APPENDIX A

GENERIC SSLs FOR THE RESIDENTIAL AND COMMERCIAL/INDUSTRIAL SCENARIOS

This appendix provides generic SSLs for 109 chemicals under residential and non-residential (i.e., commercial/industrial) exposure scenarios. Exhibit A-1 presents updated generic SSLs for the residential exposure scenario. The generic SSLs for three of the pathways in this exhibit — inhalation of volatiles in outdoor air, inhalation of fugitive dust, and migration to ground water — were calculated using the same equations and default values for exposure assumptions found in the 1996 *SSG* (and reproduced in Appendix B of this document). However, they incorporate updated values for dispersion factors, for toxicity, and for other chemical-specific parameters presented in Appendix C. The exhibit also presents new SSLs for concurrent exposures via soil ingestion and dermal absorption that are based, in part, on a new quantitative approach for evaluating dermal absorption. SSLs for combined direct ingestion and dermal absorption exposures to contaminants were calculated according to the method described in Section 3.2.1 of this document. The generic residential SSLs in Exhibit A-1 supersede those published in the 1996 *SSG*.

Exhibits A-2 and A-3 present commercial/industrial SSLs for the outdoor worker and indoor worker receptors, respectively. These SSLs have been calculated using the equations and the default values for exposure assumptions and other input parameters presented in Section 4.2.3 of this guidance document. All generic SSLs presented in this appendix, both residential and commercial/industrial, are rounded to two significant figures, with the exception of values less than 10 mg/kg, which are rounded to one significant figure.

As noted above, the values in this Appendix are based on chemical-specific physical and toxicological parameters presented in Appendix C. The values in Appendix C represent the most recent values available and are current as of the date of publication of this guidance. However, physical/chemical and toxicological data are subject to revision and should therefore be confirmed before referencing screening levels in the following tables. Trichloroethylene, in particular, is based on a draft risk assessment, and because the document is still undergoing review, the health benchmark values should be considered provisional.

EPA does not present generic SSLs for the construction exposure scenario because the complexity and variability of exposure conditions for construction activities precludes the development of such values. For information on developing SSLs for exposures during construction activities, users should refer to Chapter 5 or Appendix E of the guidance document.

The generic residential and non-residential SSLs are not necessarily protective of all known human exposure pathways or ecological threats. Before applying SSLs, it is therefore necessary to compare the conceptual site model (developed in Step 1 of the soil screening process) with the assumptions underlying the generic SSLs to ensure that site conditions and exposure pathways are consistent with these assumptions (See Exhibit A-4.) If this comparison indicates that the site is more complex than the generic SSL scenario, or that there are significant exposure pathways not accounted for by the SSL scenario, then generic SSLs alone are **not** sufficient to evaluate the site, and additional, more detailed site-specific investigation is necessary.

In each exhibit, the first column presents SSLs based on the combined soil ingestion and dermal absorption exposure pathway. When data on dermal absorption from soil are unavailable, these SSLs are based on ingestion exposures only. SSLs for this pathway may be updated in the future as dermal absorption data become available for other contaminants.

The second column in Exhibits A-1 and A-2 presents SSLs for the outdoor inhalation of volatiles pathway. Although residential receptors and indoor workers are potentially exposed to volatiles in indoor air as well, EPA has not calculated generic SSLs for migration of volatiles into indoor air because it is very difficult to identify suitable standardized default values for inputs such as dimensions of commercial buildings and the distance between contamination and a building's foundation. EPA provides spreadsheet models that can be used to calculate SSLs for this pathway using the simple site-specific or detailed site-specific approaches.[1] The third column in Exhibit A-1 and A-2 lists SSLs for the inhalation of fugitive dusts pathway. Because inhalation of fugitive dust is typically not a concern for organic compounds, SSLs for this pathway are presented only for inorganic compounds, which are listed at the end of each exhibit. Conversely, with the exception of mercury, no SSLs for the inhalation of volatiles pathway are provided for inorganic compounds because these chemicals exhibit extremely low volatility.

The user should note that several of the generic SSLs for the inhalation of volatiles pathway are determined by the chemical-specific soil saturation limit (C_{sat}) which is used to screen for the presence of non-aqueous phase liquids (NAPLs). As indicated in Section 4.2.3, in situations where the residual concentration of a compound that is a liquid at ambient soil temperature exceeds C_{sat}, the compound may exist as free-phase liquid (see Exhibit C-3 in Appendix C for a list of those compounds present in liquid phase at typical ambient soil temperatures). In these cases, further investigation will be required.

The final two columns in Exhibits A-1 through A-3 present generic SSLs for the migration to ground water pathway. The generic commercial/industrial SSLs for this pathway are the same as those for residential use and are unchanged from the 1996 *SSG*. As discussed in Section 4.2.3, this approach protects potential potable ground water resources that may be present beneath sites with commercial/industrial uses and protects off-site residents who may ingest ground water contaminated by the site. The migration to ground water SSLs are back-calculated from an acceptable target soil leachate concentration using a dilution-attenuation factor (DAF). The first of the two columns of SSLs for this pathway presents levels calculated using a DAF of 20 to account for reductions in contaminant concentration due to natural processes occurring in the subsurface. The second column presents SSL values for the migration to ground water pathway calculated assuming a DAF of one (i.e., no dilution or attenuation between the source and the receptor well). These levels should be used at sites where little or no dilution or attenuation of soil leachate concentrations is expected; this will be the case at sites with characteristics such as shallow water tables, fractured media, karst topography, or source size greater than 30 acres.

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[1] The vapor intrusion spreadsheets can be found on EPA's web site at http://www.epa.gov/superfund/programs/risk/airmodel/johnson_ettinger.htm.

After all possible SSLs for all potential receptors at a site have been identified from the tables in Exhibits A-1 through A-3, the site manager should select the lowest applicable SSL for each exposure pathway to be used for comparison to site contaminant concentrations in soil. Generally, where the relevant SSL for a given pathway of concern is not exceeded, the user may eliminate the pathway from further investigation. If all pathways of concern are eliminated for an area of the site based on comparison with residential SSLs, that area can be eliminated from further investigation. However, if commercial/industrial SSLs are used in soil screening evaluations, elimination of an area from further consideration is contingent on an analysis of institutional control options. Users should consult Section 4.3.2 of the guidance document for more information.

The final exhibit in this appendix (Exhibit A-4) presents the default values for physical site characteristics that are used in calculating SSLs (both residential and commercial/industrial) for the inhalation and migration to ground water pathways. These values describe the nature of the contaminant source area, the characteristics of site soil, meteorologic conditions, and hydrogeologic characteristics, and serve either as direct input parameters for SSL equations or as assumptions for developing input parameters for the equations.

This appendix does not include SSLs for lead, dioxin, or PCBs, because EPA has issued separate documents that specify risk-based concentrations for these contaminants in soil. For guidance on addressing soil contaminated with lead, dioxin, or PCBs, please refer to the following sources:

Lead:

- U.S. EPA, 1994. *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, EPA/540/F-94/043, Office of Solid Waste and Emergency Response, Washington, D.C. Directive 9355.4-12.

- U.S. EPA, 1996. *Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil*, Technical Review Workgroup for Lead (TRW), Washington, D.C.

- US EPA, 1999. *Frequently Asked Questions on the Adult Lead Model: Guidance Document*. Technical Review Workgroup for Lead (TRW), Washington, D.C. http://www.epa.gov/oerrpage/superfund/programs/lead/adfaqs.htm

PCBs:

- US EPA, 1990. *Guidance on Remedial Actions for Superfund Sites with PCB Contamination*. Office of Solid Waste and Emergency Response, Washington, D.C. NTIS PB91-921206CDH. (Currently being updated by the EPA PCB work group.)

Dioxin:

- U.S. EPA. 1998. *Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites*. OSWER Directive 9200.4-26.

- U.S. EPA. 2000. *Draft Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo*-p-*Dioxin (TCDD) and Related Compounds*. Office of Research and Development, Washington, D.C. EPA/600/P-00/001Bg. September.

Analysis of Effects of Source Size on Generic SSLs

The generic SSLs presented have been developed assuming an infinite source and a 0.5 acre source size. For an analysis of the sensitivity of generic SSLs to changes in source size and the depths to which infinite source SSLs are protective at larger sites, please refer to Attachment A and Table A-3 in the *Technical Background Document* of the 1996 *SSG*. Additional detail is also provided in the guidance documents specifically addressing screening levels for soils contaminated with lead, dioxin, or PCBs (listed above).

