TERRA VAC
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July 18, 1997

Ms. Medhulla Logan
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Way Parkway, Suite 250
Alameda, California 94502-6577

Re: Addendum to the Interim Remediation Work Plan
Former Chevron 9-0260
21995 Foothill Boulevard
Hayward, California

Dear Ms. Logan:

Thank you for taking the time to review the Interim Remediation Work Plan (IRWP) for the former Chevron Station 9-0260 located at 21995 Foothill Boulevard in Hayward, California. At the request of Chevron Products Company, Terra Vac has prepared an additional response to your July 15, 1997 request for clarification.

In regards to comment number:

1. Terra Vac agrees that the TCLP discussed as a secondary goal for determining remediation effectiveness is not appropriate as you described, and therefore, the TCLP test will be omitted from the IRWP.
2. The correct representative concentration is 8.8 mg/L, based on included sample data. The SSTL value for groundwater volatilization to commercial indoor air is 460 ppb. This SSTL value is correctly stated in the body of the report. An updated copy of that table was submitted to you on July 14, 1997.
3. No, this risk assessment does not consider the construction worker scenario. This decision was primarily based on the location of the hydrocarbons, located in the soil at depths between ten and fifteen feet. The construction worker scenario is only valid for surficial soils, which for this assessment were said to occur between the surface and a depth of three feet. Due to the nature of construction in Hayward, it is unlikely that construction workers would come into contact with hydrocarbon impacted soils.
4. Since Terra Vac does not have record of any petrophysical analysis data from this site, an estimate for porosity was utilized based on the site soil characteristics and petrophysical

data from similar sites. The volumetric water and air contents noted were incidentally reversed and should have been 0.2 for air and 0.1 for water. As you will notice on the revised assessment attached to this letter, Terra Vac has changed the porosity and volumetric air/water content to reflect the ASTM default values.

To clarify the above points, Terra Vac has provided an updated risk assessment to reflect the above changes. This update shows that the SSTLs did not have significant changes, where the SSTLs for residential and commercial volatilization to indoor air from impacted groundwater were calculated to be 190 and 520 ppb benzene. In addition to the changes in groundwater SSTLs, these modification also changed the SSTLs for commercial volatilization from subsurface soils to indoor air from 3.3 to 1.1 ppm benzene. This modified SSTL for soils translates to the proposed remediation goals for soil, where the IRWP, section 2.4.2 will now state, "...are an average of 1.1 ppm benzene..." The following changes to the default values were made (as reflected on the Default Parameters Table 1):

- The target risk was changed from 2.9×10^{-7} to 1.0×10^{-6} as recommended by the ASTM and EPA guidances.
- The slope factor for benzene was modified from 0.029 to 0.1 to reflect California standards rather than Federal.
- The building air exchange rate for residential structures was modified to reflect minimum requirements of the 1994 UBC, Section 1205 (c), which specifies that "....of providing two air changes per hour...." Based on the ratio of residential to commercial default values provided by the ASTM, the building air exchange rate for commercial structures was modified by a factor of 1.5.
- The crack factor was also modified at the suggestion of Alameda County from 1% to 0.5%. This is consistent with the concrete placement guidelines of the ACI Building Code 318/318R-67.

Please feel free to call if you have any further questions or require further clarification on the IRWP.

Sincerely,
Terra Vac Corporation

Jason L. Nutt
Project Engineer

Robert A. Dahl
Project Manager

cc: Mr. Phil Briggs, Chevron Products Company
Mr. Hugh Murphy, City of Hayward

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name: Chevron Station 9-0260
Site Location: 21995 Foothill Boulevard, Hayward, CA

Completed By: Jason Nutt
Date Completed: 7/15/1997

GROUNDWATER SSTL VALUES

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

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 1

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

CONSTITUENTS OF CONCERN		Representative Concentration		Groundwater Ingestion			X Groundwater Volatilization to Indoor Air		X Groundwater Volatilization to Outdoor Air		Applicable 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	8.8E+0	NA	NA	NA	1.9E-1	NA	1.6E+1	NA	1.9E-1	■	4.8E+01
100-41-4	Ethylbenzene	1.4E+0	NA	NA	NA	>Sol	NA	>Sol	NA	>Sol	☐	<1
108-88-3	Toluene	1.1E+0	NA	NA	NA	>Sol	NA	>Sol	NA	>Sol	☐	<1
1330-20-7	Xylene (mixed isomers)	6.3E+0	NA	NA	NA	>Sol	NA	>Sol	NA	>Sol	☐	<1

Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: G-337-YAX-542

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.2

Site Name: Chevron Station 9-0260
Site Location: 21995 Foothill Boulevard, Hayward, CA

Completed By: Jason Nutt
Date Completed: 7/15/1997

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: 1

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

CONSTITUENTS OF CONCERN		Representative Concentration		Soil Leaching to Groundwater			X	Soil Volatilization to Indoor Air		X	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	1.5E+0	NA	NA	NA		4.6E-1	NA		4.6E+1	NA	4.6E-1	■	3.0E+00
100-41-4	Ethylbenzene	6.0E+0	NA	NA	NA		>Res	NA		>Res	NA	>Res	☐	<1
108-88-3	Toluene	1.9E+0	NA	NA	NA		2.2E+2	NA		>Res	NA	2.2E+2	☐	<1
1330-20-7	Xylene (mixed isomers)	3.3E+1	NA	NA	NA		>Res	NA		>Res	NA	>Res	☐	<1

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RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.2

Site Name: Chevron Station 9-0260
Site Location: 21995 Foothill Boulevard, Hayward, CA

Completed By: Jason Nutt
Date Completed: 7/15/1997

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: 1

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

CONSTITUENTS OF CONCERN		Representative Concentration		Soil Leaching to Groundwater			X	Soil Volatilization to Indoor Air		X	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	1.5E+0	NA	NA	NA		NA	1.1E+0		NA	6.4E+1	1.1E+0	■	1.0E+00
100-41-4	Ethylbenzene	6.0E+0	NA	NA	NA		NA	>Res		NA	>Res	>Res	☐	<1
108-88-3	Toluene	1.9E+0	NA	NA	NA		NA	4.4E+2		NA	>Res	4.4E+2	☐	<1
1330-20-7	Xylene (mixed isomers)	3.3E+1	NA	NA	NA		NA	>Res		NA	>Res	>Res	☐	<1

Software: GSI RBCA Spreadsheet Serial: G-337-YAX-542
Version: v 1.0

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Chevron Station 9-0260 Job Identification: 30-0236
Site Location: 21995 Foothill Boulevard, Hay Date Completed: 7/15/97
Completed By: Jason Nutt

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	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				

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	TRUE	FALSE	
GW.b	Vapor Intrusion to Buildings	TRUE	FALSE	
Soil Pathways				
S.v	Volatiles from Subsurface Soils	TRUE	FALSE	
SS.v	Volatiles and Particulate Inhalation	FALSE	FALSE	FALSE
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
S.l	Leaching to Groundwater from all Soils	FALSE	FALSE	
S.b	Intrusion to Buildings - Subsurface Soils	TRUE	FALSE	

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

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)	1	
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)	***1.9E+06***		
W	Length of affected soil parallel to wind (cm)	***3.0E+03***		
W.gw	Length of affected soil parallel to groundwater (c	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)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	***7.6E+02***
Ugw.tr	Groundwater Transport velocity (cm/yr)	***2.5E+03***
Ks	Saturated Hydraulic Conductivity(cm/s)	1.2E-03
grad	Groundwater Gradient (cm/cm)	2.0E-02
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
BC	Biodegradation Capacity (mg/L)	
BIO?	Is Bioattenuation Considered	TRUE
phi.eff	Effective Porosity in Water-Bearing Unit	3.0E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03

Soil	Definition (Units)	Value	capillary	vadose	foundation
hc	Capillary zone thickness (cm)	***6.1E+01***			
hv	Vadose zone thickness (cm)	***3.0E+02***			
rho	Soil density (g/cm^3)	1.7			
foc	Fraction of organic carbon in vadose zone	0.01			
phi	Soil porosity in vadose zone	0.38			
Lgw	Depth to groundwater (cm)	***3.7E+02***			
Ls	Depth to top of affected soil (cm)	***3.0E+02***			
Lsubs	Thickness of affected subsurface soils (cm)	***1.5E+02***			
pH	Soil/groundwater pH	6.5			
phi.w	Volumetric water content		0.342	0.12	0.12
phi.a	Volumetric air content		0.038	0.26	0.26

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	***5.8E-04***	***8.3E-04***
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	***0.005***	

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)		