

March 13, 2023

Tracy England
Oregon DEQ – Eastern Region
475 NE Bellevue Dr.
Bend, Oregon 97701

**RE: Addendum to Risk-Based Closure Report
Site-Specific TPH as Gasoline RBC Calculations and Request for Site Closure
Ed Staub & Sons, 3730 Highway 97, Klamath Falls, OR (LUST ID: 18-22-0172)
HydroCon Project # 10044-001.00**

Dear Mr. England,

On behalf of Ed Staub & Sons (ES&S), HydroCon Environmental LLC (HCE) has prepared this addendum to the Risk-Based Closure Report (HCE, May 11, 2022) for the site referenced above (Figure 1). The purpose of the addendum is to provide the results of site-specific TPH as gasoline RBC calculations in support of our request for DEQ to issue a No Further Action (NFA) determination.

Site Summary

The 3.4-acre property (Site), located at 3730 Highway 97, Klamath Falls, OR (Figure 1), was developed as a fueling station and parking lot between 1956 and 1975. The Site includes three underground storage tanks (USTs) including: a 6,000-gallon diesel UST; a 6,000-gallon gasoline UST; and, a 12,000-gallon gasoline UST. All tanks are single-walled fiberglass and leak detection and tightness testing are conducted regularly.

On January 12, 2022, nine onsite soil borings (HC01-HC08, Figure 2) were completed to depths ranging between 4- and 20-feet below ground surface (using direct-push drilling methods. The boring locations were selected to assess baseline soil and groundwater conditions and identify potential contamination.

As described in the Risk-Based Closure Report, the Conceptual Site Model (CSM) indicates the Site is zoned General Commercial (GC), and the reasonably likely future use of the site is commercial. Groundwater at and near the Site is not currently, or reasonably likely to be used for beneficial purposes in the future. The CSM excluded residential exposure scenarios and identified the following exposure pathways as potentially complete for occupational, construction, and/or excavation worker receptors.

Soil:

- *Soil Ingestion, Dermal Contact, and Inhalation* (occupational, construction, and excavation)
- *Volatilization to Outdoor Air* (occupational)
- *Vapor Intrusion into Buildings* (occupational)

Groundwater:

- *Groundwater in Excavations* (construction and excavation)
- *Volatilization to Outdoor Air* (occupational)
- *Vapor Intrusion into Buildings* (occupational)

No applicable generic RBCs were exceeded in soil or groundwater samples, with the exception of gasoline-range petroleum hydrocarbons (GRPH) in groundwater sample HC08-W (17,400 µg/l), which exceeds the generic RBC for groundwater in an excavation for construction and excavation workers. To demonstrate GRPH concentrations wouldn't pose an unacceptable exposure risk to excavation and construction workers, a Site-specific TPH as gasoline RBC for this exposure pathway was calculated.

Site-Specific RBCs for TPH as Gasoline

Site-specific RBCs were calculated for TPH as gasoline using the DEQ spreadsheet *Calculating Noncarcinogenic RBCs for Total Petroleum Hydrocarbons*. The TPH fraction composition data, exposure factors, and calculated site-specific TPH RBCs for gasoline are presented in Attachment 1. The calculations used the analytical data for soil sample HC08-5.0 (Table 1), the same boring as the generic TPH RBC exceedance in groundwater. No exposure factors were adjusted.

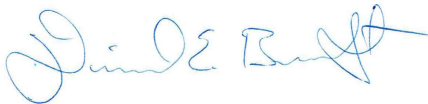
The RBCs for the applicable exposure pathways are included in Tables 1 and 2. The only adjustment from generic RBCs is the site-specific TPH as gasoline RBC_{we} for groundwater in excavations for construction and excavation workers, which exceeds the solubility limit.

The analytical results and station leak detection and other records support that the residual hydrocarbon detections do not indicate a current or on-going release, and are likely the result of historical overfill, surface spillage, or similar events. None of the detected concentrations exceed the applicable generic RBCs, or the site-specific TPH as gasoline RBC.