Exhibit A-1

GENERIC SSLs FOR RESIDENTIAL SCENARIO[a]

Compound	CAS No.	Ingestion-Dermal (mg/kg)	Inhalation of Volatiles (mg/kg)	Inhalation of Fugitive Particulates (mg/kg)	Migration to Ground Water	
					DAF=20 (mg/kg)	DAF=1 (mg/kg)
Organics						
Acenaphthene	83-32-9	3,400 [b]	--- [c]	---	570 [b]	29 [b]
Acetone (2-Propanone)	67-64-1	7,800 [b,c]	--- [c]	---	16 [b]	0.8 [b]
Aldrin	309-00-2	0.04 [c,e]	3 [e]	---	0.5 [e]	0.02 [e]
Anthracene	120-12-7	17,000 [b]	--- [c]	---	12,000 [b]	590 [b]
Benz(a)anthracene	56-55-3	0.6 [e]	--- [c]	---	2 [e]	0.08 [e,f]
Benzene	71-43-2	12 [c,e]	0.8 [e]	---	0.03	0.002 [f]
Benzo(b)fluoranthene	205-99-2	0.6 [e]	--- [c]	---	5 [e]	0.2 [e,f]
Benzo(k)fluoranthene	207-08-9	6 [e]	--- [c]	---	49 [e]	2 [e]
Benzoic acid	65-85-0	310,000 [b,c]	--- [c]	---	400 [b,k]	20 [b,k]
Benzo(a)pyrene	50-32-8	0.06 [e,f]	--- [c]	---	8	0.4
Bis(2-chloroethyl)ether	111-44-4	0.4 [e]	0.2 [e,f]	---	0.0004 [e,f]	0.00002 [e,f]
Bis(2-ethylhexyl)phthalate	117-81-7	35 [e]	--- [c]	---	3,600	180
Bromodichloromethane	75-27-4	10 [c,e]	--- [c]	---	0.6	0.03
Bromoform (tribromomethane)	75-25-2	81 [c,e]	52 [e]	---	0.8	0.04
Butanol	71-36-3	7,800 [b,c]	--- [c]	---	17 [b]	0.9 [b]
Butyl benzyl phthalate	85-68-7	12,000 [b]	--- [c]	---	930 [d]	810 [b]
Carbazole	86-74-8	24 [e]	--- [c]	---	0.6 [e]	0.03 [e,f]
Carbon disulfide	75-15-0	7,800 [b,c]	720 [d]	---	32 [b]	2 [b]
Carbon tetrachloride	56-23-5	5 [c,e]	0.3 [e]	---	0.07	0.003 [f]
Chlordane	57-74-9	2 [e]	72 [e]	---	10	0.5
p-Chloroaniline	106-47-8	240 [b]	--- [c]	---	0.7 [b]	0.03 [b,f]
Chlorobenzene	108-90-7	1,600 [b,c]	380 [b]	---	1	0.07
Chlorodibromomethane	124-48-1	8 [c,e]	--- [c]	---	0.4	0.02
Chloroform	67-66-3	780 [b,c]	--- [c]	---	0.6	0.03
2-Chlorophenol	95-57-8	310 [b]	--- [c]	---	4 [b,k]	0.2 [b,f,k]
Chrysene	218-01-9	62 [e]	--- [c]	---	160 [e]	8 [e]
DDD	72-54-8	3 [c,e]	--- [c]	---	16 [e]	0.8 [e]
DDE	72-55-9	2 [c,e]	--- [c]	---	54 [e]	3 [e]
DDT	50-29-3	2 [e]	--- [g]	---	32 [e]	2 [e]
Dibenz(a,h)anthracene	53-70-3	0.06 [e,f]	--- [c]	---	2 [e]	0.08 [e,f]
Di-n-butyl phthalate	84-74-2	6,100 [b]	--- [c]	---	2,300 [d]	270 [b]
1,2-Dichlorobenzene	95-50-1	5,500 [b]	600 [d]	---	17	0.9
1,4-Dichlorobenzene	106-46-7	20 [e]	--- [g]	---	2	0.1 [f]
3,3-Dichlorobenzidine	91-94-1	1 [e]	--- [c]	---	0.007 [e,f]	0.0003 [e,f]
1,1-Dichloroethane	75-34-3	7,800 [b,c]	1,200 [b]	---	23 [b]	1 [b]
1,2-Dichloroethane	107-06-2	7 [c,e]	0.4 [e]	---	0.02	0.001 [f]
1,1-Dichloroethylene	75-35-4	3900 [b,c]	290 [b]	---	0.06	0.003 [f]
cis-1,2-Dichloroethylene	156-59-2	780 [b,c]	--- [c]	---	0.4	0.02
trans-1,2-Dichloroethylene	156-60-5	1,600 [b,c]	--- [c]	---	0.7	0.03
2,4-Dichlorophenol	120-83-2	180 [b]	--- [c]	---	1 [b,k]	0.05 [b,f,k]
2,4-Dichlorophenoxy-acetic acid	94-75-7	690 [b]	--- [c]	---	0.4 [b,k]	0.02 [b,k]
1,2-Dichloropropane	78-87-5	9 [c,e]	15 [b]	---	0.03	0.001 [f]
1,3-Dichloropropene	542-75-6	6 [c,e]	1 [e]	---	0.004 [e]	0.0002 [e]

Exhibit A-1 (continued)

GENERIC SSLs FOR RESIDENTIAL SCENARIO[a]

Compound *Organics (continued)*	CAS No.	Ingestion-Dermal (mg/kg)	Inhalation of Volatiles (mg/kg)	Inhalation of Fugitive Particulates (mg/kg)	Migration to Ground Water	
					DAF=20 (mg/kg)	DAF=1 (mg/kg)
Dieldrin	60-57-1	0.04 [c,e]	1 [e]	---	0.004 [e]	0.0002 [e,f]
Diethylphthalate	84-66-2	49,000 [b]	--- [c]	---	470 [b]	23 [b]
2,4-Dimethylphenol	105-67-9	1,200 [b]	--- [c]	---	9 [b]	0.4 [b]
2,4-Dinitrophenol	51-28-5	120 [b]	--- [c]	---	0.2 [b,f,k]	0.008 [b,f,k]
2,4-Dinitrotoluene	121-14-2	0.7 [e]	--- [c]	---	0.0008 [e,f]	0.00004 [e,f]
2,6-Dinitrotoluene	606-20-2	0.7 [e]	--- [c]	---	0.0007 [e,f]	0.00003 [e,f]
Di-n-octyl phthalate	117-84-0	1,200 [b]	--- [c]	---	10,000 [d]	10,000 [d]
Endosulfan	115-29-7	470 [b,c]	--- [c]	---	18 [b]	0.9 [b]
Endrin	72-20-8	23 [b,c]	--- [c]	---	1	0.05
Ethylbenzene	100-41-4	7,800 [b,c]	400 [d]	---	13	0.7
Fluoranthene	206-44-0	2,300 [b]	--- [c]	---	4,300 [b]	210 [b]
Fluorene	86-73-7	2,300 [b]	--- [c]	---	560 [b]	28 [b]
Heptachlor	76-44-8	0.1 [c,e]	4 [e]	---	23	1
Heptachlor Epoxide	1024-57-3	0.07 [c,e]	5 [e]	---	0.7	0.03
Hexachlorobenzene	118-74-1	0.3 [e]	1 [e]	---	2	0.1 [f]
Hexachloro-1,3-butadiene	87-68-3	6 [e]	8 [e]	---	2	0.1 [f]
α-HCH (α-BHC)	319-84-6	0.1 [c,e]	0.7 [e]	---	0.0005 [e,f]	0.00003 [e,f]
β-HCH(β-BHC)	319-85-7	0.4 [c,e]	6 [e]	---	0.003 [e]	0.0001 [e,f]
γ-HCH(Lindane)	58-89-9	0.4 [e]	--- [c]	---	0.009	0.0005 [f]
Hexachlorocyclopentadiene	77-47-4	370 [b]	29 [b]	---	400	20
Hexachloroethane	67-72-1	35 [e]	54 [e]	---	0.5 [e]	0.02 [e,f]
Indeno(1,2,3-cd)pyrene	193-39-5	0.6 [e]	--- [c]	---	14 [e]	0.7 [e]
Isophorone	78-59-1	510 [e]	--- [c]	---	0.5 [e]	0.03 [e,f]
Methoxychlor	72-43-5	390 [b,c]	--- [c]	---	160	8
Methyl bromide	74-83-9	110 [b,c]	9 [b]	---	0.2 [b]	0.01 [b,f]
Methylene chloride	75-09-2	85 [c,e]	13 [e]	---	0.02 [e]	0.001 [e,f]
2-Methylphenol (o-cresol)	95-48-7	3,100 [b]	--- [c]	---	15 [b]	0.8 [b]
Naphthalene	91-20-3	1,100 [b]	170 [c]	---	84 [b]	4 [b]
Nitrobenzene	98-95-3	31 [b]	90 [b]	---	0.1 [b,f]	0.007 [b,f]
N-Nitrosodiphenylamine	86-30-6	99 [e]	--- [c]	---	1 [e]	0.06 [e,f]
N-Nitrosodi-n-propylamine	621-64-7	0.07 [e,f]	--- [c]	---	0.0000 [e,f]	0.000002 [e,f]
Pentachlorophenol	87-86-5	3 [e]	--- [c]	---	0.03 [f,k]	0.001 [f,k]
Phenol	108-95-2	18,000 [b]	--- [c]	---	100 [b]	5 [b]
Pyrene	129-00-0	1,700 [b]	--- [c]	---	4,200 [b]	210 [b]
Styrene	100-42-5	16,000 [b,c]	1,500 [d]	---	4	0.2
1,1,2,2-Tetrachloroethane	79-34-5	3 [c,e]	0.6 [e]	---	0.003 [e,f]	0.0002 [e,f]
Tetrachloroethylene	127-18-4	1 [c,e]	1 [e]	---	0.06	0.003 [f]
Toluene	108-88-3	16,000 [b,c]	650 [d]	---	12	0.6
Toxaphene	8001-35-2	0.6 [c,e]	87 [e]	---	31	2
1,2,4-Trichlorobenzene	120-82-1	610 [b]	3,200 [d]	---	5	0.3 [f]
1,1,1-Trichloroethane	71-55-6	--- [c]	1,200 [d]	---	2	0.1
1,1,2-Trichloroethane	79-00-5	11 [c,e]	1 [e]	---	0.02	0.0009 [f]
Trichloroethylene^	79-01-6	2 [c,e]	0.07 [e]	---	0.06	0.003 [f]
2,4,5-Trichlorophenol	95-95-4	6,100 [b]	--- [c]	---	270 [b,k]	14 [b,k]
2,4,6-Trichlorophenol	88-06-2	44 [e]	200 [e]	---	0.2 [e,f,k]	0.008 [e,f,k]

