SCA
Environmental, Inc.

SCA Environmental, Inc.
Four Embarcadero Center
Suite 480
San Francisco, CA 94111
Tel: (415) 397-9936
FAX: (415) 397-1406

TO/ COMPANY	**Amy Leach,** Alameda County
cc:	**Shawn Munger**, Engeo
FROM:	Andy Hilliard
DATE:	July 11, 1997
RE:	Parker's Shell Recalculation
SCA Proj #	
F-2082	

ENVIRONMENTAL PROTECTION
97 JUL 14 AM 10: 57

Dear Amy:

Per our discussion, enclosed please find the 2nd revised risk assessment for the Parker's Shell site.

Unfortunately, I will be out of the office until July 16th. Please feel free to contact me to discuss the assessment after that time, if necessary.

Regards-

Andy Hilliard

_√_ FAX
_14_ PAGES TO FOLLOW
FAX WILL BE FOLLOWED BY HARDCOPY
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___ UPS
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___ 2ND DAY AIR
___ US MAIL
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_√_ UPS GROUND
___ US DELIVERY

SCA
Environmental, Inc.
Engineering and Environmental Consultants

July 10, 1997

Mr. Shawn Munger
Engeo Incorporated
2401 Crow Canyon Road
Suite 200
San Ramon, CA 94583

FAX: (510) 838-7425

Re: 2nd Revised Summary of Risk-Based Corrective Action Assessment
Former Parker's Shell Facility - 5293 Crow Canyon Road
Castro Valley, CA
SCA Project No. F-2082

Dear Mr. Munger:

This letter report summarizes the risk assessment performed of the subject property. The assessment was performed by SCA Environmental, Inc. (SCA) under contract to Engeo, Inc.

Background

Underground storage tanks were removed from the site in February 1989, according to Alameda County Health Services Agency files. Subsequent soil sampling (conducted in 1990) at the site revealed the presence of benzene in soil in concentrations ranging from Non-Detect to 4.3 mg/kg.

Proposed uses for the property include residential development. The Lead Agency, Alameda County Health Care Services, requested a site-specific evaluation of risk to human health and the environment from exposure to the subsurface soil contamination left in place, specifically to the benzene in soil.

Methodology

The assessment calculations were performed by SCA using Groundwater Services, Inc. (GSI) Tier II® software.

The assessment focused on a *Soil Volatilization to Indoor Air* pathway, for a residential scenario. Other pathways were not considered in this assessment. Since groundwater at the site was not impacted, based upon extensive sampling conducted in 1990 and before, the *Soil Leaching to Groundwater* pathway was not considered.

Surface soils were expected to have minimal concentrations of the analytes of concern, given the 8 year lag time since the USTs were removed and any surface impact from product may have occurred. The surface soils are expected to be dramatically altered by the planned residential renovation, including excavated for foundations, landscaped, paved, terraced, etc. Based on SCA's experience at similar sites, this pathway would not pose a significant exposure to workers or residents, under this scenario. The net effect was that *Soil Volatilization to Outdoor Air* was not anticipated to be a significant exposure pathway and was not evaluated.

Note that California toxicity slope factors for benzene were used.

This assessment incorporates a number of modifications to the previous assessment performed by SCA (dated July 2, 1997). These modifications were made at the request of Ms. Amy Leach of Alameda County Health Care Agency, and are summarized as follows:

1. For each soil sample location, only the highest result for benzene was used, regardless of depth. For example, if results were ND at 5' depth, ND at 10' depth, and 0.1 mg/kg at 15' depth, the 0.1 mg/kg value would be used. The lower results would not be used in the assessment.

2. A 95% Upper Confidence Limit was not required for sample results; the software-calculated mean of the highest sample result for each location was used instead (see Appendix B, *Raw Data*, for a summary of values used).

3. The Individual Target Risk for Class A carcinogens was set at 10^{-5} (the default values established in ASTM standard E1739-95 is 10^{-6}).

4. The Crack Factor in the model was set at 0.005 (reduced from the default of 0.01 to reflect new construction).

5. Soil attenuation over time was not factored in to the assessment. The soils at the site were assumed to have the same concentrations of benzene as were measured in 1990.

