



Attachment D

**Regulatory and Human Health Benchmarks
Used for SSL Development**



Attachment D

Regulatory and Human Health Benchmarks for SSL Development

This attachment provides regulatory and human health benchmarks necessary to calculate SSLs for 110 chemicals commonly found at National Priority List (NPL) sites. The sources of these values (shown in the following table) are regularly updated by EPA. Prior to calculating SSLs at a site, check all relevant chemical-specific values in this attachment against the most recent version of their sources to ensure that they are up-to-date.

Attachment D. Regulatory and Human Health Benchmarks Used for SSL Development

CAS Number	Chemical Name	Maximum Contaminant Level Goal (mg/L)		Maximum Contaminant Level (mg/L)		Water Health Based Limits (mg/L)		Cancer Slope Factor (mg/kg-d) ⁻¹			Unit Risk Factor (µg/m ³) ⁻¹			Reference Dose (mg/kg-d)		Reference Concentration (mg/m ³)	
		MCLG (PMCLG)	Ref. ^a	MCL (PMCL)	Ref. ^a	HBL ^b	Basis	Carc. Class ^c	SF _o	Ref. ^a	Carc. Class ^c	URF	Ref. ^a	RfD	Ref. ^a	RfC	Ref. ^a
83-32-9	Acenaphthene					2E+00	RfD							6.0E-02	1		
67-64-1	Acetone (2-Propanone)					4E+00	RfD	D			D			1.0E-01	1		
309-00-2	Aldrin					5E-06	SF _o	B2	1.7E+01	1	B2	4.9E-03	1	3.0E-05	1		
120-12-7	Anthracene					1E+01	RfD	D			D			3.0E-01	1		
7440-36-0	Antimony	6.0E-03	3	6.0E-03	3									4.0E-04	1		
7440-38-2	Arsenic			5.0E-02	3			A	1.5E+00	1	A	4.3E-03	1	3.0E-04	1		
7440-39-3	Barium	2.0E+00	3	2.0E+00	3									7.0E-02	1	5.0E-04	2
56-55-3	Benz(a)anthracene					1E-04	SF _o	B2	7.3E-01	4	B2						
71-43-2	Benzene			5.0E-03	3			A	2.9E-02	1	A	8.3E-06	1				
205-99-2	Benzo(b)fluoranthene					1E-04	SF _o	B2	7.3E-01	4	B2						
207-08-9	Benzo(k)fluoranthene					1E-03	SF _o	B2	7.3E-02	4	B2						
65-85-0	Benzoic acid					1E+02	RfD							4.0E+00	1		
50-32-8	Benzo(a)pyrene			2.0E-04	3			B2	7.3E+00	1	B2						
7440-41-7	Beryllium	4.0E-03	3	4.0E-03	3			B2	4.3E+00	1	B2	2.4E-03	1	5.0E-03	1		
111-44-4	Bis(2-chloroethyl)ether					8E-05	SF _o	B2	1.1E+00	1	B2	3.3E-04	1				
117-81-7	Bis(2-ethylhexyl)phthalate			6.0E-03	3			B2	1.4E-02	1	B2			2.0E-02	1		
75-27-4	Bromodichloromethane			1.0E-01 *	3			B2	6.2E-02	1	B2			2.0E-02	1		
75-25-2	Bromoform (tribromomethane)			1.0E-01 *	3			B2	7.9E-03	1	B2	1.1E-06	1	2.0E-02	1		
71-36-3	Butanol					4E+00	RfD	D			D			1.0E-01	1		
85-68-7	Butyl benzyl phthalate					7E+00	RfD	C			C			2.0E-01	1		
7440-43-9	Cadmium	5.0E-03	3	5.0E-03	3			B1			B1	1.8E-03	1	1.0E-03**	1		
86-74-8	Carbazole					4E-03	SF _o	B2	2.0E-02	2							
75-15-0	Carbon disulfide					4E+00	RfD							1.0E-01	1	7.0E-01	1
56-23-5	Carbon tetrachloride			5.0E-03	3			B2	1.3E-01	1	B2	1.5E-05	1	7.0E-04	1		
57-74-9	Chlordane			2.0E-03	3			B2	1.3E+00	1	B2	3.7E-04	1	6.0E-05	1		
106-47-8	p-Chloroaniline					1E-01	RfD							4.0E-03	1		
108-90-7	Chlorobenzene	1.0E-01	3	1.0E-01	3			D			D			2.0E-02	1	2.0E-02	2
124-48-1	Chlorodibromomethane	6.0E-02	3	1.0E-01 *	3			C	8.4E-02	1	C			2.0E-02	1		
67-66-3	Chloroform			1.0E-01 *	3			B2	6.1E-03	1	B2	2.3E-05	1	1.0E-02	1		
95-57-8	2-Chlorophenol					2E-01	RfD							5.0E-03	1		

* Proposed MCL = 0.08 mg/L, *Drinking Water Regulations and Health Advisories*, U.S. EPA (1995).