Exhibit A-1 (continued)

GENERIC SSLs FOR RESIDENTIAL SCENARIO[a]

Compound	CAS No.	Ingestion-Dermal (mg/kg)	Inhalation of Volatiles (mg/kg)	Inhalation of Fugitive Particulates (mg/kg)	Migration to Ground Water	
					DAF=20 (mg/kg)	DAF=1 (mg/kg)
Organics (continued)						
Vinyl acetate	108-05-4	78,000 [b,c]	980 [b]	---	170 [b]	8 [b]
Vinyl chloride (chloroethene)	75-01-4	0.4 [c,e,h]	0.6 [e,i]	---	0.01 [f,k,i]	0.0007 [f,i]
m-Xylene	108-38-3	160,000 [b,c]	--- [c]	---	210	10
o-Xylene	95-47-6	160,000 [b,c]	--- [c]	---	190	9
p-Xylene	106-42-3	160,000 [b,c]	--- [c]	---	200	10
Inorganics						
Antimony	7440-36-0	31 [b,c]	---	--- [c]	5	0.3
Arsenic	7440-38-2	0.4 [e]	---	770 [e]	29 [k]	1 [k]
Barium	7440-39-3	5,500 [b,c]	---	710,000 [b]	1,600 [k]	82 [k]
Beryllium	7440-41-7	160 [c,e]	---	1,400 [e]	63 [k]	3 [k]
Cadmium	7440-43-9	70 [b,j]	---	1,800 [e]	8 [k]	0.4 [k]
Chromium (total)	7440-47-3	230 [b,c]	---	280 [e]	38 [k]	2 [k]
Chromium (III)	16065-83-1	120,000 [b,c]	---	--- [c]	--- [g]	--- [g]
Chromium (VI)	18540-29-9	230 [b,c]	---	280 [e]	38 [k]	2 [k]
Cyanide (amenable)	57-12-5	1,600 [b,c]	---	--- [c]	40	2
Mercury	7439-97-6	23 [b,c,l]	10 [b,k]	---	2 [k]	0.1 [k]
Nickel	7440-02-0	1,600 [b,c]	---	14,000 [e]	130 [k]	7 [k]
Selenium	7782-49-2	390 [b,c]	---	--- [c]	5 [k]	0.3 [k]
Silver	7440-22-4	390 [b,c]	---	--- [c]	34 [b,k]	2 [b,k]
Thallium	7440-28-0	6 [b,c,m]	---	--- [c]	0.7 [k]	0.04 [k]
Vanadium	7440-62-2	550 [b,c]	---	--- [c]	6,000 [b]	300 [b]
Zinc	7440-66-6	23,000 [b,c]	---	--- [c]	12,000 [b,k]	620 [b,k]

DAF = Dilution Attenuation Factor

[a] Screening level based on human health criteria only

[b] Calculated values correspond to a noncancer hazard quotient of 1. For exposure to multiple non-carcinogens, EPA evaluates contaminants according to their critical effect. See section 2.3 for further discussion.

[c] Ingestion-Dermal pathway: no dermal absorption data available; calculated based on ingestion data only. Inhalation of volatiles pathway: no toxicity criteria available

[d] Soil Saturation Limit (Csat)

[e] Calculated values correspond to a cancer risk of 1 in 1,000,000. For multiple carcinogens, EPA believes values will accumulate to be within acceptable risk levels. See section 2.3 for further discussion.

[f] Level is at or below Contract Laboratory Program required quantification limit for Regular Analytical Services (RAS)

[g] Chemical-specific properties are such that this pathway is not of concern at any soil contaminant concentration

[h] SSL is based on continuous exposure to vinyl chloride over a lifetime.

[i] SSL is based on continuous exposure to vinyl chloride during adulthood.

[j] SSL is based on dietary RfD for Cadmium

[k] SSL for pH of 6.8

[l] SSL is based on RfD for mercuric chloride (CAS No. 007847-94-7)

[m] SSL is based on RfD for thallium chloride (CAS No. 7791-12-0)

[^] Health benchmark values are based on NCEA's *Trichloroethylene Health Risk Assessment: Synthesis and Characterization - External Review Draft* (ORD, August, 2001). The trichloroethylene draft risk assessment is still under review. As a result, the health benchmark values are subject to change.

Exhibit A-2

GENERIC SSLs FOR COMMERCIAL/INDUSTRIAL SCENARIO: OUTDOOR WORKER RECEPTOR[a]

Compound	CAS No.	Ingestion-Dermal (mg/kg)	Inhalation of Volatiles (mg/kg)	Inhalation of Fugitive Particulates (mg/kg)	Migration to Ground Water	
					DAF=20 (mg/kg)	DAF=1 (mg/kg)
Organics						
Acenaphthene	83-32-9	37,000 [b]	--- [c]	---	570 [b]	29 [b]
Acetone (2-Propanone)	67-64-1	110,000 [b,c]	--- [c]	---	16 [b]	0.8 [b]
Aldrin	309-00-2	0.2 [c,e]	6 [e]	---	0.5 [e]	0.02 [e]
Anthracene	120-12-7	180,000 [b]	--- [c]	---	12,000 [b]	590 [b]
Benz(a)anthracene	56-55-3	2 [e]	--- [c]	---	2 [e]	0.08 [e,f]
Benzene	71-43-2	58 [c,e]	1 [e]	---	0.03	0.002 [f]
Benzo(b)fluoranthene	205-99-2	2 [e]	--- [c]	---	5 [e]	0.2 [e,f]
Benzo(k)fluoranthene	207-08-9	23 [e]	--- [c]	---	49 [e]	2 [e]
Benzoic acid	65-85-0	1,000,000 [b,c]	--- [c]	---	400 [b,j]	20 [b,j]
Benzo(a)pyrene	50-32-8	0.2 [e]	--- [c]	---	8	0.4
Bis(2-chloroethyl)ether	111-44-4	2 [e]	0.4 [e]	---	0.0004 [e,f]	0.00002 [e,f]
Bis(2-ethylhexyl)phthalate	117-81-7	140 [e]	--- [c]	---	3,600	180
Bromodichloromethane	75-27-4	51 [c,e]	--- [c]	---	0.6	0.03
Bromoform (tribromomethane)	75-25-2	400 [c,e]	88 [e]	---	0.8	0.04
Butanol	71-36-3	110,000 [b,c]	--- [c]	---	17 [b]	0.9 [b]
Butyl benzyl phthalate	85-68-7	140,000 [b]	--- [c]	---	930 [d]	810 [b]
Carbazole	86-74-8	96 [e]	--- [c]	---	0.6 [e]	0.03 [e,f]
Carbon disulfide	75-15-0	110,000 [b,c]	720 [d]	---	32 [b]	2 [b]
Carbon tetrachloride	56-23-5	24 [c,e]	0.6 [e]	---	0.07	0.003 [f]
Chlordane	57-74-9	7 [e]	120 [e]	---	10	0.5
p-Chloroaniline	106-47-8	2,700 [b]	--- [c]	---	0.7 [b]	0.03 [b,f]
Chlorobenzene	108-90-7	23,000 [b,c]	540 [b]	---	1	0.07
Chlorodibromomethane	124-48-1	38 [c,e]	--- [c]	---	0.4	0.02
Chloroform	67-66-3	11,000 [b,c]	--- [c]	---	0.6	0.03
2-Chlorophenol	95-57-8	3,400 [b]	--- [c]	---	4 [b,j]	0.2 [b,f,j]
Chrysene	218-01-9	230 [e]	--- [c]	---	160 [e]	8 [e]
DDD	72-54-8	13 [c,e]	--- [c]	---	16 [e]	0.8 [e]
DDE	72-55-9	9 [c,e]	--- [c]	---	54 [e]	3 [e]
DDT	50-29-3	8 [e]	--- [g]	---	32 [e]	2 [e]
Dibenz(a,h)anthracene	53-70-3	0.2 [e]	--- [c]	---	2 [e]	0.08 [e,f]
Di-n-butyl phthalate	84-74-2	68,000 [b]	--- [c]	---	2,300 [d]	270 [b]
1,2-Dichlorobenzene	95-50-1	62,000 [b]	600 [d]	---	17	0.9
1,4-Dichlorobenzene	106-46-7	80 [e]	--- [g]	---	2	0.1 [f]
3,3-Dichlorobenzidine	91-94-1	4 [e]	--- [c]	---	0.007 [e,f]	0.0003 [e,f]
1,1-Dichloroethane	75-34-3	110,000 [b,c]	1,700 [d]	---	23 [b]	1 [b]
1,2-Dichloroethane	107-06-2	35 [c,e]	0.6 [e]	---	0.02	0.001 [f]
1,1-Dichloroethylene	75-35-4	57,000 [b,c]	410 [b]	---	0.06	0.003 [f]
cis-1,2-Dichloroethylene	156-59-2	11,000 [b,c]	--- [c]	---	0.4	0.02
trans-1,2-Dichloroethylene	156-60-5	23,000 [b,c]	--- [c]	---	0.7	0.03
2,4-Dichlorophenol	120-83-2	2,100 [b]	--- [c]	---	1 [b,j]	0.05 [b,f,j]
2,4-Dichlorophenoxy-acetic acid	94-75-7	8,500 [b]	--- [c]	---	0.4 [b,j]	0.02 [b,j]
1,2-Dichloropropane	78-87-5	47 [c,e]	21 [b]	---	0.03	0.001 [f]
1,3-Dichloropropene	542-75-6	32 [c,e]	2 [e]	---	0.004 [e]	0.0002 [e]