Results

Using the protocols listed above, a Tier 2 assessment was performed of soil sampling data from 1990 and before; incorporating 1997 resampling data conducted in two locations (SB-1A and SB-8A).

a. The Tier 2 assessment established a site-specific target level (SSTL) for benzene of 5.8×10^{-2} mg/kg (See Appendix A, *Subsurface Soil SSTL Values*, Tier 2 Worksheet 9.2),

b. The mean benzene level at the site was 1.1×10^{-2} mg/kg, or below the SSTL, based on the calculations performed.

Conclusions

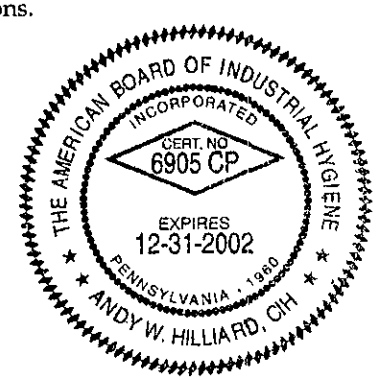
In our professional opinion, the site appears acceptable to develop for residential use, based upon the data supplied to us and the risk assessment protocols used.

Please feel free to contact me at (415) 397-9936 with any questions or clarifications.

Sincerely,
SCA ENVIRONMENTAL, INC.

Andy Hilliard, CIH, CSP, CHMM
Regional Manager

Appendix:
A. Tier 2 Worksheet 9.2 *Subsurface Soil SSTL Values*,
B. Raw Data
C. Supplementary Data



Appendix A
Tier 2 Worksheet 9.2
Subsurface Soil SSTL Values,

Tier 2 Worksheet 9.2

Site Name. Parker's Shell Station, new formulation
Site Location: Castro Valley

Completed By. Andy Hilliard
Date Completed: 7/10/1997

Target Risk (Class A & B) 1.0E-5 ☐ MCL exposure limit?
Target Risk (Class C) 1.0E-5 ☐ PEL exposure limit?
Target Hazard Quotient 1.0E+0

Calculation Option. 1

SUBSURFACE SOIL SSTL VALUES (> 3.3 FT BGS)

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	1.1E-2	NA	NA	NA	2.0E-1	NA	NA	NA	2.0E-1	☐	<1
100-41-4	Ethylbenzene	1.2E-2	NA	NA	NA	7.1E+1	NA	NA	NA	7.1E+1	☐	<1
108-88-3	Toluene	6.6E-3	NA	NA	NA	4.2E+1	NA	NA	NA	4.2E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	1.5E-2	NA	NA	NA	>Res	NA	NA	NA	>Res	☐	<1

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

Software: GSI RBCA Spreadsheet Serial: G-421-DSX-400
Version: 1.0 1

$(2.0 \times 10^{-1}) \times (0.29 \text{ For CA benzene}) = 5.8 \times 10^{-2}$

$1.1 \times 10^{-2} < 5.8 \times 10^{-2}$

Respective Concentration < SSTL

Site Name: Parker's Shell Station, new formulati Completed By: Andy Hilliard
Site Location: Castro Valley Date Completed: 7/10/1997 *1 of 1*

TIER 2 SUBSURFACE SOIL CONCENTRATION DATA SUMMARY

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations		
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	11	6	2.4E-01	1.1E-02	3.1E-02
100-41-4	Ethylbenzene	5.0E-03	11	5	3.3E-01	1.2E-02	3.4E-02
108-88-3	Toluene	5.0E-03	11	4	1.6E-01	6.6E-03	1.6E-02
1330-20-7	Xylene (mixed isomers)	5.0E-03	11	6	3.2E-01	1.5E-02	4.8E-02

