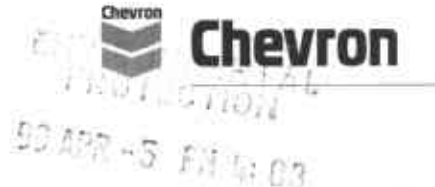


#103



April 1, 1999

Chevron Products Company
6001 Bollinger Canyon Road
Building L, Room 1110
PO Box 6004
San Ramon, CA 94583-0904

Mr. Barney Chan
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Philip R. Briggs
Project Manager
Site Assessment & Remediation
Phone 925 842-9136
Fax 925 842-8370

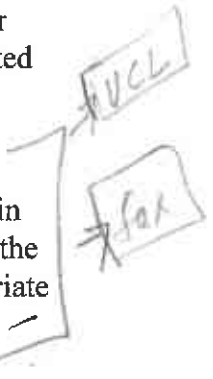
Re: Chevron Service Station #9-0076
4265 Foothill Blvd.
Oakland, California



Dear Mr. Chan:

Enclosed is a letter with attached revised ASTM RBCA calculations to respond to your letter of February 2, 1999, that requested further clarification on the previously submitted risk assessment for the above noted site. Urmas Kelmser of Chevron's CRTC group prepared the letter and calculations.

The concerns that Ms. Madhulla Logan, County risk assessor expressed are addressed in the letter. However, Mr. Kelmser noted that the use of the arithmetic mean rather than the geometric mean for log normally distributed data such as this is not an entirely appropriate use of the tool. This appears to be an area that may need to be discussed between Ms. Logan and Mr. Kelmser.



A question was raised on the omission of the dissolved oxygen (DO) and oxidation-reduction potential (ORP) parameters in the preparing of bio-parameter charts. Since the last sampling event for bio-parameters was conducted 3/12/98, Chevron will sample for bio-parameters in the next sampling event including DO and ORP. From this information, new bio-parameter charts will be prepared to determine if intrinsic bio-remediation is occurring at this site.

Appreciate you allowing us to extend the response time to your questions until April 1, 1999.

March 30, 1999
Mr. Barney Chan
Chevron Service Station #9-0076
Page 2

If you have any questions or comments, call me at (925) 842-9136 or Urmias Kelmser at (510) 242-5953.

Sincerely,
CHEVRON PRODUCTS COMPANY



Philip R. Briggs
Site Assessment and Remediation Project Manager

Enclosure

CC. Ms. K. Petryna
Equiva Services LLC
PO Box 6249
Carson, CA 90749-6249

Mr. Scott Hooton
BP Oil Company
295 SW 41st Street
Renton, WA 98055-4931

American Stores Properties, Inc.
348 East South Temple Street
Salt Lake City, UT 84111
Attn. Barbara Russell

Mr. Bill Scudder, Chevron

Mr. Urmias Kelmser, Chevron, CRTC, RIC 100/10-36

March 31, 1999
Richmond, California

Response to Comments
RBCA Evaluation
Indoor Inhalation from Soil and Groundwater
Chevron Service Station #9-0076
4265 Foothill Boulevard
Oakland, California

Mr. Phil Briggs:
San Ramon, California

This letter serves to respond to Mr. Barney Chan's, Alameda County Health Care Services Department, request for further clarification on the previously submitted risk assessment for the above site.

Regarding the RBCA, the concerns that were recounted for County risk assessor, Ms Madhulla Logan are addressed with the attached revised ASTM RBCA calculations. Specifically:

- The California slope factor of 0.1, not the default of 0.029 is used in these calculations.
- Two separate risk scenarios for residential indoor air inhalation were calculated. One, representing onsite conditions, using soil and groundwater data from wells C-2, C-3, C-4 and C5, the other, representing offsite conditions, using soil and groundwater data from wells C-6, C-7, C-8 and C-9.
- The estimated risk associated with residential exposure to indoor air inhalation for the onsite data set is $4.1e-4$. The estimated risk associated with residential exposure to indoor air inhalation for the offsite data set is $9.0e-6$. Both values are above the $1e-6$ estimated risk value considered acceptable for residential exposure. These results show a higher risk value than the previously submitted assessment primarily because an arithmetic average of the soil and groundwater concentration data was used (rather than a 95% upper confidence limited geometric mean of the data). Using the arithmetic mean rather than the geometric mean for log normally distributed data such as this is not an entirely appropriate use of the tool. The use of California slope factor also raises the risk values but to a lesser degree.
- The two spoils samples, SP1A-D and SP2-A-D were removed from screen 7.3.
- Arithmetic averages for soil and groundwater data for the four quarters of 1997 and the first quarter of 1998 were used in the GSI evaluation.