In consideration of the investigation results, HCE requests an NFA determination be issued for the site.

If you have any questions, feel free to call me on my cell phone at 541-350-3610.

Sincerely,

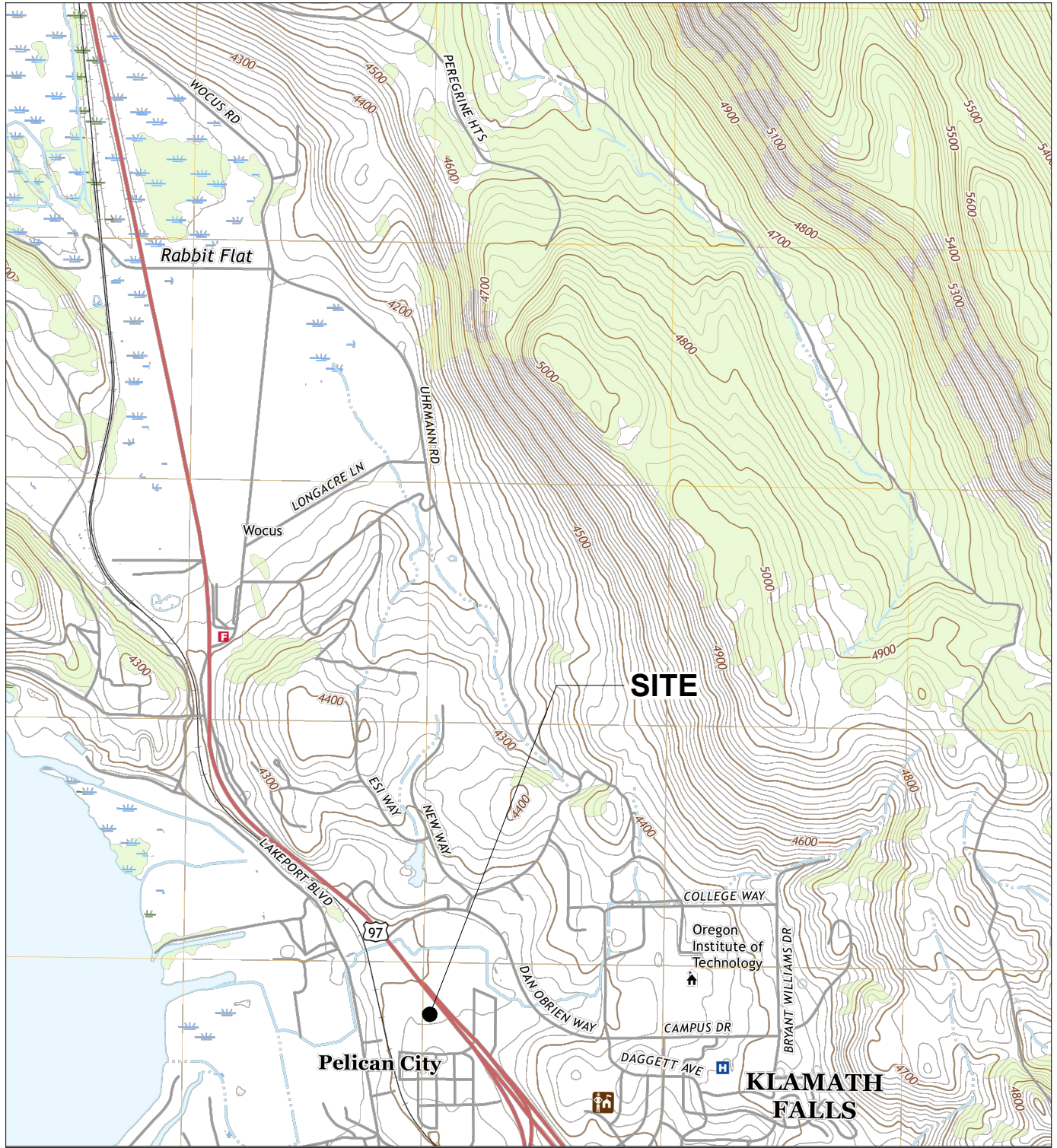


Daniel Becraft R.G.
Senior Geologist
HydroCon Environmental, LLC

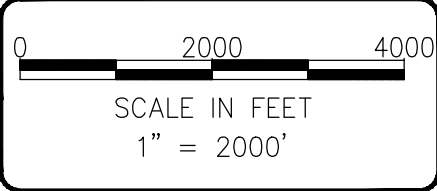
Attachments



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NOTE(S):
 USGS, WOCUS QUADRANGLE,
 OREGON - KLAMATH COUNTY
 7.5 MINUTE SERIES (TOPOGRAPHIC)



314 W 15th Street, Suite 300, Vancouver, Washington 98660
 Phone 360.703.6079 Fax 360.703.6086

DATE: 1-28-2022
 DWN: LC
 CHK: DB
 APPROVED: DB
 PRJ. MGR: DB
 PROJECT NO:
 2022-001

FIGURE 1
 SITE LOCATION MAP