Serial: G-421-DSX-40 Software: GSI RBCA Spreadsheet
Version: 1.0.1

Appendix B
Raw Data

Raw Data											
Former Parker's Shell Station, Castro Valley, CA											
SCA Project No. F-2082				July 10, 1997							
Sample Location:	SB-1A	SB-2	SB-3	SB-4	SB-6	SB-7	SB-8A	SB-9	B-10	B-11	B-12
Date:	Apr-97	Apr-90	Apr-90	Apr-90	Apr-90	Apr-90	Apr-97	Apr-90	May-90	May-90	May-90
Benzene	0.0076	0.24	0.09	0.0063	0.023	ND	ND	0.19	ND	ND	ND
Ethylbenzene	0.025	0.097	0.016	ND	0.33	ND	ND	0.17	ND	ND	ND
Toluene	ND	0.0051	ND	ND	0.023	ND	ND	0.085	0.16	ND	ND
Xylene (mixed isomers)	0.063	0.0055	0.01	ND	0.031	ND	ND	0.32	0.26	ND	ND

TABLE 1
SAMPLE ANALYTICAL RESULTS

SAMPLE #	GASOLINE	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES
	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg
SB-1A used					
SB-1, 5'	110	2,500	1,200	690	1,300
SB-1, 10'	N.D.	780	44	19	16
SB-1, 15'	N.D.	N.D.	N.D.	N.D.	N.D.
SB-1, 20'	N.D.	N.D.	N.D.	N.D.	N.D.
→ SB-2, 5'	7.8	240	5.1	97	5.5
SB-2, 10'	N.D.	N.D.	N.D.	N.D.	N.D.
SB-2, 20'	N.D.	N.D.	N.D.	N.D.	N.D.
→ SB-3, 5'	N.D.	90	N.D.	16	10
SB-3, 10'	N.D.	N.D.	N.D.	N.D.	N.D.
SB-3, 15'	N.D.	N.D.	N.D.	N.D.	N.D.
SB-4, 10'	N.D.	N.D.	N.D.	N.D.	N.D.
SB-4, 15'	N.D.	N.D.	N.D.	N.D.	N.D.
→ SB-4, 20'	N.D.	6.3	N.D.	N.D.	N.D.
SB-6, 5'	N.D.	N.D.	N.D.	N.D.	N.D.
→ SB-6, 10'	79	23	10	330	310
SB-6, 15'	N.D.	N.D.	N.D.	N.D.	N.D.
→ SB-7, 10'	N.D.	N.D.	N.D.	N.D.	N.D.
SB-7, 15'	N.D.	N.D.	N.D.	N.D.	N.D.
SB-7, 20'	N.D.	N.D.	N.D.	N.D.	N.D.
SB-8A used SB-8, 5'	390	4,300	4,000	2,800	5,300
SB-8, 10'	N.D.	37	11	N.D.	5.4
SB-8, 15'	N.D.	49	20	7.5	15
SB-8, 20'	N.D.	N.D.	N.D.	N.D.	N.D.
SB-9, 5'	N.D.	N.D.	N.D.	N.D.	N.D.
→ SB-9, 10'	66	190	85	170	320
SB-9, 15'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-1, 5'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-1, 10'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-1, 15'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-1, 20'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-1, 40'	N.D.	N.D.	N.D.	N.D.	N.D.

Water Samples

	GASOLINE Diesel	CCHC EPA 601	BTEX EPA 602	ClPest EPA 608	PNAs EPA 625 O&G
	mg/l	ug/l	ug/l	ug/l	ug/l
MW-1	N.D. NA	~~N.D.~~	~~N.D.~~	~~N.D.~~	~~N.D.~~ NA
MW-2	N.D. NA	~~N.D.~~	~~N.D.~~	~~N.D.~~	~~N.D.~~ NA
MW-3	N.D. ND	N.D.	N.D.	N.D.	N.D. ND

N.D. - not detected

(4)