Exhibit A-2 (continued)

GENERIC SSLs FOR COMMERCIAL/INDUSTRIAL SCENARIO: OUTDOOR WORKER RECEPTOR[a]

Compound	CAS No.	Ingestion-Dermal (mg/kg)	Inhalation of Volatiles (mg/kg)	Inhalation of Fugitive Particulates (mg/kg)	Migration to Ground Water	
					DAF=20 (mg/kg)	DAF=1 (mg/kg)
***Organics* (continued)**						
Dieldrin	60-57-1	0.2 [c,e]	2 [e]	---	0.004 [e]	0.0002 [e,f]
Diethylphthalate	84-66-2	550,000 [b]	--- [c]	---	470 [b]	23 [b]
2,4-Dimethylphenol	105-67-9	14,000 [b]	--- [c]	---	9 [b]	0.4 [b]
2,4-Dinitrophenol	51-28-5	1,400 [b]	--- [c]	---	0.2 [b,f,j]	0.008 [b,f,j]
2,4-Dinitrotoluene	121-14-2	3 [e]	--- [c]	---	0.0008 [e,f]	0.00004 [e,f]
2,6-Dinitrotoluene	606-20-2	3 [e]	--- [c]	---	0.0007 [e,f]	0.00003 [e,f]
Di-n-octyl phthalate	117-84-0	14,000 [b]	--- [c]	---	10,000 [d]	10,000 [d]
Endosulfan	115-29-7	6,800 [b,c]	--- [c]	---	18 [b]	0.9 [b]
Endrin	72-20-8	340 [b,c]	--- [c]	---	1	0.05
Ethylbenzene	100-41-4	110,000 [b,c]	400 [d]	---	13	0.7
Fluoranthene	206-44-0	24,000 [b]	--- [c]	---	4,300 [b]	210 [b]
Fluorene	86-73-7	24,000 [b]	--- [c]	---	560 [b]	28 [b]
Heptachlor	76-44-8	0.7 [c,e]	7 [e]	---	23	1
Heptachlor Epoxide	1024-57-3	0.3 [c,e]	8 [e]	---	0.7	0.03
Hexachlorobenzene	118-74-1	1 [e]	2 [e]	---	2	0.1 [f]
Hexachloro-1,3-butadiene	87-68-3	25 [e]	13 [e]	---	2	0.1 [f]
α-HCH (α-BHC)	319-84-6	0.5 [c,e]	1 [e]	---	0.0005 [e,f]	0.00003 [e,f]
β-HCH(β-BHC)	319-85-7	2 [c,e]	--- [g]	---	0.003 [e]	0.0001 [e,f]
γ-HCH(Lindane)	58-89-9	2 [e]	--- [c]	---	0.009	0.0005 [f]
Hexachlorocyclopentadiene	77-47-4	4,100 [b]	41 [b]	---	400	20
Hexachloroethane	67-72-1	140 [e]	92 [e]	---	0.5 [e]	0.02 [e,f]
Indeno(1,2,3-cd)pyrene	193-39-5	2 [e]	--- [c]	---	14 [e]	0.7 [e]
Isophorone	78-59-1	2,000 [e]	--- [c]	---	0.5 [e]	0.03 [e,f]
Methoxychlor	72-43-5	5,700 [b,c]	--- [c]	---	160	8
Methyl bromide	74-83-9	1,600 [b,c]	13 [b]	---	0.2 [b]	0.01 [b,f]
Methylene chloride	75-09-2	420 [c,e]	22 [e]	---	0.02 [e]	0.001 [e,f]
2-Methylphenol (o-cresol)	95-48-7	34,000 [b]	--- [c]	---	15 [b]	0.8 [b]
Naphthalene	91-20-3	12,000 [b]	240 [b]	---	84 [b]	4 [b]
Nitrobenzene	98-95-3	340 [b]	130 [b]	---	0.1 [b,f]	0.007 [b,f]
N-Nitrosodiphenylamine	86-30-6	390 [e]	--- [c]	---	1 [e]	0.06 [e,f]
N-Nitrosodi-n-propylamine	621-64-7	0.3 [e]	--- [c]	---	0.00005 [e,f]	0.000002 [e,f]
Pentachlorophenol	87-86-5	10 [e]	--- [c]	---	0.03 [f,j]	0.001 [f,j]
Phenol	108-95-2	210,000 [b]	--- [c]	---	100 [b]	5 [b]
Pyrene	129-00-0	18,000 [b]	--- [c]	---	4,200 [b]	210 [b]
Styrene	100-42-5	230,000 [b,c]	1,500 [d]	---	4	0.2
1,1,2,2-Tetrachloroethane	79-34-5	16 [c,e]	1 [e]	---	0.003 [e,f]	0.0002 [e,f]
Tetrachloroethylene	127-18-4	6 [c,e]	2 [e]	---	0.06	0.003 [f]
Toluene	108-88-3	230,000 [b,c]	650 [d]	---	12	0.6
Toxaphene	8001-35-2	3 [c,e]	150 [e]	---	31	2
1,2,4-Trichlorobenzene	120-82-1	6,800 [b]	3,200 [d]	---	5	0.3 [f]
1,1,1-Trichloroethane	71-55-6	--- [c]	1,200 [d]	---	2	0.1
1,1,2-Trichloroethane	79-00-5	56 [c,e]	2 [e]	---	0.02	0.0009 [f]
Trichloroethylene^	79-01-6	8 [c,e]	0.1 [e]	---	0.06	0.003 [f]
2,4,5-Trichlorophenol	95-95-4	68,000 [b]	--- [c]	---	270 [b,j]	14 [b,j]
2,4,6-Trichlorophenol	88-06-2	170 [e]	340 [e]	---	0.2 [e,f,j]	0.008 [e,f,j]

Exhibit A-2 (continued)

GENERIC SSLs FOR COMMERCIAL/INDUSTRIAL SCENARIO: OUTDOOR WORKER RECEPTOR[a]

Compound	CAS No.	Ingestion-Dermal (mg/kg)	Inhalation of Volatiles (mg/kg)	Inhalation of Fugitive Particulates (mg/kg)	Migration to Ground Water	
					DAF=20 (mg/kg)	DAF=1 (mg/kg)
***Organics* (continued)**						
Vinyl acetate	108-05-4	1,000,000 [b,c]	1,400 [b]	---	170 [b]	8 [b]
Vinyl chloride (chloroethene)	75-01-4	4 [c,e,h]	1 [e,h]	---	0.01 [f,h,j]	0.0007 [f,h]
m-Xylene	108-38-3	1,000,000 [b,c]	--- [c]	---	210	10
o-Xylene	95-47-6	1,000,000 [b,c]	--- [c]	---	190	9
p-Xylene	106-42-3	1,000,000 [b,c]	--- [c]	---	200	10
Inorganics						
Antimony	7440-36-0	450 [b,c]	---	--- [c]	5	0.3
Arsenic	7440-38-2	2 [e]	---	1,400 [e]	29 [j]	1 [j]
Barium	7440-39-3	79,000 [b,c]	---	1,000,000 [b]	1,600 [j]	82 [j]
Beryllium	7440-41-7	2,300 [c,e]	---	2,600 [e]	63 [j]	3 [j]
Cadmium	7440-43-9	900 [b,i]	---	3,400 [e]	8 [j]	0.4 [j]
Chromium (total)	7440-47-3	3,400 [b,c]	---	510 [e]	38 [j]	2 [j]
Chromium (III)	16065-83-1	1,000,000 [b,c]	---	--- [c]	--- [g]	--- [g]
Chromium (VI)	18540-29-9	3,400 [b,c]	---	510 [e]	38 [j]	2 [j]
Cyanide (amenable)	57-12-5	23,000 [b,c]	---	--- [c]	40	2
Mercury	7439-97-6	340 [b,c,k]	14 [b,k]	---	2 [j]	0.1 [j]
Nickel	7440-02-0	23,000 [b,c]	---	26,000 [e]	130 [j]	7 [j]
Selenium	7782-49-2	5,700 [b,c]	---	--- [c]	5 [j]	0.3 [j]
Silver	7440-22-4	5,700 [b,c]	---	--- [c]	34 [b,j]	2 [b,j]
Thallium	7440-28-0	91 [b,c,l]	---	--- [c]	0.7 [j]	0.04 [j]
Vanadium	7440-62-2	7,900 [b,c]	---	--- [c]	6,000 [b]	300 [b]
Zinc	7440-66-6	340,000 [b,c]	---	--- [c]	12,000 [b,j]	620 [b,j]

DAF = Dilution Attenuation Factor

[a] Screening level based on human health criteria only

[b] Calculated values correspond to a noncancer hazard quotient of 1. For exposure to multiple non-carcinogens, EPA evaluates contaminants according to their critical effect. See section 2.3 for further discussion.