Regarding the charts of bio-parameters versus BTEX concentrations, I would agree that a chart of BTEX vrs dissolved oxygen and RED-OX potential would be a useful tool and I will plot these when more DO data is available.

The concentrations for the specific parameters used in the graphs were derived from the 3/12/98 sampling event. They are the actual measured values except for the BTEX values, which are the sum of the B, T, E, and X value for the particular well.

Please contact me at 242-5953 with any questions or comments.

Sincerely,

Urmas Kelmser

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Chevron #9-0076 Onsite (Analysis) Identification: #9-0076 Software: GSI RBCA Spreadsheet
 Site Location: 4265 Foothill Blvd, Oakland CA Date Completed: 5/21/1998 Version: 1.0.1
 Completed By: Curtis A. Peck modified by U.K. 3/99

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

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

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

Groundwater Parameters	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	2.5E+03
Ugw.lr	Groundwater seepage velocity (cm/yr)	6.6E+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)	
phi.eff	Effective porosity in water-bearing unit	3.8E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is biotenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil Parameters	Definition (Units)	Value
hc	Capillary zone thickness (cm)	<u>6.7E+01</u>
hv	Vadose zone thickness (cm)	<u>5.4E+02</u>
rho	Soil density (g/cm ³)	1.7
foc	Fraction of organic carbon in vadose zone	0.01
phi	Soil porosity in vadose zone	0.38
Lgw	Depth to groundwater (cm)	<u>8.0E+02</u>
Ls	Depth to top of affected subsurface soil (cm)	<u>1.2E+02</u>
Lsubs	Thickness of affected subsurface soils (cm)	<u>4.9E+02</u>
pH	Soil/groundwater pH	6.5
		<u>capillary</u> <u>vadose</u> <u>foundation</u>
phi.w	Volumetric water content	0.342 0.12 0.12
phi.a	Volumetric air content	0.038 0.26 0.26

Building Parameters	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	

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

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

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

Matrix of Target Risks	Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	1.0E-06
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

RBCA CHEMICAL DATABASE

Physical Property Data

CAS Number	Constituent	type	Molecular Weight (g/mole)		Diffusion Coefficients (cm ² /s)			log (Koc) or log(Kd) (@ 20 - 25 C)		Henry's Law Constant (@ 20 - 25 C)		Vapor Pressure (@ 20 - 25 C) (mm Hg)		Solubility (@ 20 - 25 C) (mg/L)		acid	base	
			MW	ref	Dair	ref	Dwat	ref	log(l/kg)	ref	mol	(unitless)	ref	ref	pKa	pKb	ref	
71-43-2	Benzene	A	78.1	5	9.30E-02	A	1.10E-05	A	1.58	A	5.29E-03	2.20E-01	A	9.52E+01	4	1.75E+03	A	
100-41-4	Ethylbenzene	A	106.2	5	7.60E-02	A	8.50E-06	A	1.98	A	7.69E-03	3.20E-01	A	1.00E+01	4	1.52E+02	5	
1634-04-4	Methyl t-Butyl Ether	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	A	5.77E-04	2.40E-02		2.49E+02		4.80E+04	A	
108-88-3	Toluene	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	A	6.25E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29	
1330-20-7	Xylene (mixed isomers)	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	A	6.97E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5	

Site Name: Chevron #9-0076 Onsite (Arith Av Site Location: 4265 Foothill Blvd, Oakla Completed By: Curtis A. Peck modifiedDate Completed: 5/21/1998

Software version: 1.0.1

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RBCA CHEMICAL DATABASE

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day)			Slope Factors 1/(mg/kg/day)			EPA Weight of Evidence	Is Constituent Carcinogenic ?
		Oral RfD_oral	Inhalation ref RfD_inhal	ref	Oral SF_oral	Inhalation ref SF_inhal	ref		
71-43-2	Benzene	-	1.70E-03	R	2.90E-02	A	1.00E-01	A	TRUE
100-41-4	Ethylbenzene	1.00E-01	A 2.86E-01	A	1.0E-01	-	-	D	FALSE
1634-04-4	Methyl t-Butyl Ether	5.00E-03	R 8.57E-01	R	-	-	-	D	FALSE
108-88-3	Toluene	2.00E-01	A,R 1.14E-01	A,R	-	-	-	D	FALSE
1330-20-7	Xylene (mixed isomers)	2.00E+00	A,R 2.00E+00	A	-	-	-	D	FALSE

