0.287		
Θ_{acap}	•Capillary zone	0.042	❑ 0.038	
Θ_{as}	•Vadose zone	0.287	❑ 0.26	
Θ_{acrack}	•Foundation crack	0.287	❑ 0.26	
d	Thickness of surficial soil zone (cm)	91 cm	❑ 100 cm	
BUILDING PARAMETERS				
			Resid.	Comm/ Ind.
L_b	Building volume/area ratio (cm)		❑ 200	■ 300
ER	Building air exchange rate (dy-1)		❑ 12	■ 20
L_{crack}	Foundation crack thickness (cm)		■ 15	
η	Foundation crack fraction		■ 0.01	

Additional Information:

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 8.3**

Site Name: Former Chevron Station #9-1723 Completed By: Curt Peck
Site Location: 9757 San Leandro St., Oakland CA Date Completed: 2/27/1996

TIER 2 BASELINE RISK SUMMARY TABLE

	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
EXPOSURE PATHWAY	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
AIR EXPOSURE PATHWAYS										
Complete:	1.3E-4	1.0E-5	0.0E+0	N/A	■	0.0E+0	1.0E+0	0.0E+0	N/A	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
SOIL EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
CRITICAL EXPOSURE PATHWAY (Select Maximum Values From Complete Pathways)										
	1.3E-4	1.0E-5	0.0E+0	N/A	■	0.0E+0	1.0E+0	0.0E+0	N/A	☐

NOTE: Calculated Risk is for Arithmetic Average of Soil (5.8mg/Kg) and Groundwater (0.51 mg/L).

Serial: g-303-ydx-9: Software: GSI RBCA Spreadsheet
Version: v 1.0

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Former Chevron Station #9-1723 Former Chevron Station #9-1723 Identification: 9-1723ra
Site Location: 9757 San Leandro St., Oakland 9757 San Leandro St., Oakland Date Completed: 2/27/96
Completed By: Curt Peck

Software: GSI RBCA Spreadsheet
Version: v 1.0

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

DEFAULT PARAMETERS

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

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

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

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

Surface Parameters	Definition (Units)	Residential	Commercial/Industrial Chronic	Commercial/Industrial Construction
t	Exposure duration (yr)	30	25	1
A	Contaminated soil area (cm^2)	2.2E+06		1.0E+06
W	Length of affected soil parallel to wind (cm)	1.5E+03		1.0E+03
W.gw	Length of affected soil parallel to groundwater (cm	1.5E+03		
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02		
delta	Air mixing zone height (cm)	2.0E+02		
Lss	Definition of surficial soils (cm)	***9.1E+01***		
Pe	Particulate areal emission rate (g/cm^2/s)	2.2E-10		

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	***1.5E+02***
I	Groundwater infiltration rate (cm/yr)	***3.0E-01***
Ugw	Groundwater Darcy velocity (cm/yr)	***3.0E+03***
Ugw.tr	Groundwater Transport velocity (cm/yr)	***3.0E+03***
Ks	Saturated Hydraulic Conductivity(cm/s)	
grad	Groundwater Gradient (cm/cm)	
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
BC	Biodegradation Capacity (mg/L)	
BIO?	Is Bioattenuation Considered	FALSE
phi.eff	Effective Porosity in Water-Bearing Unit	3.8E-01
foc.sat	Fraction organic carbon in water-bearing unit	***1.4E-03***

Soil	Definition (Units)	Value		
hc	Capillary zone thickness (cm)	***1.0E+02***		
hv	Vadose zone thickness (cm)	***2.8E+02***		
rho	Soil density (g/cm^3)	***2.03***		
foc	Fraction of organic carbon in vadose zone	***0.0014***		
phi	Soil porosity in vadose zone	***0.42***		
Lgw	Depth to groundwater (cm)	***3.9E+02***		
Ls	Depth to top of affected soil (cm)	***9.1E+01***		
Lsubs	Thickness of affected subsurface soils (cm)	***2.9E+02***		
pH	Soil/groundwater pH	6.5		
		capillary	**vadose**	**foundation**
phi.w	Volumetric water content	***0.378***	***0.133***	***0.133***
phi.a	Volumetric air content	***0.042***	***0.287***	***0.287***