[c] Ingestion-Dermal pathway: no dermal absorption data available; calculated based on ingestion data only. Inhalation of volatiles pathway: no toxicity criteria available

[d] Soil Saturation Limit (Csat)

[e] Calculated values correspond to a cancer risk of 1 in 1,000,000. For multiple carcinogens, EPA believes values will accumulate to be within acceptable risk levels. See section 2.3 for further discussion.

[f] Level is at or below Contract Laboratory Program required quantification limit for Regular Analytical Services (RAS)

[g] Chemical-specific properties are such that this pathway is not of concern at any soil contaminant concentration

[h] SSL is based on continuous exposure to vinyl chloride during adulthood.

[i] SSL is based on dietary RfD for Cadmium

[j] SSL for pH of 6.8

[k] SSL is based on RfD for mercuric chloride (CAS No. 007847-94-7)

[l] SSL is based on RfD for thallium chloride (CAS No. 7791-12-0)

[^] Health benchmark values are based on NCEA's *Trichloroethylene Health Risk Assessment: Synthesis and Characterization - External Review Draft* (ORD, August, 2001). The trichloroethylene draft risk assessment is still under review. As a result, the health benchmark values are subject to change.

Exhibit A-3

GENERIC SSLs FOR COMMERCIAL/INDUSTRIAL SCENARIO: INDOOR WORKER RECEPTOR[a]

Compound	CAS No.	Ingestion-Dermal* (mg/kg)	Migration to Ground Water	
			DAF=20 (mg/kg)	DAF=1 (mg/kg)
Organics				
Acenaphthene	83-32-9	120,000 [b]	570 [b]	29 [b]
Acetone (2-Propanone)	67-64-1	200,000 [b]	16 [b]	0.8 [b]
Aldrin	309-00-2	0.3 [e]	0.5 [e]	0.02 [e]
Anthracene	120-12-7	610,000 [b]	12,000 [b]	590 [b]
Benz(a)anthracene	56-55-3	8 [e]	2 [e]	0.08 [e,f]
Benzene	71-43-2	100 [e]	0.03	0.002 [f]
Benzo(b)fluoranthene	205-99-2	8 [e]	5 [e]	0.2 [e,f]
Benzo(k)fluoranthene	207-08-9	78 [e]	49 [e]	2 [e]
Benzoic acid	65-85-0	1,000,000 [b]	400 [b,j]	20 [b,j]
Benzo(a)pyrene	50-32-8	0.8 [e]	8	0.4
Bis(2-chloroethyl)ether	111-44-4	5 [e]	0.0004 [e,f]	0.00002 [e,f]
Bis(2-ethylhexyl)phthalate	117-81-7	410 [e]	3,600	180
Bromodichloromethane	75-27-4	92 [e]	0.6	0.03
Bromoform (tribromomethane)	75-25-2	720 [e]	0.8	0.04
Butanol	71-36-3	200,000 [b]	17 [b]	0.9 [b]
Butyl benzyl phthalate	85-68-7	410,000 [b]	930 [d]	810 [b]
Carbazole	86-74-8	290 [e]	0.6 [e]	0.03 [e,f]
Carbon disulfide	75-15-0	200,000 [b]	32 [b]	2 [b]
Carbon tetrachloride	56-23-5	44 [e]	0.07	0.003 [f]
Chlordane	57-74-9	16 [e]	10	0.5
p-Chloroaniline	106-47-8	8,200 [b]	0.7 [b]	0.03 [b,f]
Chlorobenzene	108-90-7	41,000 [b]	1	0.07
Chlorodibromomethane	124-48-1	68 [e]	0.4	0.02
Chloroform	67-66-3	20,000 [b]	0.6	0.03
2-Chlorophenol	95-57-8	10,000 [b]	4 [b,j]	0.2 [b,f,j]
Chrysene	218-01-9	780 [e]	160 [e]	8 [e]
DDD	72-54-8	24 [e]	16 [e]	0.8 [e]
DDE	72-55-9	17 [e]	54 [e]	3 [e]
DDT	50-29-3	17 [e]	32 [e]	2 [e]
Dibenz(a,h)anthracene	53-70-3	0.8 [e]	2 [e]	0.08 [e,f]
Di-n-butyl phthalate	84-74-2	200,000 [b]	2,300 [d]	270 [b]
1,2-Dichlorobenzene	95-50-1	180,000 [b]	17	0.9
1,4-Dichlorobenzene	106-46-7	240 [e]	2	0.1 [f]
3,3-Dichlorobenzidine	91-94-1	13 [e]	0.007 [e,f]	0.0003 [e,f]
1,1-Dichloroethane	75-34-3	200,000 [b]	23 [b]	1 [b]
1,2-Dichloroethane	107-06-2	63 [e]	0.02	0.001 [f]
1,1-Dichloroethylene	75-35-4	100,000 [b]	0.06	0.003 [f]
cis-1,2-Dichloroethylene	156-59-2	20,000 [b]	0.4	0.02
trans-1,2-Dichloroethylene	156-60-5	41,000 [b]	0.7	0.03
2,4-Dichlorophenol	120-83-2	6,100 [b]	1 [b,j]	0.05 [b,f,j]
2,4-Dichlorophenoxy-acetic acid	94-75-7	20,000 [b]	0.4 [b]	0.02 [b,j]

Exhibit A-3 (continued)

GENERIC SSLs FOR COMMERCIAL/INDUSTRIAL SCENARIO: INDOOR WORKER RECEPTOR[a]

Compound			Migration to Ground Water	
Organics(continued)	CAS No.	Ingestion-Dermal* (mg/kg)	DAF=20 (mg/kg)	DAF=1 (mg/kg)
1,2-Dichloropropane	78-87-5	84 [e]	0.03	0.001 [f]
1,3-Dichloropropene	542-75-6	57 [e]	0.004 [e]	0.0002 [e]
Dieldrin	60-57-1	0.4 [e]	0.004 [e]	0.0002 [e,f]
Diethylphthalate	84-66-2	1,000,000 [b]	470 [b]	23 [b]
2,4-Dimethylphenol	105-67-9	41,000 [b]	9 [b]	0.4 [b]
2,4-Dinitrophenol	51-28-5	4,100 [b]	0.2 [b,f,j]	0.008 [b,f,j]
2,4-Dinitrotoluene	121-14-2	8 [e]	0.0008 [e,f]	0.00004 [e,f]
2,6-Dinitrotoluene	606-20-2	8 [e]	0.0007 [e,f]	0.00003 [e,f]
Di-n-octyl phthalate	117-84-0	41,000 [b]	10,000 [d]	10,000 [d]
Endosulfan	115-29-7	12,000 [b]	18 [b]	0.9 [b]
Endrin	72-20-8	610 [b]	1	0.05
Ethylbenzene	100-41-4	200,000 [b]	13	0.7
Fluoranthene	206-44-0	82,000 [b]	4,300 [b]	210 [b]
Fluorene	86-73-7	82,000 [b]	560 [b]	28 [b]
Heptachlor	76-44-8	1 [e]	23	1
Heptachlor Epoxide	1024-57-3	0.6 [e]	0.7	0.03
Hexachlorobenzene	118-74-1	4 [e]	2	0.1 [f]
Hexachloro-1,3-butadiene	87-68-3	73 [e]	2	0.1 [f]
"-HCH ("-BHC)	319-84-6	0.9 [e]	0.0005 [e,f]	0.00003 [e,f]
$-HCH($-BHC)	319-85-7	3 [e]	0.003 [e]	0.0001 [e,f]
(-HCH(Lindane)	58-89-9	4 [e]	0.009	0.0005 [f]
Hexachlorocyclopentadiene	77-47-4	12,000 [b]	400	20
Hexachloroethane	67-72-1	410 [e]	0.5 [e]	0.02 [e,f]
Indeno(1,2,3-cd)pyrene	193-39-5	8 [e]	14 [e]	0.7 [e]
Isophorone	78-59-1	6,000 [e]	0.5 [e]	0.03 [e,f]
Methoxychlor	72-43-5	10,000 [b]	160	8
Methyl bromide	74-83-9	2,900 [b]	0.2 [b]	0.01 [b,f]
Methylene chloride	75-09-2	760 [e]	0.02 [e]	0.001 [e,f]
2-Methylphenol (o-cresol)	95-48-7	100,000 [b]	15 [b]	0.8 [b]
Naphthalene	91-20-3	41,000 [b]	84 [b]	4 [b]
Nitrobenzene	98-95-3	1,000 [b]	0.1 [b,f]	0.007 [b,f]
N-Nitrosodiphenylamine	86-30-6	1,200 [e]	1 [e]	0.06 [e,f]
N-Nitrosodi-n-propylamine	621-64-7	0.8 [e]	0.00005 [e,f]	0.000002 [e,f]
Pentachlorophenol	87-86-5	48 [e]	0.03 [f,j]	0.001 [f,j]
Phenol	108-95-2	610,000 [b]	100 [b]	5 [b]
Pyrene	129-00-0	61,000 [b]	4,200 [b]	210 [b]
Styrene	100-42-5	410,000 [b]	4	0.2
1,1,2,2-Tetrachloroethane	79-34-5	29 [e]	0.003 [e,f]	0.0002 [e,f]
Tetrachloroethylene	127-18-4	11 [e]	0.06	0.003 [f]
Toluene	108-88-3	410,000 [b]	12	0.6
Toxaphene	8001-35-2	5 [e]	31	2
1,2,4-Trichlorobenzene	120-82-1	20,000 [b]	5	0.3 [f]
1,1,1-Trichloroethane	71-55-6	--- [c]	2	0.1
1,1,2-Trichloroethane	79-00-5	100 [e]	0.02	0.0009 [f]
Trichloroethylene^	79-01-6	14 [e]	0.06	0.003 [f]
2,4,5-Trichlorophenol	95-95-4	200,000 [b]	270 [b,j]	14 [b,j]