Site Name: Chevron #9-0076 Onsite (ArSite Location: 4265 Foothill Blvd, OakCompleted By: Curtis A. Peck modifDate Completed: 5/21/1998

Software version: 1.0.1

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RBCA CHEMICAL DATABASE

Miscellaneous Chemical Data

CAS Number	Constituent	Maximum Contaminant Level		Permissible Exposure Limit PEL/TLV		Relative Absorption Factors		Detection Limits			Half Life (First-Order Decay)		ref	
		MCL (mg/L)	reference	(mg/m3)	ref	Oral	Dermal	Groundwater (mg/L)	Soil (mg/kg)	Saturated	Unsaturated			
71-43-2	Benzene	5.00E-03	52 FR 25890	3.20E+00	OSHA	1	0.5	0.002	C	0.005	S	720	720	H
100-41-4	Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.002	C	0.005	S	228	228	H
1634-04-4	Methyl t-Butyl Ether			1.44E+02	ACGIH	1	0.5					360	180	H
108-88-3	Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	1	0.5	0.002	C	0.005	S	28	28	H
1330-20-7	Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.005	C	0.005	S	360	360	H

Site Name: Chevron #9-0076 Onsite (A) Site Location: 4265 Foothill Blvd, Oakland CA

Completed By: Curtis A. Peck mDate Completed: 5/21/1998

Software version: 1.0.1

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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	3.1E+0	Arith			1.2E+0	Arith
Ethylbenzene	7.9E-1	Arith			6.5E-1	Arith
Methyl t-Butyl Ether	1.6E+0	Arith			6.4E+0	Arith
Toluene	1.5E+0	Arith			4.5E+0	Arith
Xylene (mixed isomers)	2.1E+0	Arith			1.1E+1	Arith

Site Name: Chevron #9-0076 Onsite (Arith Avg)
 Site Location: 4265 Foothill Blvd, Oakland CA

Completed By: Curtis A. Peck modified by U.K. 3/99
 Date Completed: 5/21/1998

Site Name: Chevron #9-0076, Onsite (Arith Avg)

Site Location: 4265 Foothill Blvd, Oakland CA

Completed By: Curtis A. Peck mDate Completed: 5/21/1998

4 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS:

VAPOR INTRUSION TO BUILDINGS

Constituents of Concern	Exposure Concentration					5) Average Daily Intake Rate (mg/kg-day) (3) X (4)
	1) Source Medium	2) NAF Value (m ³ /kg) Receptor		3) Exposure Medium	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (m ³ /kg-day)	
	Subsurface Soil Conc. (mg/kg)	On-Site Residential		On-Site Residential	On-Site Residential	
Benzene	1.2E+0	3.2E+1		3.9E-2	8.8E-2	3.4E-3
Ethylbenzene	6.5E-1	3.2E+1		2.0E-2	2.1E-1	4.2E-3
Methyl t-Butyl Ether	6.4E+0	5.9E+1		1.1E-1	2.1E-1	2.2E-2
Toluene	4.5E+0	3.8E+1		1.2E-1	2.1E-1	2.4E-2
Xylene (mixed isomers)	1.1E+1	7.0E+1		1.5E-1	2.1E-1	3.2E-2

NOTE: ABS = Dermal absorption factor (dim)
AF = Adherence factor (mg/cm²)
AT = Averaging time (days)

BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)

EF = Exposure frequency (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m³/day)

POE = Point of exposure
SA = Skin exposure area (cm²/day)

Site Name: Chevron #9-0076 Onsite (Arith Avg)

Site Location: 4265 Foothill Blvd, Oakland CA Completed By: Curtis A. Peck modified by Date Completed: 5/21/1998

5 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS <input checked="" type="checkbox"/> (CHECKED IF PATHWAY IS ACTIVE)							
GROUNDWATER: VAPOR INTRUSION TO BUILDINGS	Exposure Concentration					TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from subsurface & groundwater routes.)	
	1) Source Medium	2) NAF Value (m ³ /L) Receptor	3) Exposure Medium Indoor Air: POE Conc. (mg/m ³) (1) / (2)	4) Exposure Multiplier (IR*EF*ED)/(BW*AT) (m ³ /kg-day)	5) Average Daily Intake Rate (mg/kg-day) (3) X (4)		
Constituents of Concern	Groundwater Conc. (mg/L)	On-Site Residential	On-Site Residential	On-Site Residential	On-Site Residential	On-Site Residential	
Benzene	3.1E+0	3.9E+2	7.8E-3	8.8E-2	6.9E-4	4.1E-3	
Ethylbenzene	7.9E-1	3.9E+2	2.0E-3	2.1E-1	4.2E-4	4.6E-3	
Methyl t-Butyl Ether	1.6E+0	4.8E+2	3.4E-3	2.1E-1	7.0E-4	2.3E-2	
Toluene	1.5E+0	4.0E+2	3.7E-3	2.1E-1	7.7E-4	2.5E-2	
Xylene (mixed isomers)	2.1E+0	4.3E+2	4.8E-3	2.1E-1	9.9E-4	3.3E-2	