 PHASE II ENVIRONMENTAL SITE ASSESSMENT
 ED STAUB AND SONS
 3730 HIGHWAY 97 NORTH
 KLAMATH FALLS, OREGON

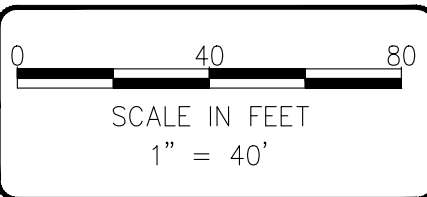
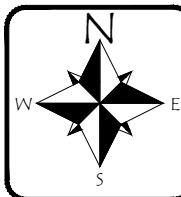
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Legend

--- Subject Site Property Boundary (Approximate)

HC01  Soil and Groundwater Sample Location




314 W 15th Street, Suite 300, Vancouver, Washington 98660
Phone 360.703.6079 Fax 360.703.6086

DATE: 1-28-2022
DWN: LC
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FIGURE 2
BORING LOCATIONS
PHASE II ENVIRONMENTAL SITE ASSESSMENT
ED STAUB AND SONS
3730 HIGHWAY 97 NORTH
KLAMATH FALLS, OREGON



Table 1
Summary of Phase II ESA Soil Analytical Results
3730 Hwy 97, Klamath Falls, Oregon