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	0.01	

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

RBCA SITE ASSESSMENT	Tier 2 Worksheet 8.3

Site Name: Former Chevron Station #9-1723 Completed By: Curt Peck
Site Location: 9757 San Leandro St., Oakland CA Date Completed: 2/27/1996

TIER 2 BASELINE RISK SUMMARY TABLE

	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
EXPOSURE PATHWAY	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
AIR EXPOSURE PATHWAYS										
Complete:	2.7E-5	1.0E-5	0.0E+0	N/A	■	0.0E+0	1.0E+0	0.0E+0	N/A	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
SOIL EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
CRITICAL EXPOSURE PATHWAY (Select Maximum Values From Complete Pathways)										
	2.7E-5	1.0E-5	0.0E+0	N/A	■	0.0E+0	1.0E+0	0.0E+0	N/A	☐

NOTE: Calculated Risk is for 95% UCL of Geometic Mean of Soil (1.2 mg/Kg) and Groundwater (0.055 mg/L).

Serial: g-303-ydx-93 Software: GSI RBCA Spreadsheet
Version: v 1.0

RBCA SITE ASSESSMENT | Input Screen 7

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

(Complete the following table)

CONSTITUENT	Representative COC Concentration					
	in Groundwater		in Surface Soil		in Subsurface Soil	
	value (mg/L)	note	value (mg/kg)	note	value (mg/kg)	note
Benzene	5.1E-1	AVG			5.8E+0	AVG
Ethylbenzene	1.7E-1	AVG			1.1E+1	AVG
Toluene	3.2E-1	AVG			5.2E+0	AVG
Xylene (mixed isomers)	1.2E+0	AVG			3.2E+1	AVG

Site Name: Former Chevron Station #9-1723
Site Location: 9757 San Leandro St., Oakland CA

Completed By: Curt Peck
Date Completed: 2/27/1996

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SUBSURFACE SOIL SSTL VALUES (> 3 FT BGS)

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

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2

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

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater			X Soil Volatilization to Indoor Air		Soil Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/kg)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential: (on-site)	Commercial: (on-site)	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	5.8E+0	NA	NA	NA	NA	4.5E-1	NA	NA	4.5E-1	■	1.3E+01
100-41-4	Ethylbenzene	1.1E+1	NA	NA	NA	NA	>Res	NA	NA	>Res	☐	<1
108-88-3	Toluene	5.2E+0	NA	NA	NA	NA	5.3E+1	NA	NA	5.3E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	3.2E+1	NA	NA	NA	NA	>Res	NA	NA	>Res	☐	<1

Software: GSI RBCA Spreadsheet
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Serial: g-303-ydx-938

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name: Former Chevron Station #9-1723
Site Location: 9757 San Leandro St., Oakland CA

Completed By: Curt Peck
Date Completed: 2/27/1996

GROUNDWATER SSTL VALUES

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

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2

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

CONSTITUENTS OF CONCERN		Representative Concentration		Groundwater Ingestion			X	Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		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
71-43-2	Benzene	5.1E-1	NA	NA	NA		NA	6.7E+0	NA	NA	6.7E+0	☐	<1
100-41-4	Ethylbenzene	1.7E-1	NA	NA	NA		NA	>Sol	NA	NA	>Sol	☐	<1
108-88-3	Toluene	3.2E-1	NA	NA	NA		NA	>Sol	NA	NA	>Sol	☐	<1
1330-20-7	Xylene (mixed isomers)	1.2E+0	NA	NA	NA		NA	>Sol	NA	NA	>Sol	☐	<1

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