Exhibit A-3 (continued)

GENERIC SSLs FOR COMMERCIAL/INDUSTRIAL SCENARIO: INDOOR WORKER RECEPTOR[a]

Compound	CAS No.	Ingestion-Dermal* (mg/kg)	Migration to Ground Water	
			DAF=20 (mg/kg)	DAF=1 (mg/kg)
Organics(continued)				
2,4,6-Trichlorophenol	88-06-2	520 [e]	0.2 [e,f,j]	0.008 [e,f,j]
Vinyl acetate	108-05-4	1,000,000 [b,c]	170 [b]	8 [b]
Vinyl chloride (chloroethene)	75-01-4	8 [e,h]	0.01 [f,h,j]	0.0007 [f,h]
m-Xylene	108-38-3	1,000,000 [b]	210	10
o-Xylene	95-47-6	1,000,000 [b]	190	9
p-Xylene	106-42-3	1,000,000 [b]	200	10
Inorganics				
Antimony	7440-36-0	820 [b]	5	0.3
Arsenic	7440-38-2	4 [e]	29 [j]	1 [j]
Barium	7440-39-3	140,000 [b]	1,600 [j]	82 [j]
Beryllium	7440-41-7	4,100 [b]	63 [j]	3 [j]
Cadmium	7440-43-9	2,000 [b,i]	8 [j]	0.4 [j]
Chromium (total)	7440-47-3	6,100 [b]	38 [j]	2 [j]
Chromium (III)	16065-83-1	1,000,000 [b]	--- [g]	--- [g]
Chromium (VI)	18540-29-9	6,100 [b]	38 [j]	2 [j]
Cyanide (amenable)	57-12-5	41,000 [b]	40	2
Mercury	7439-97-6	610 [b,k]	2 [j]	0.1 [j]
Nickel	7440-02-0	41,000 [b]	130 [j]	7 [j]
Selenium	7782-49-2	10,000 [b]	5 [j]	0.3 [j]
Silver	7440-22-4	10,000 [b]	34 [b,j]	2 [b,j]
Thallium	7440-28-0	160 [b,l]	0.7 [j]	0.04 [j]
Vanadium	7440-62-2	14,000 [b]	6,000 [b]	300 [b]
Zinc	7440-66-6	610,000 [b]	12,000 [b,j]	620 [b,j]

DAF = Dilution Attenuation Factor

* No dermal absorption data available for indoor worker receptor; calculated based on ingestion data only

[a] Screening level based on human health criteria only

[b] Calculated values correspond to a noncancer hazard quotient of 1

[c] Ingestion-Dermal pathway: no dermal absorption data available; calculated based on ingestion data only. Inhalation of volatiles pathway: no toxicity criteria available

[d] Soil Saturation Limit (Csat)

[e] Calculated values correspond to a cancer risk of 1 in 1,000,000

[f] Level is at or below Contract Laboratory Program required quantification limit for Regular Analytical Services (RAS)

[g] Chemical-specific properties are such that this pathway is not of concern at any soil contaminant concentration

[h] SSL is based on continuous exposure to vinyl chloride during adulthood.

[i] SSL is based on dietary RfD for Cadmium

[j] SSL for pH of 6.8

[k] SSL is based on RfD for mercuric chloride (CAS No. 007847-94-7)

[l] SSL is based on RfD for thallium chloride (CAS No. 7791-12-0)

^ Health benchmark values are based on NCEA's *Trichloroethylene Health Risk Assessment: Synthesis and Characterization - External Review Draft* (ORD, August, 2001). The trichloroethylene draft risk assessment is still under review. As a result, the health benchmark values are subject to change.

Exhibit A-4

GENERIC SSLs: DEFAULT VALUES FOR PARAMETERS DESCRIBING SITE CONDITIONS - INHALATION AND MIGRATION TO GROUND WATER PATHWAYS

Parameter	SSL Pathway		Method
	Inhalation	Migration to Ground Water	
Source Characteristics			
Continuous vegetative cover	!		50 percent
Roughness height	"		0.5 cm for open terrain; used to derive $U_{t,7}$
Source area (A)	!	"	0.5 acres (2,024m^2); used to derive L for GW
Source length (L)		!	45 m (assumes square source)
Source depth		"	Extends to water table (i.e., no attenuation in unsaturated zone)
Soil Characteristics			
Soil texture	"	"	Loam; defines soil characteristics/parameters
Dry soil bulk density (D_b)	!	!	1.5 kg/L
Soil porosity (n)	!	"	0.43
Vol. soil water content (θ_w)	!	!	0.15 (INH); 0.30 (GW; Indoor INH)*
Vol. soil air content (θ_a)	!	!	0.28 (INH); 0.13 (GW; Indoor INH)*
Soil organic carbon (f_{oc})	!	!	0.006 (0.6%, INH); 0.002 (0.2%, GW)
Soil pH	"	"	6.8; used to determine pH-specific K_d (metals) and K_{OC} (ionizable organics)
Mode soil aggregate size	"		0.5 mm; used to derive $U_{t,7}$
Threshold windspeed @ 7 m ($U_{t,7}$)	!		11.32 m/s
Meteorological Data			
Mean annual windspeed (U_m)	!		4.69 m/s (Minneapolis, MN)
Air dispersion factor (Q/C)	!		90th percentile conterminous U.S.
Volatilization Q/C	!		68.18; Los Angeles, CA; 0.5-acre source
Fugitive particulate Q/C	!		93.77; Minneapolis, MN; 0.5-acre source
Hydrogeologic Characteristics (DAF)			
Hydrogeologic setting		"	Generic (national); surficial aquifer
Dilution/attenuation factor (DAF)		!	20 or 1

! Indicates parameters used directly in the SSL equations.
" Indicates parameters/assumptions used to develop input parameters for SSL equations.
INH = Inhalation pathway.
GW = Migration to ground water pathway.
Indoor INH = Inhalation of volatiles in indoor air pathway.
* The inhalation of volatiles in indoor air pathway is evaluated using subsurface soil defaults for θ_w and θ_a. The model's default parameters assume contamination located directly beneath a basement floor that is two meters below the ground surface.

APPENDIX B
SSL EQUATIONS FOR RESIDENTIAL SCENARIO

This appendix provides equations for the simple site-specific approach to developing SSLs for the residential exposure scenario. These equations, along with the default values for exposure assumptions and other model parameters listed below them, were used to develop the generic residential SSLs presented in Appendix A, Exhibit A-1. Site-specific parameters are indicated in bold. Site managers can use site-specific values for these parameters when developing SSLs; the default values for these parameters should be used when site-specific data are not available.

These equations allow site managers to calculate simple site-specific SSLs for chronic exposures to contaminants via the combined routes of direct ingestion and dermal absorption, outdoor inhalation of volatiles, outdoor inhalation of fugitive dust, and ingestion of leachate contaminated ground water. With the exception of the combined equations for direct ingestion and dermal absorption (Equations B-1 and B-2), the equations in this appendix are identical to those presented in the 1996 *Soil Screening Guidance*, though users should note that the default values for the fugitive dust and volatiles dispersion factors have been updated since the original guidance was published. For information on the applicability and use of these equations, users should refer to Section 2.5 of the 1996 *SSG* for ingestion, inhalation, and ground water exposures, and Section 3.2 of *RAGS, Part E* for dermal exposures. The specific equations provided in this appendix are:

- **Equations B-1 through B-5.** Screening level equations for combined ingestion and dermal absorption exposures to carcinogenic and non-carcinogenic soil contaminants, including calculation of dermal toxicity values and the age-adjusted dermal factor.

- **Equations B-6 through B-8.** Screening level equations for inhalation of carcinogenic and non-carcinogenic contaminants in fugitive dust, including calculation of the Particulate Emission Factor (PEF).

- **Equations B-9 through B-12.** Screening level equations for inhalation of carcinogenic and non-carcinogenic volatile contaminants, including calculation of the Volatilization Factor (VF) and the chemical-specific soil saturation limits (C_{sat}).

- **Equations B-13 through B-17.** Screening level equations for ingestion of contaminants in ground water, including calculation of chemical-specific dilution attenuation factors, site-specific mixing-zone depth, and mass limit volatilization factors.