** Cadmium RfD is based on dietary exposure.

Attachment D (continued)

CAS Number	Chemical Name	Maximum Contaminant Level Goal (mg/L)		Maximum Contaminant Level (mg/L)		Water Health Based Limits (mg/L)		Cancer Slope Factor (mg/kg-d) ⁻¹			Unit Risk Factor (µg/m ³) ⁻¹			Reference Dose (mg/kg-d)		Reference Concentration (mg/m ³)	
		MCLG (PMCLG)	Ref. ^a	MCL (PMCL)	Ref. ^a	HBL ^b	Basis	Carc. Class ^c	SF _o	Ref. ^a	Carc. Class ^c	URF	Ref. ^a	RfD	Ref. ^a	RfC	Ref. ^a
7440-47-3	Chromium	1.0E-01	3	1.0E-01	3			A			A	1.2E-02	1	5.0E-03	1		
16065-83-1	Chromium (III)					4E+01	RfD							1.0E+00	1		
18540-29-9	Chromium (VI)			1.0E-01	3 *			A			A	1.2E-02	1	5.0E-03	1		
218-01-9	Chrysene					1E-02	SF _o	B2	7.3E-03	4							
57-12-5	Cyanide (amenable)	(2.0E-01)	3	(2.0E-01)	3			D			D			2.0E-02	1		
72-54-8	DDD					4E-04	SF _o	B2	2.4E-01	1	B2						
72-55-9	DDE					3E-04	SF _o	B2	3.4E-01	1	B2						
50-29-3	DDT					3E-04	SF _o	B2	3.4E-01	1	B2	9.7E-05	1	5.0E-04	1		
53-70-3	Dibenz(a,h)anthracene					1E-05	SF _o	B2	7.3E+00	4	B2						
84-74-2	Di-n-butyl phthalate					4E+00	RfD	D			D			1.0E-01	1		
95-50-1	1,2-Dichlorobenzene	6.0E-01	3	6.0E-01	3			D			D			9.0E-02	1	2.0E-01	2
106-46-7	1,4-Dichlorobenzene	7.5E-02	3	7.5E-02	3			B2	2.4E-02	2	B2					8.0E-01	1
91-94-1	3,3-Dichlorobenzidine					2E-04	SF _o	B2	4.5E-01	1	B2						
75-34-3	1,1-Dichloroethane					4E+00	RfD	C			C			1.0E-01	7	5.0E-01	2
107-06-2	1,2-Dichloroethane			5.0E-03	3			B2	9.1E-02	1	B2	2.6E-05	1				
75-35-4	1,1-Dichloroethylene	7.0E-03	3	7.0E-03	3			C	6.0E-01	1	C	5.0E-05	1	9.0E-03	1		
156-59-2	cis-1,2-Dichloroethylene	7.0E-02	3	7.0E-02	3			D			D			1.0E-02	2		
156-60-5	trans-1,2-Dichloroethylene	1.0E-01	3	1.0E-01	3									2.0E-02	1		
120-83-2	2,4-Dichlorophenol					1E-01	RfD							3.0E-03	1		
78-87-5	1,2-Dichloropropane			5.0E-03	3			B2	6.8E-02	2	B2					4.0E-03	1
542-75-6	1,3-Dichloropropene					5E-04	SF _o	B2	1.8E-01	2	B2	3.7E-05	2	3.0E-04	1	2.0E-02	1
60-57-1	Dieldrin					5E-06	SF _o	B2	1.6E+01	1	B2	4.6E-03	1	5.0E-05	1		
84-66-2	Diethylphthalate					3E+01	RfD	D			D			8.0E-01	1		
105-67-9	2,4-Dimethylphenol					7E-01	RfD							2.0E-02	1		
51-28-5	2,4-Dinitrophenol					4E-02	RfD							2.0E-03	1		
121-14-2	2,4-Dinitrotoluene**					1E-04	SF _o	B2	6.8E-01	1				2.0E-03	1		
606-20-2	2,6-Dinitrotoluene**					1E-04	SF _o	B2	6.8E-01	1				1.0E-03	2		
117-84-0	Di-n-octyl phthalate					7E-01	RfD							2.0E-02	2		
115-29-7	Endosulfan					2E-01	RfD							6.0E-03	2		
72-20-8	Endrin	2.0E-03	3	2.0E-03	3			D			D			3.0E-04	1		

* MCL for total chromium is based on Cr (VI) toxicity.