NOTE: ABS = Dermal absorption factor (dim) BW = Body weight (kg) EF = Exposure frequency (days/yr) POE = Point of exposure
 AF = Adherence factor (mg/cm²) CF = Units conversion factor ET = Exposure time (hrs/day) SA = Skin exposure area (cm²/day)
 AT = Averaging time (days) ED = Exposure duration (yrs) IR = Inhalation rate (m³/day)

Site Name: Chevron #9-0076 Onsite (Arith A Site Location: 4265 Foothill Blvd, Oakland CA

Completed By: Curtis A. Peck modified by U.K Date Completed: 5/21/1998

2 OF 4

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAYS ARE ACTIVE)

Constituents of Concern	CARCINOGENIC RISK				TOXIC EFFECTS			
	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site Residential	(3) Inhalation Slope Factor (mg/kg-day) ⁻¹	(4) Individual COC Risk (2) x (3) On-Site Residential	(5) Total Toxicant Intake Rate (mg/kg/day) On-Site Residential	(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site Residential	
Benzene	A	4.1E-3	1.0E-1	4.1E-4	9.6E-3	1.7E-3	5.7E+0	
Ethylbenzene	D				4.8E-3	2.9E-1	1.6E-2	
Methyl t-Butyl Ether					2.3E-2	8.6E-1	2.7E-2	
Toluene	D				2.5E-2	1.1E-1	2.2E-1	
Xylene (mixed isomers)	D				3.3E-2	2.0E+0	1.6E-2	

Total Pathway Carcinogenic Risk = **4.1E-4** **0.0E+0**

Total Pathway Hazard Index = **5.9E+0** **0.0E+0**

RBCA SITE ASSESSMENT

Tier 2 Worksheet 8.3

Site Name: Chevron #9-0076 Onsite (Arith Avg)
 Site Location: 4265 Foothill Blvd, Oakland CA

Completed By: Curtis A. Peck modified by U.K. 3/99
 Date Completed: 5/21/1998

TIER 2 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	NC	1.0E-6	NC	N/A		NC	1.0E+0	NC	N/A	
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	4.1E-4	1.0E-6	4.1E-4	N/A	■	5.7E+0	1.0E+0	5.9E+0	N/A	■
SOIL EXPOSURE PATHWAYS										
Complete:	NC	1.0E-6	NC	N/A		NC	1.0E+0	NC	N/A	
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	NC	1.0E-6	NC	N/A		NC	1.0E+0	NC	N/A	
CRITICAL EXPOSURE PATHWAY (Select Maximum Values From Complete Pathways)										
	4.1E-4	1.0E-6	4.1E-4	N/A	■	5.7E+0	1.0E+0	5.9E+0	N/A	■

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.2

Site Name: Chevron #9-0078 Onsite (Arith Avg)

Completed By: Curtis A. Peck modified by U.K. 3/99

Site Location: 4255 Foothill Blvd, Oakland CA

Date Completed: 5/21/1998

1 OF 1

**SUBSURFACE SOIL SSTL VALUES
(> 3.3 FT BGS)**

Target Risk (Class A & B) 1.0E-6

MCL exposure limit?

Calculation Option: 2

Target Risk (Class C) 1.0E-5

PEL exposure limit?

Target Hazard Quotient 1.0E+0

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

CONSTITUENTS OF CONCERN		Representative Concentration (mg/kg)	Soil Leaching to Groundwater			Soil Volatilization to Indoor Air		Soil Volatilization to Outdoor Air		Applicable SSTL (mg/kg)	SSTL Exceeded ? *■* if yes	Required CRF Only if "yes" left
CAS No.	Name		Residential (on-site)	Commercial (on-site)	Regulatory (MCL) (on-site)	Residential (on-site)	Commercial (on-site)	Residential (on-site)	Commercial (on-site)			
71-43-2	Benzene	1.2E+0	NA	NA	NA	3.6E-3	NA	NA	NA	3.6E-3	■	3.4E+02
100-41-4	Ethylbenzene	6.5E-1	NA	NA	NA	4.4E+1	NA	NA	NA	4.4E+1	□	<1
1634-04-4	Methyl t-Butyl Ether	6.4E+0	NA	NA	NA	2.5E+2	NA	NA	NA	2.5E+2	□	<1
108-88-3	Toluene	4.5E+0	NA	NA	NA	2.1E+1	NA	NA	NA	2.1E+1	□	<1
1330-20-7	Xylene (mixed isomers)	1.1E+1	NA	NA	NA	>Res	NA	NA	NA	>Res	□	<1