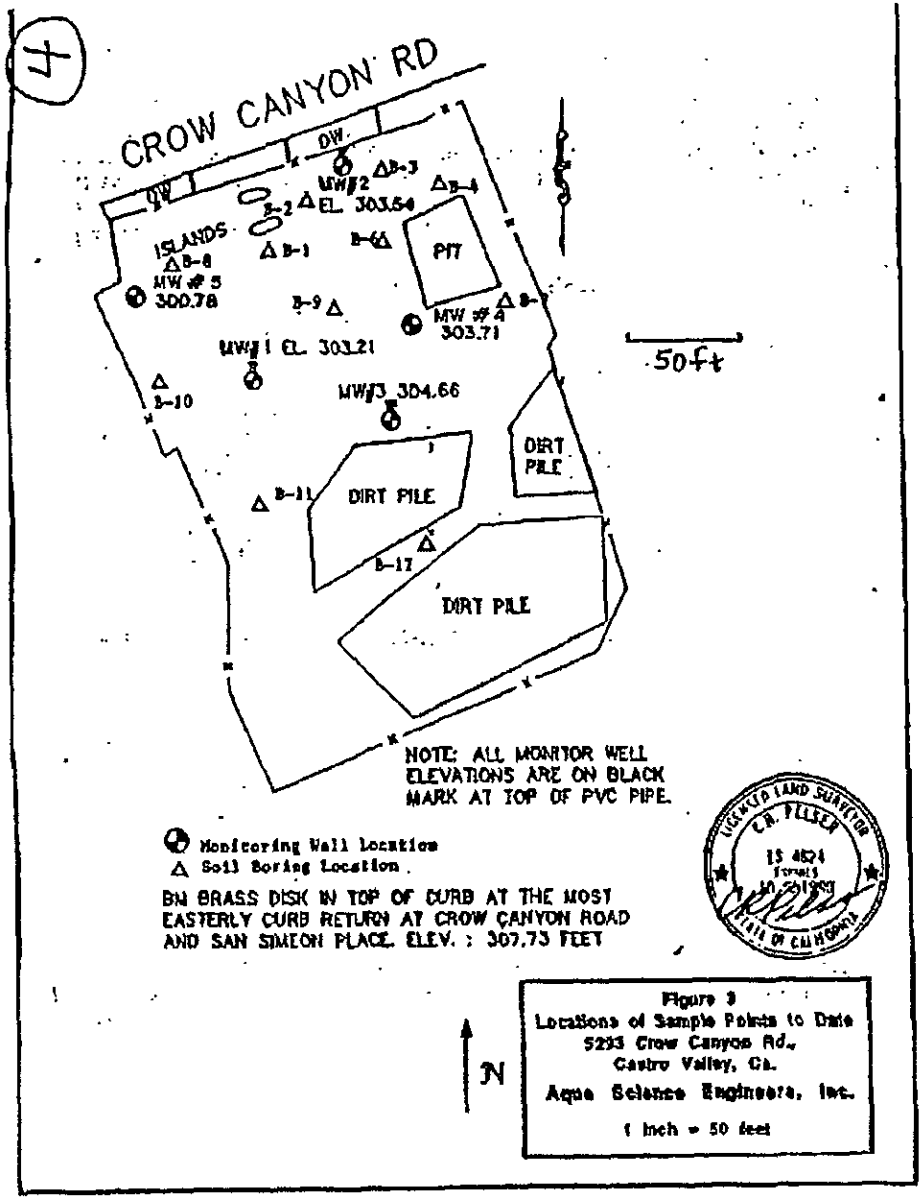


Figure 3
Locations of Sample Points to Date
5293 Crow Canyon Rd.,
Castro Valley, Ca.
Aqua Science Engineers, Inc.
1 inch = 50 feet

(4)

TABLE ONE:
RESULTS OF
SOIL SAMPLE ANALYSES

Soil Sample #	TPH gasoline mg/kg	benzene ug/kg	toluene ug/kg	ethyl benzene ug/kg	total xylenes ug/kg
B-10,5'	N.D.	N.D.	N.D.	N.D.	N.D.
B-10,15'	[illegible]	N.D.	[illegible]	N.D.	[illegible]
B-10,15'	[illegible]	N.D.	[illegible]	N.D.	[illegible]
B-10,20'	[illegible]	N.D.	N.D.	N.D.	N.D.
B-11,5'	N.D.	N.D.	N.D.	N.D.	N.D.
B-11,20'	N.D.	N.D.	N.D.	N.D.	N.D.
B-12,5'	N.D.	N.D.	N.D.	N.D.	N.D.
B-12,10'	N.D.	N.D.	N.D.	N.D.	N.D.
B-12,15'	N.D.	N.D.	N.D.	N.D.	N.D.
B-12,20'	N.D.	N.D.	N.D.	N.D.	N.D.
B-12,25'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-4,5'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-4,10'	[illegible]	N.D.	N.D.	N.D.	N.D.
MW-4,15'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-4,20'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-5,5'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-5,9.5'	N.D.	N.D.	N.D.	N.D.	N.D.
MW-5,15'	N.D.	N.D.	N.D.	N.D.	N.D.