Sample Identification	Sample Depth (feet bgs)	Sample Date	Soil Analytical Results in mg/kg																				
			GRPH	DRPH	ORPH	Benzene	Toluene	Ethylbenzene	Xylenes, Total	MTBE	Naphthalene	EDB	EDC	Isopropylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Fluoranthene	Fluorene	1-Methylnaphthalene	Phenanthrene	Pyrene	Dibenzofuran	Remaining PAHs
HC01-5.0	5.0	01/12/22	231	3370	<63.3	<0.0231	<0.116	<0.0578	<0.173	<0.116	<0.491	<0.116	<0.0578	<0.116	<0.116	<0.116	1.4	1.02	0.691	0.779	0.479	ND	
HC01-10	10.0	01/12/22	<22.9	80.4	<93.5	<0.0459	<0.229	<0.115	<0.344	-	<0.459	-	-	-	-	-	-	-	-	-	-	-	
HC02-4.0	4.0	01/12/22	191	<25.0	<50.0	<0.0143	<0.0715	<0.0358	<0.107	-	<0.143	-	-	-	-	-	-	-	-	-	-	-	
HC03-4.0	4.0	01/12/22	<7.37	<25.0	<50.0	<0.0147	<0.0737	<0.0368	<0.111	-	<0.147	-	-	-	-	-	-	-	-	-	-	-	
HC04-10.0	10.0	01/12/22	<23.9	<43.0	<86.0	<0.0477	<0.239	<0.119	<0.358	-	<0.477	-	-	-	-	-	-	-	-	-	-	-	
HC05-20	20.0	01/12/22	<16.8	<39.8	<79.6	<0.0336	<0.168	<0.0839	<0.252	-	<0.336	-	-	-	-	-	-	-	-	-	-	-	
HC06-15.0	15.0	01/13/22	<17.9	<43.9	<87.7	<0.0358	<0.179	<0.0896	<0.269	-	<0.358	-	-	-	-	-	-	-	-	-	-	-	
HC07-10.0	10.0	01/13/22	18	64.4	89.6	<0.0303	<0.152	<0.0758	<0.227	-	<0.303	-	-	-	-	-	-	-	-	-	-	-	
HC08-5.0	5	01/13/22	11	<25.2	167	<0.0120	<0.0598	<0.0299	<0.0897	<0.0598	0.122	<0.0598	<0.0299	<0.0598	<0.0598	-	-	-	-	-	-	-	
Applicable DEQ Risk-Based Concentrations ¹																							
Vapor Intrusion into Buildings (RBC _{si})			>Max	>Max	>Max	2.1	>538	17	>358	110	83	0.16	1	>335	210	>Max	NV	>Max	NV	NV	>Max	NV	-
Volatilization to Outdoor Air (RBC _{so})			>Max	>Max	>Max	50	>538	160	>358	1500	83	0.65	15	>335	980	>Max	NV	>Max	NV	NV	>Max	NV	-
Soil Ingestion, Dermal Contact, and Inhalation (RBC _{ss})			20,000	14,000	36,000	37	88,000	150	25,000	1,100	23	0.73	16	57,000	2,000	12,000	30,000	47,000	NV	NV	23,000	NV	-
Occupational Worker			9,700	4,600	11,000	380	28,000	1,700	20,000	12,000	580	9	580	580	580	580	10,000	14,000	NV	NV	7,500	NV	-
Construction Worker			>Max	>Max	>Max	11,000	770,000	49,000	560,000	320,000	16,000	250	16,000	16,000	16,000	16,000	280,000	390,000	NV	NV	210,000	NV	-
Excavation Worker																							

NOTES:

bgs = below ground surface

Chemical analyses performed by APEX Labs of Tigard, Oregon.

Gasoline-Range Total Petroleum Hydrocarbons (GRPH) analyzed by Northwest Method NWTPH-Gx.

Diesel-Range Total Petroleum Hydrocarbons (DRPH) analyzed by Northwest Method NWTPH-Dx.

Oil-Range Total Petroleum Hydrocarbons (ORPH) analyzed by Northwest Method NWTPH-Dx.

BTEX + Naphthalene analyzed by EPA Method 8260D.

¹Oregon Department of Environmental Quality (DEQ). Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites.

mg/kg = milligrams per kilogram (parts per million)

Bold indicates analyte detection exceeds one or more RBC.

"<6.09" indicates the analyte was not detected above the laboratory reporting limit.

>Csat = this soil RBC exceeds the limit of three-phase equilibrium partitioning.

>Max = this constituent RBC for this pathway is calculated as greater than 1,000,000 mg/kg. Therefore, this substance is deemed to not pose risks in this scenario.



Table 2
Summary of Phase II ESA Groundwater Analytical Results
3730 Hwy 97, Klamath Falls, Oregon