>Res indicates risk-based target concentration greater than constituent residual saturation value

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name: Chevron #9-0076 Onsite (Arith Avg)

Completed By: Curtis A. Peck modified by U.K. 3/99

1 OF 1

Site Location: 4265 Foothill Blvd, Oakland CA

Date Completed: 5/21/1998

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6

MCL exposure limit?

Calculation Option: 2

Target Risk (Class C) 1.0E-5

PEL exposure limit?

Target Hazard Quotient 1.0E+0

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

CONSTITUENTS OF CONCERN		Representative Concentration (mg/L)	Groundwater Ingestion			Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable SSTL (mg/L)	SSTL Exceeded ? "■" if yes	Required CRF Only if "yes" left
CAS No.	Name		Residential (on-site)	Commercial (on-site)	Regulatory (MCL) (on-site)	Residential (on-site)	Commercial (on-site)	Residential (on-site)	Commercial (on-site)			
71-43-2	Benzene	3.1E+0	NA	NA	NA	4.5E-2	NA	NA	NA	4.5E-2	■	6.9E+01
100-41-4	Ethylbenzene	7.9E-1	NA	NA	NA	>Sol	NA	NA	NA	>Sol	□	<1
1634-04-4	Methyl t-Butyl Ether	1.6E+0	NA	NA	NA	2.0E+3	NA	NA	NA	2.0E+3	□	<1
108-88-3	Toluene	1.5E+0	NA	NA	NA	2.2E+2	NA	NA	NA	2.2E+2	□	<1
1330-20-7	Xylene (mixed isomers)	2.1E+0	NA	NA	NA	>Sol	NA	NA	NA	>Sol	□	<1

>Sol indicates risk-based target concentration greater than constituent solubility

Handwritten:
3100 ppb →
150 ppb →

**SCREEN 7.1
GROUNDWATER
CONCENTRATION
CALCULATOR**

Choose UCL Percentile

95%

Analytical Data (Up to 50 Data Points)

1 2 3 4 5 6 7 8 9 10 11 12 13

Default
Detection
Limit

(mg/L)

0.0005
0.0005
0.0025
0.0005
0.0005

	(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)
Well Name	C-6	C-6	C-6	C-6	C-6	C-7	C-7	C-7	C-7	C-7	C-8	C-8	C-8
Date Sampled	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	6/1/1997	#####
	0.5	0.57	0.33	0.23	0.3	0.31	0.015	0.12	0.01	ND	ND	ND	
	0.025	0.029	0.005	0.0073	0.015	0.11	0.0033	0.031	0.00097	ND	ND	ND	
	0.05	0.22	0.076	0.046	0.049	0.098	ND	0.054	ND	ND	ND	ND	
	0.01	0.005	0.005	0.005	0.005	0.046	ND	0.011	ND	ND	ND	ND	
	0.01	0.01	0.005	0.0064	0.012	0.31	0.0051	0.084	0.0016	ND	ND	ND	

14 15 16 17 18 19 20

(mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L) (mg/L)

C-8	C-8	C-9	C-9	C-9	C-9	C-9
#####	#####	#####	#####	#####	#####	#####

	ND	ND	ND			ND
	ND	ND	ND			ND
	0.0026	ND	ND			ND
	ND	ND	ND			ND
	ND	ND	ND			ND

Site Name: Chevron #9-0076 Offsite

Site Location: 4265 Foothill Blvd, Oakland CA

Completed By: C.A. Peck, U.Kelm Date Completed: 3/30/1999

4 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS:

