State of Oregon Department of Environmental Quality

RISK-BASED CONCENTRATIONS ABRIDGED FOR **LEAKING UNDERGROUND STORAGE TANKS (LUST)** AND H**EATING** O**IL** T**ANKS (HOT)**

Contaminated Medium →		SOIL mg/Kg (ppm)										SOIL mg/Kg (ppm)						SOIL mg/Kg (ppm)						SOIL mg/Kg (ppm)						GROUNDWATER (µg/L (ppb))					
Exposure Pathway →		Soil Ingestion, Dermal Contact, and Inhalation (RBC_{ss})										Volatilization to Outdoor Air (RBC_{so})						Vapor Intrusion into Buildings (RBC_{si})						Leaching to Groundwater (RBC_{sw})						Ingestion & Inhalation from Tapwater (RBC_{tw})					
Receptor Scenario →		Residential		Urban Residential		Occupational		Construction Worker		Excavation Worker		Residential		Urban Residential		Occupational		Residential		Urban Residential		Occupational		Residential		Urban Residential		Occupational		Residential		Urban Residential		Occupational	
Direct or Indirect Pathway (see notes)		DC		DC		DC		DC		DC		IVS		IVS		IVS		IVS		IVS		IVS		IS		IS		IS		DS		DS		DS	
Contaminant	Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note
Benzene	c, v	8.2		24		37		380		11,000	>Csat	11		27		50		0.16		0.38		2.1		0.023		0.10		0.10		0.46		2.0		2.1	
Toluene	nc, v	5,800	>Csat	12,000	>Csat	88,000	>Csat	28,000	>Csat	770,000	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	84		340		490		1,100		4,400		6,300	
Ethylbenzene	c, v	34		110		150		1,700	>Csat	49,000	>Csat	36		85		160		1.3		3.0		17		0.22		0.94		0.90		1.5		6.7		6.4	
Xylenes	nc, v	1,400	>Csat	2,900	>Csat	25,000	>Csat	20,000	>Csat	560,000	>Csat	-	>Csat	-	>Csat	-	>Csat	160		160		-	>Csat	23		87		100		190		710		830	
iso-Propylbenzene (cumene)	nc, v	3,500	>Csat	7,000	>Csat	57,000	>Csat	27,000	>Csat	750,000	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	96		-	>Csat	-	>Csat	440		1,800		2000	
Trimethylbenzene, 1,2,4-	nc, v	430		860		6,900	>Csat	2,900	>Csat	81,000	>Csat	-	>Csat	-	>Csat	-	>Csat	140		140		-	>Csat	10		43		48		54		230		250	
Trimethylbenzene, 1,3,5-	nc, v	430	>Csat	860	>Csat	6,900	>Csat	2,900	>Csat	81,000	>Csat	-	>Csat	-	>Csat	-	>Csat	98		98		-	>Csat	11		45		53		59		240		280	
Acenaphthene	nc, v	4,700	>Csat	9,400	>Csat	70,000	>Csat	21,000	>Csat	590,000	>Csat	-	>Max	-	>Max	-	>Max	-	>Max	-	>Max	-	>Max	-	>Csat	-	>Csat	-	>Csat	510		2,400		2,500	
Anthracene	nc, v	23,000	>Csat	47,000	>Csat	350,000	>Csat	110,000	>Csat	-	>Max	-	>Max	-	>Max	-	>Max	-	>Max	-	>Max	-	>Max	-	>Csat	-	>Csat	-	>Csat	-	>S	-	>S	-	>S
Benz[a]anthracene	c,v	1.1		2.5		21	>Csat	170	>Csat	4,800	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	1.6		6.0		-	>Csat	0.030		0.11		0.38	
Benzo[b]fluoranthene	c, nv	1.1		2.5		21	>Csat	170	>Csat	4,900	>Csat	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>Csat	-	>Csat	-	>Csat	0.25		0.80		-	>S
Benzo[k]fluoranthene	c, nv	11	>Csat	25	>Csat	210	>Csat	1,700	>Csat	49,000	>Csat	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>Csat	-	>Csat	-	>Csat	-	>S	-	>S	-	>S
Benzo[a]pyrene (BaP equivalents)**	c, nv	0.11		0.25		2.1		17	>Csat	490	>Csat	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	4.4		-	>Csat	-	>Csat	0.025		0.080		0.47	
Chrysene	c, nv	110	>Csat	250	>Csat	2,100	>Csat	17,000	>Csat	490,000	>Csat	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>Csat	-	>Csat	-	>Csat	-	>S	-	>S	-	>S
Dibenz[a,h]anthracene	c, nv	0.11		0.25		2.1		17	>Csat	490	>Csat	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>Csat	-	>Csat	-	>Csat	0.025		0.080		0.47	
Fluoranthene	nc, nv	2,400	>Csat	4,800	>Csat	30,000	>Csat	10,000	>Csat	280,000	>Csat	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>Csat	-	>Csat	-	>Csat	-	>S	-	>S	-	>S
Fluorene	nc, v	3,100	>Csat	6,300	>Csat	47,000	>Csat	14,000	>Csat	390,000	>Csat	-	>Max	-	>Max	-	>Max	-	>Max	-	>Max	-	>Max	-	>Csat	-	>Csat	-	>Csat	280		1,400		1,300	
Indeno[1,2,3-cd]pyrene	c, nv	1.1		2.5		21	>Csat	170	>Csat	4,800	>Csat	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>Csat	-	>Csat	-	>Csat	-	>S	-	>S	-	>S
Naphthalene	c, v	5.3		25		23		580		16,000	>Csat	6.4		15		83		6.4		15		83		0.077		0.37		0.34		0.17		0.78		0.72	
Pyrene	nc, v	1,800	>Csat	3,600	>Csat	23,000	>Csat	7,500	>Csat	210,000	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	-	>Csat	110		-	>S	-	>S
MTBE (methyl t-butyl ether)	c, v	250		730		1,100		12,000	>Csat	320,000	>Csat	340		810		1,500		8.5		20		110		0.11		0.50		0.54		14		64		68	
EDB (1,2-dibromoethane)	c, v	0.16		0.53		0.73		9.0		250		0.15		0.35		0.65		0.012		0.028		0.16		0.00012		0.00056		0.00056		0.0075		0.034		0.034	
EDC (1,2-dichloroethane)	c, v	3.6		12		16		200		5,600	>Csat	3.4		8.1		15		0.077		0.18		1.0		0.0028		0.013		0.013		0.17		0.78		0.78	
Lead	nc, nv	400	L	400	L	800	L	800	L	800	L	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	30	L	30	L	30	L	15	L	15	L	15	L
Generic Gasoline	nc, v	1,200		2,500		20,000		9,700		>Max		5,900		5,900		69,000		94		94		>Max		31		31		130		110		110		450	
Generic Diesel/Heating Oil	nc, v	1,100		2,200		14,000		4,600		>Max		>Max		>Max		>Max		>Max		>Max		>Max		9,500		9,500		>Max		100		100		430	
Generic Mineral/Insulating Oil	nc, nv	2,800		5,700		36,000		11,000		>Max		>Max		>Max		>Max		>Max		>Max		>Max		>Max		>Max		>Max		300		300		1,300	