Well Identification	Sample Date	Groundwater Analytical Results in µg/L																						
		GRPH	DRPH	ORPH	Benzene	Toluene	Ethylbenzene	Xylenes, Total	MTBE	Napthalene	EDB	EDC	Isopropylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Acenaphthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Phenanthrene	Pyrene	Dibenzofuran	Remaining PAHs	Lead
HC01-W	01/15/22	771	5,450	<162	3.94	22.30	2.11	23.30	<1.00	<4.0	<0.500	<0.500	<1.00	3.41	1.82	<1.49	2.82	6.49	<0.851	0.984	0.613	1.21	<1.49	-
HC04-W	01/15/22	<100	129	<151	<0.200	<1.0	<0.500	<1.50	-	<2.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HC06-W	01/15/22	<100	<87.0	<174	<0.200	<1.0	<0.500	<1.50	-	<2.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HC07-W	01/15/22	408	3,230	<151	<0.200	<1.0	<0.500	<1.50	-	<2.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HC08-W	01/15/22	17,400	2,330	<163	202	48	910	581	1.52	181.0	<0.500	<0.500	<87.4	584	144	-	-	-	-	-	-	-	-	23.1
Applicable DEQ Risk-Based Concentrations¹																								
Vapor Intrusion into Buildings (RBC_{wi})																								
Occupational	>150,000	>80,000	>100,000	2,800	>526,000	8,200	>106,000	870,000	11,000	590	3,900	>61,300	>57,000	>48,200	>3,900	>1,690	>25,000	>24,600	NV	>135	-	-	-	-
Volatilization to Outdoor Air (RBC_{wo})																								
Occupational	>150,000	>80,000	>100,000	14,000	>526,000	43,000	>106,000	1,500,000	16,000	790	9,000	>61,300	>57,000	>48,200	>3,900	>1,690	>25,000	>24,600	NV	>135	-	-	-	-
Groundwater in Excavation (RBC_{wc})																								
Cons. & Exc. Worker	>S	>80,000	>100,000	1,800	220,000	4,500	23,000	63,000	500	27	630	51,000	1,700	15,000	>3,900	>1,690	>25,000	>24,600	NV	>Pv	-	-	<S	

NOTES:

Chemical analyses performed by APEX Labs of Tigard, Oregon.

Gasoline-Range Total Petroleum Hydrocarbons (GRPH) analyzed by Northwest Method NWTPH-Gx.

Diesel-Range Total Petroleum Hydrocarbons (DRPH) analyzed by Northwest Method NWTPH-Dx.

Oil-Range Total Petroleum Hydrocarbons (ORPH) analyzed by Northwest Method NWTPH-Dx.

RBDM Compunds analyzed by EPA Method 8260CD

¹Oregon Department of Environmental Quality (DEQ). Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites.

µg/L = micrograms per liter (parts per billion)

Bold indicates analyte detection exceeds one or more RBC.

"<100" indicates the analyte was not detected above the laboratory reporting limit.

>S = this groundwater RBC exceeds the solubility limit.

>S - Green color indicates site-specific RBC

ATTACHMENT 1
SITE-SPECIFIC TPH-GASOLINE RBC SPREADSHEETS

TPH Fraction Composition (Weight Fraction)

Fuel Fractions	Site-Specific Data			Generic Weight Fraction Data		
	Raw Data mg/kg (ppm)	Adjusted Data mg/kg (ppm)	Weight Fraction	Gasoline	Diesel	Mineral Oil
Aliphatic C5-C6		3	2.98E-01	2.06E-01	0.00E+00	0.00E+00
Aliphatic >C6-C8		4	3.18E-01	2.20E-01	0.00E+00	0.00E+00
Aliphatic >C8-C10		1	1.30E-01	9.00E-02	2.00E-02	1.00E-03
Aliphatic >C10-C12		0	4.34E-02	3.00E-02	7.00E-02	3.00E-03
Aliphatic >C12-C16		0	0.00E+00	0.00E+00	3.50E-01	1.60E-01
Aliphatic >C16-C21		0	0.00E+00	0.00E+00	3.40E-01	7.00E-01
Aliphatic >C21-C34		0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aromatic >C8-C10		1	1.31E-01	9.02E-02	2.52E-03	1.00E-03
Aromatic >C10-C12		0	3.26E-02	2.25E-02	7.40E-03	1.00E-03
Aromatic >C12-C16		0	0.00E+00	0.00E+00	8.00E-02	7.00E-03
Aromatic >C16-C21		0	0.00E+00	0.00E+00	1.20E-01	8.00E-02
Aromatic >C21-C34		0	0.00E+00	0.00E+00	0.00E+00	4.60E-02
n-Hexane		0.4	3.47E-02	2.40E-02	0.00E+00	0.00E+00
Benzene	0.0	0.0	1.09E-03	2.50E-02	2.90E-04	0.00E+00
Toluene	0.0	0.0	0.00E+00	1.20E-01	1.80E-03	0.00E+00
Ethylbenzene	0.0	0.0	0.00E+00	2.00E-02	6.80E-04	0.00E+00
Total Xylenes	0.0	0.0	0.00E+00	1.10E-01	5.00E-03	0.00E+00
1,2,4-trimethylbenzene	0.0	0.0	0.00E+00	3.00E-02	0.00E+00	0.00E+00
1,3,5-trimethylbenzene	0.0	0.0	0.00E+00	9.80E-03	1.80E-03	0.00E+00
Naphthalene	0.1	0.1	1.11E-02	2.50E-03	2.60E-03	0.00E+00
Total	0	11	1.00	1.00	1.00	1.00