Exposure Concentration

VAPOR INTRUSION TO BUILDINGS

Constituents of Concern	1) Source Medium	2) NAF Value (m ³ /kg) Receptor	3) Exposure Medium Indoor Air: POE Conc. (mg/m ³) (1) / (2)	4) Exposure Multiplier (IR×EF×ED)/(BW×AT) (m ³ /kg-day)	5) Average Daily Intake Rate (mg/kg-day) (3) X (4)
	Subsurface Soil Conc. (mg/kg)	On-Site Residential	On-Site Residential	On-Site Residential	On-Site Residential
Benzene	2.1E-2	3.2E+1	6.5E-4	8.8E-2	5.7E-5
Ethylbenzene	1.1E-2	3.2E+1	3.3E-4	2.1E-1	6.8E-5
Methyl t-Butyl Ether	0.0E+0	5.9E+1	0.0E+0	2.1E-1	0.0E+0
Toluene	2.5E-3	3.6E+1	6.5E-5	2.1E-1	1.3E-5
Xylene (mixed isomers)	2.7E-2	7.0E+1	3.9E-4	2.1E-1	8.0E-5

NOTE: ABS = Dermal absorption factor (dim) BW = Body weight (kg) EF = Exposure frequency (days/yr) POE = Point of exposure
 AF = Adherence factor (mg/cm²) CF = Units conversion factor ET = Exposure time (hrs/day) SA = Skin exposure area (cm²/day)
 AT = Averaging time (days) ED = Exposure duration (yrs) IR = Inhalation rate (m³/day)

Site Name: Chevron #9-0076 Offsite

Site Location: 4265 Foothill Blvd, Oakland CA Completed By: C.A. Peck, U. Kelmser

Date Completed: 3/30/1999

5 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER:

VAPOR INTRUSION TO BUILDINGS

Constituents of Concern	Exposure Concentration					TOTAL PATHWAY INTAKE (ng/kg-day) (Sum intake values from subsurface & groundwater routes.)	
	1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (m ³ /L) Receptor On-Site Residential	3) Exposure Medium Indoor Air; POE Conc. (ng/m ³) (1) / (2) On-Site Residential	4) Exposure Multiplier (IR*EF*ED)/(BW*AT) (m ³ /kg-day) On-Site Residential	5) Average Daily Intake Rate (mg/kg-day) (3) X (4) On-Site Residential	On-Site Residential	On-Site Residential
Benzene	1.5E-1	3.9E+2	3.8E-4	8.8E-2	3.3E-5	9.0E-5	
Ethylbenzene	1.4E-2	3.9E+2	3.7E-5	2.1E-1	7.6E-6	7.6E-5	
Methyl t-Butyl Ether	3.8E-2	4.8E+2	8.0E-5	2.1E-1	1.6E-5	1.6E-5	
Toluene	5.6E-3	4.0E+2	1.4E-5	2.1E-1	2.9E-6	1.6E-5	
Xylene (mixed isomers)	2.8E-2	4.3E+2	6.5E-5	2.1E-1	1.3E-5	9.3E-5	

NOTE: ABS = Dermal absorption factor (dim) BW = Body weight (kg) EF = Exposure frequency (days/yr) POE = Point of exposure
 AF = Adherence factor (mg/cm²) CF = Units conversion factor ET = Exposure time (hrs/day) SA = Skin exposure area (cm²/day)
 AT = Averaging time (days) ED = Exposure duration (yrs) IR = Inhalation rate (m³/day)

Site Name: Chevron #9-0076 Offsite

Site Location: 4265 Foothill Blvd, Oakland CA

Completed By: C.A. Peck, U.Kelmser

Date Completed: 3/30/1999

2 OF 4

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS

(CHECKED IF PATHWAYS ARE ACTIVE)

Constituents of Concern	CARCINOGENIC RISK				TOXIC EFFECTS			
	(1) EPA	(2) Total Carcinogenic Intake Rate (mg/kg/day)	(3) Inhalation Slope Factor	(4) Individual COC Risk (2) x (3)	(5) Total Toxicant Intake Rate (mg/kg/day)	(6) Inhalation Reference Dose	(7) Individual COC Hazard Quotient (5) / (6)	
	Carcinogenic Classification	On-Site Residential	(mg/kg-day) ⁻¹	On-Site Residential	On-Site Residential	(mg/kg-day)	On-Site Residential	On-Site Residential
Benzene	A	9.0E-5	1.0E-1	9.0E-6	2.1E-4	1.7E-3	1.2E-1	
Ethylbenzene	D				7.6E-5	2.9E-1	2.7E-4	
Methyl t-Butyl Ether					1.6E-5	8.6E-1	1.9E-5	
Toluene	D				1.6E-5	1.1E-1	1.4E-4	
Xylene (mixed isomers)	D				9.3E-5	2.0E+0	4.7E-5	

Total Pathway Carcinogenic Risk = 9.0E-6 0.0E+0

Total Pathway Hazard Index = 1.2E-1 0.0E+0

RBCA SITE ASSESSMENT

Tier 2 Worksheet 8.3

Site Name: Chevron #9-0076 Offsite
 Site Location: 4265 Foothill Blvd, Oakland CA