Soil Sample #	TPH-diesel mg/kg	TOG mg/kg	chlorinated hydrocarbons ug/kg
B-12,10'	N.D.	N.D.	[illegible] dichloromethane
B-12,20'	N.D.	N.D.	[illegible] dichloromethane
MW-4,10'	N.D.	----	----

5293 Crow Canyon Rd. - Sept. 16, 1991

Appendix C
Supplementary Data

Output Table 1

RBCA TIER 1/TIER 2 EVALUATION

Site Name: Parker's Shell Station, new fodab Identification: 1428-01
Site Location: Castro Valley Date Completed 7/10/97
Completed By: Andy Hilliard

Software: GSI RBCA Spreadsheet
Version: 1 0.1

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

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
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				

Matrix of Exposed Persons to Complete Exposure Pathways		Residential	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
Outdoor Air Pathways:				
SS v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S.v	Volatilization from Subsurface Soils	FALSE	FALSE	
GW v	Volatilization from Groundwater	FALSE	FALSE	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	TRUE	FALSE	
GW.b	Vapors from Groundwater	FALSE	FALSE	
Soil Pathways:				
SS d	Direct Ingestion and Dermal Contact	FALSE	FALSE	TRUE
Groundwater Pathways:				
GW i	Groundwater Ingestion	FALSE	FALSE	
S l	Leaching to Groundwater from all Soils	FALSE	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-05*	
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	Constrctn
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
W.gw	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)	8.9E-14	

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)	2.5E+03
Ugw.tr	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 bioattenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value		
hc	Capillary zone thickness (cm)	5 0E+00		
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)	3.0E+02		
Ls	Depth to top of affected subsurface soil (cm)	*1.5E+02*		
Lsubs	Thickness of affected subsurface soils (cm)	*3.0E+02*		
pH	Soil/groundwater pH	6.5		
		capillary	vadose	foundation
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)	1.4E-04	2 3E-04
Lcrk	Foundation crack thickness (cm)	1 5E+01	
eta	Foundation crack fraction	*0.005*	

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)		

CAS Number	Constituent	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(l/kg)	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3/mol)	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
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			
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: Parker's Shell Station, new formulat Site Location: Castro Valley Completed By: Andy Hilliard Date Completed: 7/10/1997

Software version: 1.0.1

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Inhalation RfD_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Inhalation SF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
71-43-2	Benzene	-		1.70E-03	R	2.90E-02	A	2.90E-02	A	A	TRUE
100-41-4	Ethylbenzene	1.00E-01	A	2.86E-01	A	-		-		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: Parker's Shell Station, new fo Site Location: Castro Valley Completed By: Andy Hilliard Date Completed: 7/10/1997

Software version: 1.0.1

RBCA CHEMICAL DATABASE

CAS Number	Constituent	Maximum Contaminant Level MCL (mg/L)	Maximum Contaminant Level reference	Permissible Exposure Limit PEL/TLV (mg/m3)	PEL/TLV ref	Relative Absorption Factors Oral	Relative Absorption Factors Dermal	Detection Limits Groundwater (mg/L)	Groundwater ref	Detection Limits Soil (mg/kg)	Soil ref	Half Life (First-Order Decay) (days) Saturated	Half Life (First-Order Decay) (days) Unsaturated	ref
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
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: Parker's Shell Station, new fo Site Location: Castro Valley Completed By: Andy Hilliard Date Completed: 7/10/1997

Software version: 1.0.1