Use one of the following two options for site-specific TPH RBC calculations.		
OPTION 1: Estimate TPH Fractions	(1) Enter TPH data (mg/kg or ppm) into the cell on the right.	11
	(2) Enter BTEX, TMB, and naphthalene data in the "Raw Data" column above.	Gasoline Estimate
	(3) Use one of the buttons at the right to identify the predominant product.	Diesel Estimate
OR		
OPTION 2: Use VPH and EPH Results	(1) Enter TPH fraction <u>and</u> constituent data in the "Raw Data" column above.	Gasoline Fractions
	(2) Use one of the buttons at the right to identify the predominant product.	Non-Gas Fractions

For references, please refer to *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, 2003).

Exposure Factors

Reasonable Maximum Exposure

Parameter (unit)	Symbol	Residential	Urban Residential	Occupational	Construction Worker	Excavation Worker
ACCEPTABLE RISK LEVELS						
Acceptable Risk Level - Carcinogens	ARLc	1.00E-06	=	=	=	=
Acceptable Risk Level - Noncarcinogens	ARLn	1	=	=	=	=
EXPOSURE PARAMETERS						
Averaging Time - Carcinogen (yr)	ATc	70	=	=	=	=
Averaging Time - Noncarcinogen (yr)	ATn	30	11	25	1	1
Averaging Time - Noncarcinogen, Child (yr)	ATnc	6	6	NA	NA	NA
Body Weight - Adult (kg)	BWa	70	=	=	=	=
Body Weight - Child (kg)	BWc	15	=	NA	NA	NA
Exposure Duration - Adult (yr)	ED	30	11	25	1	1
Exposure Duration - Child (yr)	EDc	6	6	NA	NA	NA
Exposure Frequency (day/yr)	EF	350	175	250	250	9
Exposure Time (hr/day)	ET	24	24	8	8	8
Event Frequency - Groundwater (events/day)	EvFwe	NA	NA	NA	2	=
Event Time - Groundwater (hr/event)	t _{event}	NA	NA	NA	2	=
Inhalation Rate - Adult (m ³ /day)	IRA	20	20	7	7	7
Inhalation Rate - Child (m ³ /day)	IRAc	8.3	=	NA	NA	NA
Soil Ingestion Rate - Adult (mg/day)	IRS	100	100	100	330	330
Soil Ingestion Rate - Child (mg/day)	IRSc	200	200	NA	NA	NA
Water Ingestion Rate - Adult (L/day)	IRW	2.0	2.0	0.7	NA	NA
Water Ingestion Rate - Child (L/day)	IRWc	1.5	=	NA	NA	NA
Skin Surface Area - Adult to Soil (cm ²)	SA	5700	5700	3300	3300	3300
Skin Surface Area - Child to Soil (cm ²)	SAc	2800	=	NA	NA	NA
Skin Surface Area - Adult to Groundwater (cm ²)	SAw	NA	NA	NA	5700	5700
Soil to Skin Adherence Factor - Adult (mg/cm ² -day)	AF	0.07	0.07	0.10	0.30	0.30
Soil to Skin Adherence Factor - Child (mg/cm ² -day)	AFc	0.20	=	NA	NA	NA
AGE-ADJUSTED EXPOSURE FACTORS						
Ingestion Factor - Soil (mg-yr/kg-d)	IFSadj	114	87	NA	NA	NA
Ingestion Factor - Water (L-yr/kg-d)	IFWadj	1.29	0.74	NA	NA	NA
Surface Area Factor - Skin (mg-yr/kg-d)	SFSadj	361	253	NA	NA	NA