Completed By: C.A.Peck, U.Kelmser
 Date Completed: 3/30/1999

TIER 2 BASELINE RISK SUMMARY TABLE

EXPOSURE PATHWAY	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	NC	1.0E-6	NC	N/A		NC	1.0E+0	NC	N/A	
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	9.0E-6	1.0E-6	9.0E-6	N/A	■	1.2E-1	1.0E+0	1.2E-1	N/A	□
SOIL EXPOSURE PATHWAYS										
Complete:	NC	1.0E-6	NC	N/A		NC	1.0E+0	NC	N/A	
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	NC	1.0E-6	NC	N/A		NC	1.0E+0	NC	N/A	
CRITICAL EXPOSURE PATHWAY (Select Maximum Values From Complete Pathways)										
	9.0E-6	1.0E-6	9.0E-6	N/A	■	1.2E-1	1.0E+0	1.2E-1	N/A	□

Site Name: Chevron #9-0076 Offsite

Completed By: C.A.Peck, U Kelmser

Site Location: 4265 Foothill Blvd, Oakland CA

Date Completed: 3/30/1999

**SUBSURFACE SOIL SSTL VALUES
(> 3.3 FT BGS)**

Target Risk (Class A & B) 1.0E-6

MCL exposure limit?

Calculation Option: 2

Target Risk (Class C) 1.0E-5

PEL exposure limit?

Target Hazard Quotient: 1.0E+0

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

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater			Soil Volatilization to Indoor Air		Soil Volatilization to Outdoor Air		Applicable SSTL (mg/kg)	SSTL Exceeded ? *■* If yes	Required CRF Only if "yes" left
			Residential (on-site)	Commercial (on-site)	Regulatory(MCL) (on-site)	Residential (on-site)	Commercial (on-site)	Residential (on-site)	Commercial (on-site)			
CAS No.	Name	(mg/kg)										
71-43-2	Benzene	2.1E-2	NA	NA	NA	3.6E-3	NA	NA	NA	3.6E-3	■	6.0E+00
100-41-4	Ethylbenzene	1.1E-2	NA	NA	NA	4.4E+1	NA	NA	NA	4.4E+1	<input type="checkbox"/>	<1
1634-04-4	Methyl t-Butyl Ether	0.0E+0	NA	NA	NA	2.5E+2	NA	NA	NA	2.5E+2	<input type="checkbox"/>	<1
108-88-3	Toluene	2.5E-3	NA	NA	NA	2.1E+1	NA	NA	NA	2.1E+1	<input type="checkbox"/>	<1
1330-20-7	Xylene (mixed isomers)	2.7E-2	NA	NA	NA	>Res	NA	NA	NA	>Res	<input type="checkbox"/>	<1

>Res indicates risk-based target concentration greater than constituent residual saturation value.

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name: Chevron #9-0076 Offsite

Completed By: C A Peck, U Kelmser

Site Location: 4265 Foothill Blvd, Oakland CA

Date Completed: 3/30/1999

1 OF 1

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6

MCL exposure limit?

Calculation Option: 2

Target Risk (Class C) 1.0E-5

PEL exposure limit?

Target Hazard Quotient 1.0E+0

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

CONSTITUENTS OF CONCERN		Representative Concentration (mg/L)	Groundwater Ingestion			Groundwater Volatilization to Indoor Air		Groundwater Volatilization to Outdoor Air		Applicable SSTL (mg/L)	SSTL Exceeded ? "■" if yes	Required CRF Only if "yes" left
			Residential (on-site)	Commercial (on-site)	Regulatory(MCL) (on-site)	Residential (on-site)	Commercial (on-site)	Residential (on-site)	Commercial (on-site)			
71-43-2	Benzene	1.5E-1	NA	NA	NA	4.5E-2	NA	NA	NA	4.5E-2	■	3.0E+00
100-41-4	Ethylbenzene	1.4E-2	NA	NA	NA	>Sol	NA	NA	NA	>Sol	<input type="checkbox"/>	<1
1634-04-4	Methyl t-Butyl Ether	3.8E-2	NA	NA	NA	2.0E+3	NA	NA	NA	2.0E+3	<input type="checkbox"/>	<1
108-88-3	Toluene	5.6E-3	NA	NA	NA	2.2E+2	NA	NA	NA	2.2E+2	<input type="checkbox"/>	<1
1330-20-7	Xylene (mixed isomers)	2.8E-2	NA	NA	NA	>Sol	NA	NA	NA	>Sol	<input type="checkbox"/>	<1