** Cancer Slope Factor is for 2,4-, 2,6-Dinitrotoluene mixture.

Attachment D (continued)

CAS Number	Chemical Name	Maximum Contaminant Level Goal (mg/L)		Maximum Contaminant Level (mg/L)		Water Health Based Limits (mg/L)		Cancer Slope Factor (mg/kg-d) ⁻¹			Unit Risk Factor (µg/m ³) ⁻¹			Reference Dose (mg/kg-d)		Reference Concentration (mg/m ³)	
		MCLG (PMCLG)	Ref. ^a	MCL (PMCL)	Ref. ^a	HBL ^b	Basis	Carc. Class ^c	SF _o	Ref. ^a	Carc. Class ^c	URF	Ref. ^a	RfD	Ref. ^a	RfC	Ref. ^a
100-41-4	Ethylbenzene	7.0E-01	3	7.0E-01	3			D			D		1.0E-01	1	1.0E+00	1	
206-44-0	Fluoranthene					1E+00	RfD	D			D		4.0E-02	1			
86-73-7	Fluorene					1E+00	RfD	D					4.0E-02	1			
76-44-8	Heptachlor			4.0E-04	3			B2	4.5E+00	1	B2	1.3E-03	1	5.0E-04	1		
1024-57-3	Heptachlor epoxide			2.0E-04	3			B2	9.1E+00	1	B2	2.6E-03	1	1.3E-05	1		
118-74-1	Hexachlorobenzene			1.0E-03	3			B2	1.6E+00	1	B2	4.6E-04	1	8.0E-04	1		
87-68-3	Hexachloro-1,3-butadiene	1.0E-03	3			1E-03	SF _o	C	7.8E-02	1	C	2.2E-05	1	2.0E-04	2		
319-84-6	-HCH (-BHC)					1E-05	SF _o	B2	6.3E+00	1	B2	1.8E-03	1				
319-85-7	-HCH (-BHC)					5E-05	SF _o	C	1.8E+00	1	C	5.3E-04	1				
58-89-9	-HCH (Lindane)	2.0E-04	3	2.0E-04	3			B2	1.3E+00	2	C			3.0E-04	1		
77-47-4	Hexachlorocyclopentadiene	5.0E-02	3	5.0E-02	3			D			D			7.0E-03	1	7.0E-05	2
67-72-1	Hexachloroethane					6E-03	SF _o	C	1.4E-02	1	C	4.0E-06	1	1.0E-03	1		
193-39-5	Indeno(1,2,3- <i>cd</i>)pyrene					1E-04	SF _o	B2	7.3E-01	4	B2						
78-59-1	Isophorone					9E-02	SF _o	C	9.5E-04	1	C			2.0E-01	1		
7439-97-6	Mercury	2.0E-03	3	2.0E-03	3			D			D			3.0E-04	2	3.0E-04	2
72-43-5	Methoxychlor	4.0E-02	3	4.0E-02	3			D			D			5.0E-03	1		
74-83-9	Methyl bromide					5E-02	RfD	D			D			1.4E-03	1	5.0E-03	1
75-09-2	Methylene chloride			5.0E-03	3			B2	7.5E-03	1	B2	4.7E-07	1	6.0E-02	1	3.0E+00	2
95-48-7	2-Methylphenol (<i>o</i> -cresol)					2E+00	RfD	C			C			5.0E-02	1		
91-20-3	Naphthalene					1E+00	RfD	D			D			4.0E-02	6		
7440-02-0	Nickel					1E-01	HA *	A			A	2.4E-04	1	2.0E-02	1		
98-95-3	Nitrobenzene					2E-02	RfD	D			D			5.0E-04	1	2.0E-03	2
86-30-6	<i>N</i> -Nitrosodiphenylamine					2E-02	SF _o	B2	4.9E-03	1	B2						
621-64-7	<i>N</i> -Nitrosodi- <i>n</i> -propylamine					1E-05	SF _o	B2	7.0E+00	1	B2						
87-86-5	Pentachlorophenol			1.0E-03	3			B2	1.2E-01	1	B2			3.0E-02	1		
108-95-2	Phenol					2E+01	RfD	D			D			6.0E-01	1		
129-00-0	Pyrene					1E+00	RfD	D			D			3.0E-02	1		
7782-49-2	Selenium	5.0E-02	3	5.0E-02	3			D			D			5.0E-03	1		
7440-22-4	Silver					2E-01	RfD	D			D			5.0E-03	1		
100-42-5	Styrene	1.0E-01	3	1.0E-01	3			D			D			2.0E-01	1	1.0E+00	1
79-34-5	1,1,2,2-Tetrachloroethane					4E-04	SF _o	C	2.0E-01	1	C	5.8E-05	1				

* Health advisory for nickel (MCL is currently remanded); EPA Office of Science and Technology, 7/10/95.