Fuel Fraction	RBCwi			RBCwe	RBCair		
	Residential	Urban Residential	Occupational	Construction & Excavation Worker	Residential	Urban Residential	Occupational
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/m ³)	(ug/m ³)	(ug/m ³)
Aliphatic C5-C6	2.9E+03	2.9E+03	3.7E+04	1.7E+05	7.3E+02	7.3E+02	3.1E+03
Aliphatic >C6-C8	1.9E+03	1.9E+03	2.4E+04	1.7E+05	7.3E+02	7.3E+02	3.1E+03
Aliphatic >C8-C10	1.7E+02	1.7E+02	2.2E+03	2.0E+03	1.0E+02	1.0E+02	4.4E+02
Aliphatic >C10-C12	1.1E+02	1.1E+02	1.4E+03	6.7E+02	1.0E+02	1.0E+02	4.4E+02
Aliphatic >C12-C16	2.6E+01	2.6E+01	3.3E+02	1.2E+02	1.0E+02	1.0E+02	4.4E+02
Aliphatic >C16-C21	2.8E+17	2.8E+17	3.5E+18	2.4E+03	1.0E+19	1.0E+19	4.4E+19
Aliphatic >C21-C34	1.4E+16	1.4E+16	1.7E+17	9.0E+02	1.0E+19	1.0E+19	4.4E+19
Aromatic >C8-C10	2.7E+21	2.7E+21	3.4E+22	2.1E+21	1.0E+19	1.0E+19	4.4E+19
Aromatic >C10-C12	8.9E+04	8.9E+04	1.1E+06	1.4E+04	1.0E+02	1.0E+02	4.4E+02
Aromatic >C12-C16	2.3E+05	2.3E+05	2.9E+06	1.2E+04	1.0E+02	1.0E+02	4.4E+02
Aromatic >C16-C21	8.9E+05	8.9E+05	1.1E+07	9.5E+03	1.0E+02	1.0E+02	4.4E+02
Aromatic >C21-C34	1.7E+24	1.7E+24	2.1E+25	7.3E+03	1.0E+19	1.0E+19	4.4E+19
n-Hexane	9.5E+03	9.5E+03	1.2E+05	6.5E+04	7.3E+02	7.3E+02	3.1E+03
Benzene	1.9E+04	1.9E+04	2.4E+05	5.7E+03	3.1E+01	3.1E+01	1.3E+02
Toluene	2.7E+06	2.7E+06	3.4E+07	2.1E+05	5.2E+03	5.2E+03	2.2E+04
Ethylbenzene	5.3E+05	5.3E+05	6.6E+06	1.1E+05	1.0E+03	1.0E+03	4.4E+03
Total Xylenes	5.9E+04	5.9E+04	7.4E+05	2.3E+04	1.0E+02	1.0E+02	4.4E+02
1,2,4-trimethylbenzene	5.0E+03	5.0E+03	6.4E+04	1.7E+03	7.3E+00	7.3E+00	3.1E+01
1,3,5-trimethylbenzene	5.4E+21	5.4E+21	6.8E+22	2.3E+04	1.0E+19	1.0E+19	4.4E+19
Naphthalene	2.9E+04	2.9E+04	3.7E+05	7.2E+02	3.1E+00	3.1E+00	1.3E+01
TPH RBC* →	4,400	4,400	>S	>S	690	690	2,900
Generic Gasoline	22,000	22,000	>S	14,000	390	390	1,700
Generic Diesel / Heating Oil	>S	>S	>S	>S	100	100	440
Generic Mineral Insulating Oil	>S	>S	>S	>S	150	150	620