Equation B-1
Screening Level Equation for Combined Ingestion and Dermal Absorption Exposure to Carcinogenic Contaminants in Soil - Residential Scenario

$$\text{Screening Level (mg/kg)} = \frac{TR \times AT \times 365\,d/yr}{(EF \times 10^{-6}\,kg/mg)[(SF_o \times IF_{soil/adj}) + (SF_{ABS} \times SFS \times ABS_d \times EV)]}$$

Parameter/Definition (units)	Default
TR/target cancer risk (unitless)	10^{-6}
AT/averaging time (years)	70
EF/exposure frequency (days/year)	350
SF_{ABS}/dermally adjusted cancer slope factor $(mg/kg\text{-}d)^{-1}$	chemical-specific (Equation B-3)
SFS/age-adjusted dermal factor (mg-yr/kg-event)	**360 (Equation B-5)**
ABS_d/dermal absorption fraction (unitless)	chemical-specific (Appendix C)
EV/event frequency (events/day)	1
SF_o/oral cancer slope factor $(mg/kg\text{-}d)^{-1}$	chemical-specific (Appendix C)
$IF_{soil/adj}$/age-adjusted soil ingestion factor (mg-yr/kg-d)	114[a]

[a] Calculated per *RAGS, Part B,* Equation 3.

Equation B-2
Screening Level Equation for Combined Ingestion and Dermal Absorption Exposure to Non-Carcinogenic Contaminants in Soil - Residential Scenario

$$\text{Screening Level (mg/kg)} = \frac{THQ \times BW \times AT \times 365\,d/yr}{(EF \times ED \times 10^{-6}\,kg/mg)\left[\left(\frac{1}{RfD_o} \times IR\right) + \left(\frac{1}{RfD_{ABS}} \times AF \times ABS_d \times EV \times SA\right)\right]}$$

Parameter/Definition (units)	Default
THQ/target hazard quotient (unitless)	1
BW/body weight (kg)	15
AT/averaging time (years)	6[a]
EF/exposure frequency (days/year)	350
ED/exposure duration (years)	6
RfD_o/oral reference dose (mg/kg-d)	chemical-specific (Appendix C)
IR/soil ingestion rate (mg/d)	200
RfD_{ABS}/dermally-adjusted reference dose (mg/kg-d)	chemical-specific (Equation B-4)
AF/skin-soil adherence factor (mg/cm^2-event)	**0.2**
ABS_d/dermal absorption factor (unitless)	chemical-specific (Appendix C)
EV/event frequency (events/day)	1
SA/skin surface area exposed-child (cm^2)	**2,800**

[a] For non-carcinogens, averaging time equals to exposure duration.

Equation B-3
Calculation of Dermal Carcinogenic Toxicity Values

$$SF_{ABS} = \frac{SF_O}{ABS_{GI}}$$

Parameter/Definition (units)	Default
SF_{ABS}/dermally adjusted slope factor $(mg/kg\text{-}d)^{-1}$	chemical-specific
SF_O/oral slope factor $(mg/kg\text{-}d)^{-1}$	chemical-specific (Appendix C)
ABS_{GI}/gastro-intestinal absorption factor (unitless)	chemical-specific (Appendix C)

Equation B-4
Calculation of Dermal Non-Carcinogenic Toxicity Values

$$RfD_{ABS} = RfD_O \times ABS_{GI}$$

Parameter/Definition (units)	Default
RfD_{ABS}/dermally adjusted reference dose (mg/kg-d)	chemical-specific
RfD_O/oral reference dose (mg/kg-d)	chemical-specific (Appendix C)
ABS_{GI}/gastro-intestinal absorption factor (unitless)	chemical-specific (Appendix C)

Equation B-5
Derivation of the Age-Adjusted Dermal Factor

$$SFS = \left[\frac{SA_{1\&6} \times AF_{1\&6} \times ED_{1\&6}}{BW_{1\&6}}\right] + \left[\frac{SA_{7\&31} \times AF_{7\&31} \times ED_{7\&31}}{BW_{7\&31}}\right]$$

Parameter/Definition (units)	Default
SFS/age-adjusted dermal factor (mg-yr/kg-event)	360
$SA_{1\text{-}6}$/skin surface area exposed-child (cm2)	**2,800**
$SA_{7\text{-}31}$/skin surface area exposed-adult (cm2)	**5,700**
$AF_{1\text{-}6}$/skin-soil adherence factor-child (mg/cm2 - event)	**0.2**
$AF_{7\text{-}31}$/skin-soil adherence factor-adult (mg/cm2 - event)	**0.07**
$ED_{1\text{-}6}$/exposure duration-child (years)	6
$ED_{7\text{-}31}$/exposure duration-adult (years)	24
$BW_{1\text{-}6}$/body weight-child (kg)	15
$BW_{7\text{-}31}$/body weight-adult (kg)	70

Equation B-6
Screening Level Equation for Inhalation of Carcinogenic Fugitive Dusts
- Residential Scenario

$$\text{Screening Level (mg/kg)} = \frac{TR \times AT \times 365\,d/yr}{URF \times 1{,}000\,\mu g/mg \times EF \times ED \times \frac{1}{PEF}}$$

Parameter/Definition (units)	Default
TR/target cancer risk (unitless)	10^{-6}
AT/averaging time (yr)	70
URF/inhalation unit risk factor $(\mu g/m^3)^{-1}$	chemical-specific (Appendix C)
EF/exposure frequency (d/yr)	350
ED/exposure duration (yr)	30
PEF/particulate emission factor (m^3/kg)	**1.36×10^9 (Equation B-8)**

Equation B-7
Screening Level Equation for Inhalation of Non-carcinogenic Fugitive Dusts
- Residential Scenario

$$\text{Screening Level (mg/kg)} = \frac{THQ \times AT \times 365 d/yr}{EF \times ED \times [\frac{1}{RfC} \times \frac{1}{PEF}]}$$

Parameter/Definition (units)	Default
THQ/target hazard quotient (unitless)	1
AT/averaging time (yr)	30[a]
EF/exposure frequency (d/yr)	350
ED/exposure duration (yr)	30
RfC/inhalation reference concentration (mg/m^3)	chemical-specific (Appendix C)
PEF/particulate emission factor (m^3/kg)	**1.36×10^9 (Equation B-8)**

[a] For non-carcinogens, averaging time equals exposure duration.

Equation B-8
Derivation of the Particulate Emission Factor
- Residential Scenario

$$PEF = Q/C_{wind} \times \frac{3{,}600 s/h}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)}$$

Parameter/Definition (units)	Default
PEF/particulate emission factor (m^3/kg)	1.36×10^9
Q/C_{wind}/inverse of the ratio of the geometric mean air concentration to the emission flux at center of a square source (g/m^2-s per kg/m^3)	**93.77[a]**
V/fraction of vegetative cover (unitless)	**0.5 (50%)**
U_m/mean annual windspeed (m/s)	**4.69**
U_t/equivalent threshold value of windspeed at 7m (m/s)	**11.32**
F(x)/function dependent on U_m/U_t derived using Cowherd et al. (1985) (unitless)	**0.194**

[a] Assumes as 0.5 acre source; for site-specific values, consult Appendix D.

Equation B-9
Screening Level Equation for Inhalation of Carcinogenic Volatile Contaminants in Soil
- Residential Scenario

$$\text{Screening Level (mg/kg)} = \frac{TR \times AT \times 365 d/yr}{URF \times 1{,}000 \mu g/mg \times EF \times ED \times \frac{1}{VF}}$$

Parameter/Definition (units)	Default
TR/target cancer risk (unitless)	10^{-6}
AT/averaging time (yr)	70
URF/inhalation unit risk factor $(\mu g/m^3)^{-1}$	chemical-specific (Appendix C)
EF/exposure frequency (d/yr)	350
ED/exposure duration (yr)	30
VF/soil-to-air volatilization factor (m^3/kg)	**chemical-specific (Equation B-11)**

Equation B-10
Screening Level Equation for Inhalation of Non-carcinogenic Volatile Contaminants in Soil - Residential Scenario

$$\text{Screening Level (mg/kg)} = \frac{THQ \times AT \times 365 d/yr}{EF \times ED \times [\frac{1}{RfC} \times \frac{1}{VF}]}$$

Parameter/Definition (units)	Default
THQ/target hazard quotient (unitless)	1
AT/averaging time (yr) Outdoor Worker	30[a]
EF/exposure frequency (d/yr)	350
ED/exposure duration (yr)	30
RfC/inhalation reference concentration (mg/m^3)	chemical-specific (Appendix C)
VF/soil-to-air volatilization factor (m^3/kg)	**chemical-specific (Equation B-11)**

[a] For non-carcinogens, averaging time equals exposure duration.

Equation B-11
Derivation of the Volatilization Factor
- Residential Scenario

$$VF = \frac{Q/C_{vol} \times (3.14 \times D_A \times T)^{1/2} \times 10^{-4} (m^2/cm^2)}{(2 \times \rho_b \times D_A)}$$

where:

$$D_A = \frac{[(\theta_a^{10/3} D_i H') + (\theta_w^{10/3} D_w) / n^2]}{\rho_b K_d + \theta_w + \theta_a H'}$$

Parameter/Definition (units)	Default
VF/volatilization factor (m^3/kg)	—
D_A/apparent diffusivity (cm^2/s)	—
Q/C_{vol} /inverse of the geometric mean air concentration to the volatilization flux at the center of a square source (g/m^2-s per kg/m^3)	**68.18[a]**
T/exposure interval (s)	9.5×10^8
ρ_b/dry soil bulk density (g/cm^3)	**1.5**
θ_a/air-filled soil porosity (L_{air}/L_{soil})	$n-\theta_w$
n/total soil porosity (L_{pore}/L_{soil})	$1-(\rho_b/\rho_s)$
θ_w/water-filled soil porosity (L_{water}/L_{soil})	**0.15**
ρ_s/soil particle density (g/cm^3)	2.65
D_i/diffusivity in air (cm^2/s)	chemical-specific[b]
H´/dimensionless Henry's law constant	chemical-specific[b]
D_w/diffusivity in water (cm^2/s)	chemical-specific[b]
K_d/soil-water partition coefficient (cm^3/g)	organics = $K_{oc} \times f_{oc}$ inorganics = see Appendix C[c]
K_{oc}/soil organic carbon partition coefficient (cm^3/g)	chemical-specific[b]
f_{oc}/fraction organic carbon in soil (g/g)	**0.006 (0.6%)**

[a] Assumes a 0.5 acre source; for site-specific values, consult Appendix D.
[b] See Appendix C.
[c] Assume a pH of 6.8 when selecting default K_d values for metals.