Attachment D (continued)

CAS Number	Chemical Name	Maximum Contaminant Level Goal (mg/L)		Maximum Contaminant Level (mg/L)		Water Health Based Limits (mg/L)		Cancer Slope Factor (mg/kg-d) ⁻¹			Unit Risk Factor (µg/m ³) ⁻¹			Reference Dose (mg/kg-d)		Reference Concentration (mg/m ³)	
		MCLG (PMCLG)	Ref. ^a	MCL (PMCL)	Ref. ^a	HBL ^b	Basis	Carc. Class ^c	SF _o	Ref. ^a	Carc. Class ^c	URF	Ref. ^a	RfD	Ref. ^a	RfC	Ref. ^a
127-18-4	Tetrachloroethylene			5.0E-03	3				5.2E-02	5		5.8E-07	5	1.0E-02	1		
7440-28-0	Thallium	5.0E-04	3	2.0E-03	3												
108-88-3	Toluene	1.0E+00	3	1.0E+00	3			D			D			2.0E-01	1	4.0E-01	1
8001-35-2	Toxaphene			3.0E-03	3			B2	1.1E+00	1	B2	3.2E-04	1				
120-82-1	1,2,4-Trichlorobenzene	7.0E-02	3	7.0E-02	3			D			D			1.0E-02	1	2.0E-01	2
71-55-6	1,1,1-Trichloroethane	2.0E-01	3	2.0E-01	3			D			D					1.0E+00	5
79-00-5	1,1,2-Trichloroethane	3.0E-03	3	5.0E-03	3			C	5.7E-02	1	C	1.6E-05	1	4.0E-03	1		
79-01-6	Trichloroethylene	zero	3	5.0E-03	3				1.1E-02	5		1.7E-06	5				
95-95-4	2,4,5-Trichlorophenol					4E+00	RfD							1.0E-01	1		
88-06-2	2,4,6-Trichlorophenol					8E-03	SF _o	B2	1.1E-02	1	B2	3.1E-06	1				
7440-62-2	Vanadium					3E-01	RfD							7.0E-03	2		
108-05-4	Vinyl acetate					4E+01	RfD							1.0E+00	1	2.0E-01	1
75-01-4	Vinyl chloride (chloroethene)			2.0E-03	3			A	1.9E+00	2	A	8.4E-05	2				
108-38-3	<i>m</i> -Xylene	1.0E+01	3 *	1.0E+01	3 *			D			D			2.0E+00	2		
95-47-6	<i>o</i> -Xylene	1.0E+01	3 *	1.0E+01	3 *			D			D			2.0E+00	2		
106-42-3	<i>p</i> -Xylene	1.0E+01	3 *	1.0E+01	3 *			D			D			2.0E+00	1 **		
7440-66-6	Zinc					1E+01	RfD	D			D			3.0E-01	1		

* MCL for total xylenes [1330-20-7] is 10 mg/L.

** RfD for total xylenes is 2 mg/kg-day.

- ^a References:
- 1 = IRIS, U.S. EPA (1995)
 - 2 = HEAST, U.S. EPA (1995)
 - 3 = U.S. EPA (1995)
 - 4 = OHEA, U.S. EPA (1993)
 - 5 = Interim toxicity criteria provided by Superfund Health Risk Technical Support Center, Environmental Criteria Assessment Office (ECAO), Cincinnati, OH (1994)
 - 6 = ECAO, U.S. EPA (1994i)
 - 7 = ECAO, U.S. EPA (1994h)

^c Categorization of overall weight of evidence for human carcinogenicity:

- Group A: human carcinogen
- Group B: probable human carcinogen
 - B1: limited evidence from epidemiologic studies
 - B2: "sufficient" evidence from animal studies and "inadequate" evidence or "no data" from epidemiologic studies
- Group C: possible human carcinogen
- Group D: not classifiable as to health carcinogenicity
- Group E: evidence of noncarcinogenicity for humans

^b Health Based Limits calculated for 30-year exposure duration, 10⁻⁶ risk or hazard quotient = 1.