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Contaminated Medium →	GROUNDWATER (µg/L (ppb))						GROUNDWATER (µg/L (ppb))						GROUNDWATER (µg/L (ppb))		Soil Gas (µg/m³)						AIR (µg/m³)					
Exposure Pathway →	Volatilization to Outdoor Air (RBC_{wo})						Vapor Intrusion into Buildings (RBC_{wi})						GW in Excavation (RBC_{we})		Inhalation (RBC_{SV})						Inhalation (RBC_{air})					
Receptor Scenario →	Residential		Urban Residential		Occupational		Residential		Urban Residential		Occupational		Construction & Excavation Worker		Residential		Urban Residential		Occupational		Residential		Urban Residential		Occupational	
Direct or Indirect Pathway (see notes)	IVW		IVW		IVW		IVW		IVW		IVW		DS		ICA		ICA		ICA		DCA		DCA		DCA	
Contaminant	Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note		Note	
Benzene	c, v	3,100		7,400		14,000		210		510		2,800		1,800		72		170		1,600		0.36		0.85		1.6	
Toluene	nc, v	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	220,000		1,000,000		1,000,000		21,900,000		5200		5200		22000	
Ethylbenzene	c, v	9,900	>S	23,000	>S	43,000	>S	620	>S	1,500	>S	8,200	>S	4,500		220		530		4,900		1.1		2.7		4.9	
Xylenes	nc, v	-	>S	-	>S	-	>S	86,000		86,000		-	>S	23,000		21,000		21,000		440,000		100		100		440	
iso-Propylbenzene (cumene)	nc, v	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	51,000		83,000		83,000		1,800,000		420		420		1800	
Trimethylbenzene, 1,2,4-	nc, v	-	>S	-	>S	-	>S	50,000		50,000		-	>S	6,300		13,000		13,000		260,000		63		63		260	
Trimethylbenzene, 1,3,5-	nc, v	-	>S	-	>S	-	>S	36,000		36,000		-	>S	7,500		13,000		13,000		260,000		63		63		260	
Acenaphthene	nc, v	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>Pv	-	>Pv	-	>Pv	-	>Pv	-	>Pv	-	>Pv
Anthracene	nc, v	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>Pv	-	>Pv	-	>Pv	-	>Pv	-	>Pv	-	>Pv
Benz[a]anthracene	c, v	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>Pv	-	>Pv	-	>Pv	0.017		0.033		0.20	
Benzo[b]fluoranthene	c, nv	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>S	-	NV	-	NV	-	NV	0.017		0.033		0.20	
Benzo[k]fluoranthene	c, nv	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>S	-	NV	-	NV	-	NV	-	>Pv	-	>Pv	-	>Pv
Benzo[a]pyrene (BaP equivalents)**	c*, nv	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>S	-	NV	-	NV	-	NV	0.0017		0.0021		0.0088	
Chrysene	c, nv	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>S	-	NV	-	NV	-	NV	1.7		3.3		-	>Pv
Dibenz[a,h]anthracene	c, nv	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>S	-	NV	-	NV	-	NV	-	>Pv	-	>Pv	-	>Pv
Fluoranthene	nc, nv	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>S	-	NV	-	NV	-	NV	-	>Pv	-	>Pv	-	>Pv
Fluorene	nc, v	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>Pv	-	>Pv	-	>Pv	-	>Pv	-	>Pv	-	>Pv
Indeno[1,2,3-cd]pyrene	c, nv	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>S	-	NV	-	NV	-	NV	-	>Pv	-	>Pv	-	>Pv
Naphthalene	c, v	3,600		8,500		16,000	>S	840		2,000		11,000		500		17		39		360		0.083		0.20		0.36	
Pyrene	nc, v	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>S	-	>Pv	-	>Pv	-	>Pv	-	>Pv	-	>Pv	-	>Pv
MTBE (methyl t-butyl ether)	c, v	350,000		830,000		1,500,000		67,000		160,000		870,000		63,000		2,200		5,100		47,000		11		26		47	
EDB (1,2-dibromoethane)	c, v	180		430		790		45		110		590		27		0.94		2.2		20		0.0047		0.011		0.02	
EDC (1,2-dichloroethane)	c, v	2,100		4,900		9,000		300		700		3,900		630		22		51		470		0.11		0.26		0.47	
Lead	nc, nv	-	NV	-	NV	-	NV	-	NV	-	NV	-	NV	-	>S	-	NV	-	NV	-	NV	-	>Pv	-	>Pv	-	>Pv
Generic Gasoline	nc, v	>S		>S		>S		22,000		22,000		>S		14,000		79,000		79,000		1,700,000		390		390		1,700	
Generic Diesel/Heating Oil	nc, v	>S		>S		>S		>S		>S		>S		>S		21,000		21,000		440,000		100		100		440	
Generic Mineral/Insulating Oil	nc, nv	>S		>S		>S		>S		>S		>S		>S		30,000		30,000		620,000		150		150		620	