>Sol indicates risk-based target concentration greater than constituent solubility

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	1.5E-1	Arith			2.1E-2	Arith
Ethylbenzene	1.4E-2	Arith			1.1E-2	Arith
Methyl t-Butyl Ether	3.8E-2	Arith				
Toluene	5.6E-3	Arith			2.5E-3	ND's
Xylene (mixed isomers)	2.8E-2	Arith			2.7E-2	Arith

Site Name: Chevron #9-0076 Offsite

Completed By: C.A.Peck, U.Kelmser

Site Location: 4265 Foothill Blvd, Oakland CA

Date Completed: 3/30/1999

RBCA CHEMICAL DATABASE

Physical Property Data

CAS Number	Constituent	type	Molecular Weight (g/mole)		Diffusion Coefficients (cm ² /s)				log (Koc) or log(Kd) (@ 20 - 25 C)		Henry's Law Constant (@ 20 - 25 C)			Vapor Pressure (@ 20 - 25 C) (mm Hg)		Solubility (@ 20 - 25 C) (mg/L)			acid	base
			MW	ref	Dair	ref	Dwat	ref	log(l/kg)	ref	mol	(unitless)	ref	ref	ref	ref	pKa	pKb	ref	
71-43-2	Benzene	A	78.1	5	9.30E-02	A	1.10E-05	A	1.58	A	5.29E-03	2.20E-01	A	9.52E+01	4	1.75E+03	A			
100-41-4	Ethylbenzene	A	106.2	5	7.60E-02	A	8.50E-06	A	1.98	A	7.69E-03	3.20E-01	A	1.00E+01	4	1.52E+02	5			
1634-04-4	Methyl t-Butyl Ether	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	A	5.77E-04	2.40E-02		2.49E+02		4.80E+04	A			
108-88-3	Toluene	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	A	6.25E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29			
1330-20-7	Xylene (mixed isomers)	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	A	6.97E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5			

Site Name: Chevron #9-0076 Offsite

Site Location: 4265 Foothill Blvd, Oakia

Completed By: C.A. Peck, U. Kelmser
Date Completed: 3/30/1999

Software version: 1.0.1

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RBCA CHEMICAL DATABASE

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day)			Slope Factors 1/(mg/kg/day)			EPA Weight of Evidence	Is Constituent Carcinogenic ?	
		Oral RfD_oral	ref	Inhalation RfD_inhal	ref	Oral SF_oral	ref			Inhalation SF_inhal
71-43-2	Benzene	-		1.70E-03	R	2.90E-02	A	1.00E-01	A	TRUE
100-41-4	Ethylbenzene	1.00E-01	A	2.86E-01	A	-		-	D	FALSE
1634-04-4	Methyl t-Butyl Ether	5.00E-03	R	8.57E-01	R	-		-		FALSE
108-88-3	Toluene	2.00E-01	A,R	1.14E-01	A,R	-		-	D	FALSE
1330-20-7	Xylene (mixed isomers)	2.00E+00	A,R	2.00E+00	A	-		-	D	FALSE

Site Name: Chevron #9-0076 Offsite Site Location: 4265 Foothill Blvd, Oak Completed By: C.A. Peck, U.Kelmser Date Completed: 3/30/1999

Software version: 1.0.1

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RBCA CHEMICAL DATABASE

Miscellaneous Chemical Data

CAS Number	Constituent	Maximum Contaminant Level		Permissible Exposure Limit PEL/TLV		Relative Absorption Factors		Detection Limits		Half Life (First-Order Decay)		ref		
		MCL (mg/L)	reference	(mg/m3)	ref	Oral	Dermal	Groundwater (mg/L)	Soil (mg/kg)	Saturated (days)	Unsaturated (days)			
71-43-2	Benzene	5.00E-03	52 FR 25690	3.20E+00	OSHA	1	0.5	0.002	C	0.005	S	720	720	H
100-41-4	Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.002	C	0.005	S	228	228	H
1634-04-4	Methyl t-Butyl Ether			1.44E+02	ACGIH	1	0.5					360	180	H
108-88-3	Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	1	0.5	0.002	C	0.005	S	28	28	H
1330-20-7	Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.005	C	0.005	S	360	360	H

Site Name: Chevron #9-0076 Offsite Site Location: 4265 Foothill Blvd, Oakland CA

Completed By: C.A.Peck, U.Kelms Date Completed: 3/30/1999

Software version: 1.0.1

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