NOTES:

Direct or Indirect Pathway Codes have the following meanings: DC means it is a direct contact pathway with a limiting value of Csat. IVS means it is an indirect pathway with a limiting value of Csat. DS means it is a direct contact pathway with a limiting value equal to the solubility, S. IVW means it is an indirect pathway with a limiting value equal to the solubility, S. DPA or ICA means it has a limiting value equal to the vapor pressure, Pv.

The symbols in the "**Note**" columns are explained below. The references can be found in *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites* (DEQ, 2003)

c	This chemical is a known or suspected carcinogen. The RBCs in this row were calculated using equations for carcinogens. To calculate the appropriate RBCs for non-carcinogenic effects, you need to first change the toxicity basis in the spreadsheet from "c" to "nc", and then re-calculate the RBCs. You should use the lower of the calculated RBCs for each exposure scenario. This summary table (but not the associated spreadsheet) includes the lower of the carcinogenic and non-carcinogenic RBCs.
>Csat	This soil RBC exceeds the limit of three-phase equilibrium partitioning. Refer to "ChemData" page for the corresponding value of Csat. Soil concentrations in excess of Csat indicate that free product might be present. See Section B.2.1.4 for additional information.
L	The values for lead reported in this table are not derived from the equations developed in Appendix B. See Section B.3.4 for the source of the lead numbers and information on applying them. Note that the lead values for RBCsw are reported as mg/L rather than mg/kg since they are the results of leaching tests, not soil measurements.
>Max	The constituent RBC for this pathway is greater than 1,000,000 mg/kg or 1,000,000 mg/L. Therefore, these substances are not expected to pose risks in the scenario shown.
NA	Not Available.
nc	This chemical is a noncarcinogen. The RBCs in this row were calculated using equations for noncarcinogens described in Appendix B.
nv	This chemical is considered "nonvolatile" for purposes of the exposure calculations.
>Pv	The air concentration reported for the RBC exceeds the vapor pressure of the pure chemical. It can be assumed that this constituent cannot create an unacceptable risk by this pathway. See Section B.2.1.4 for additional information.
>S	This groundwater RBC exceeds the solubility limit. Refer to Appendix D for the corresponding value of S. Groundwater concentrations in excess of S indicate that free product may be present. See Section B.2.1.4 for additional information.
v	This chemical is classified as "volatile" for purposes of the exposure calculations in this document.
**	Carcinogenic PAHs are considered in aggregate as a chemical class. RBCs for individual carcinogenic PAHs are provided for convenience.
-	When "Show All Values" is not selected on the Main Menu, all RBC values for indirect pathways that exceed a limit (Csat, S, or Pv) are removed from the table and replaced with "-". If you suspect that a chemical may be present at high concentrations on airborne dust rather than vapor, the vapor pressure limit does not apply, so
c*	use the RBCair value. The values shown are based primarily on a cancer endpoint, but there are one or more scenarios where they are based on a noncancer endpoint.