Equation B-12
Derivation of the Soil Saturation Limit

$$C_{sat} = \frac{S}{\rho_b}(K_d \rho_b + \theta_w + H \theta_a)$$

Parameter/Definition (units)	Default
C_{sat}/soil saturation concentration (mg/kg)	--
S/solubility in water (mg/L-water)	chemical-specific[a]
ρ_b/dry soil bulk density (kg/L)	**1.5**
K_d/soil-water partition coefficient (L/kg)	organics = $K_{oc} \times f_{oc}$ inorganics = see Appendix C[b]
K_{oc}/organic carbon partition coefficient (L/kg)	chemical-specific[a]
f_{oc}/fraction organic carbon in soil (g/g)	**0.006 (0.6%)**
θ_w/water-filled soil porosity (L_{water}/L_{soil})	**0.15**
H/dimensionless Henry's law constant	chemical-specific[a]
θ_a/air-filled soil porosity (L_{air}/L_{soil})	$n - \theta_w$
n/total soil porosity (L_{pore}/L_{soil})	$1 - (\rho_b/\rho_s)$
ρ_s/soil particle density (kg/L)	2.65

[a] See Appendix C.
[b] Assume a pH of 6.8 when selecting default K_d values for metals.

Equation B-13
Soil Screening Level Partitioning Equation for Migration to Ground Water

$$\text{Screening Level in Soil (mg/kg)} = C_w \left[K_D + \frac{(\theta_w + \theta_a H')}{\rho_b} \right]$$

Parameter/Definition (units)	Default
C_w/target soil leachate concentration (mg/L)	(nonzero MCLG, MCL, or HBL)[a] × dilution factor
K_d/soil-water partition coefficient (L/kg)	organics = $K_{oc} \times f_{oc}$ inorganics = see Appendix C[b]
K_{oc}/soil organic carbon/water partition coefficient (L/kg)	chemical-specific[c]
f_{oc}/fraction organic carbon in soil (g/g)	**0.002 (0.2%)**
θ_w/water-filled soil porosity (L_{water}/L_{soil})	**0.3**
θ_a/air-filled soil porosity (L_{air}/L_{soil})	$n - \theta_w$
ρ_b/dry soil bulk density (kg/L)	**1.5**
n/soil porosity (L_{pore}/L_{soil})	$1 - (\rho_b/\rho_s)$
ρ_s/soil particle density (kg/L)	2.65
H′/dimensionless Henry's law constant	chemical-specific[c] (assume to be zero for inorganic contaminants except mercury)

[a] Chemical-specific (see Appendix C).
[b] Assume a pH of 6.8 when selecting default K_d values for metals.
[c] See Appendix C.

Equation B-14
Derivation of Dilution Attenuation Factor

$$\text{Dilution Attenuation Factor (DAF)} = 1 + \frac{K \times i \times d}{I \times L}$$

Parameter/Definition (units)	Default
DAF/dilution attenuation factor (unitless)	20 or 1 (0.5-acre source)
K/aquifer hydraulic conductivity (m/yr)	Site-specific
i/hydraulic gradient (m/m)	Site-specific
I/infiltration rate (m/yr)	Site-specific
d/mixing zone depth (m)	Site-specific
L/source length parallel to ground water flow (m)	Site-specific

Equation B-15
Estimation of Mixing Zone Depth

$$d = (0.0112 L^2)^{0.5} + d_a(1 - \exp[(-L \times I)/(K \times i \times d_a)])$$

Parameter/Definition (units)	Default
d/mixing zone depth (m)	Site-specific
L/source length parallel to ground water flow (m)	Site-specific
I/infiltration rate (m/yr)	Site-specific
K/aquifer hydraulic conductivity (m/yr)	Site-specific
i/hydraulic gradient (m/m)	Site-specific
d_a/aquifer thickness (m)	Site-specific

Equation B-16
Mass-Limit Volatilization Factor
- Residential Scenario

$$VF = Q/C_{vol} \times \frac{[T \times (3.15 \times 10^7 s/yr)]}{(\rho_b \times d_s \times 10^6 g/Mg)}$$

Parameter/Definition (units)	Default
d_s/average source depth (m)	**site-specific**
T/exposure interval (yr)	30
Q/C_{vol}/inverse of the geometric mean air concentration to the volatilization flux at the center of a square source (g/m^2-s per kg/m^3)	**68.18[a]**
ρ_b/dry soil bulk density (kg/L or Mg/m^3)	**1.5**

[a] Assumes a 0.5 acre source; for site-specific values, consult Appendix D.

Equation B-17
Mass-Limit Soil Screening Level for Migration to Ground Water

$$\text{Screening Level in Soil (mg/kg)} = \frac{(C_w \times I \times ED)}{\rho_b \times d_s}$$

Parameter/Definition (units)	Default
C_w/target soil leachate concentration (mg/L)	(nonzero MCLG, MCL, or HBL)[a] × dilution factor
d_s/depth of source (m)	**site-specific**
I/infiltration rate (m/yr)	**0.18**
ED/exposure duration (yr)	70
ρ_b/dry soil bulk density (kg/L)	**1.5**

[a] Chemical-specific, see Appendix C.

APPENDIX C

Chemical Properties and Regulatory/Human Health Benchmarks for SSL Calculations

This appendix provides the chemical properties and regulatory and human health benchmarks necessary to calculate SSLs for 109 chemicals commonly found at NPL sites. It consists of the following exhibits:

- Exhibit C-1 provides chemical-specific organic carbon-water partition coefficients (K_{oc}), air and water diffusivities (D_a and D_w), water solubilities (S), and dimensionless Henry's law constants (H').

- Exhibit C-2 provides pH-specific K_{oc} values for 10 organic contaminants that ionize under natural pH conditions. Site-specific soil pH measurements (see EPA's 1996 *SSG*, Section 2.3.5) can be used to select appropriate K_{oc} values for these contaminants. Where site-specific soil pH values are not available, values corresponding to a pH of 6.8 should be used. Note that K_{oc} values presented in Exhibit C-1 for these contaminants are based on a default pH of 6.8).

- Exhibit C-3 provides the physical state (liquid or solid) for organic contaminants. This information is needed to apply and interpret soil saturation limit (C_{sat}) results when calculating SSLs for the inhalation of volatiles in outdoor air pathway.

- Exhibit C-4 provides pH-specific soil-water partition coefficients (K_d) for metals. Site-specific soil pH measurements (see 1996 *SSG*, Section 2.3.5) can be used to select appropriate K_d values for these metals. Where site-specific soil pH values are not available, values corresponding to a pH of 6.8 should be used.

- Exhibit C-5 provides chemical-specific regulatory and human health benchmarks for organic and inorganic contaminants. The chemical-specific Maximum Contaminant Level Goal (MCLG), Maximum Contaminant Level (MCL), Water Health Based Limit (HBL), Cancer Slope Factor (CSF), Unit Risk Factor (URF), Reference Dose (RfD), and Reference Concentration (RfC) values presented in this exhibit are used as inputs in the SSL equations in Sections 3, 4, and 5 of this document.

- Exhibit C-6 presents chemical-specific absorption percentages for dermal contact (ABS_d) for all contaminants for which this pathway is relevant. The values presented represent the average dermal absorption values across a range of soil types, loading rates, and chemical concentrations for these contaminants.

- Exhibit C-7 provides gastrointestinal absorption factors (ABS_{GI}) for contaminants of concern for the dermal pathway. These values are used for route-to-route extrapolation of toxicity values. Specifically, these factors are used to adjust the oral reference dose (RfD) and cancer slope factor (SF) for a contaminant, which is based

on administered dose, to more accurately reflect the dermal dose, which is an absorbed dose. Where there is greater than 50 percent gastrointestinal absorption (e.g., ABS_{GI}>.5), no adjustment is made.

With the exception of values for air diffusivity (D_a), water diffusivity (D_w), and certain K_{oc} values, all of the chemical properties used to calculate SSLs are also reported in the Superfund Chemical Data Matrix (SCDM). Water and air diffusivities were obtained from EPA's CHEMDAT8 and WATER8 models. For more information on the derivation of K_{oc} values, or for a more detailed discussion of the chemical properties presented in Exhibits C-1 through C-4, please refer to the *Technical Background Document* for the 1996 *Soil Screening Guidance* (*SSG*).[1]

The sources for the regulatory and human health benchmarks include the list of National Primary Drinking Water Regulations (NPDWRs), maintained by EPA's Office of Ground Water and Drinking Water, and EPA's *Integrated Risk Information System* (IRIS).[2] The full list of sources for the regulatory and chronic human health benchmarks is presented at the end of Exhibit C-5. Chemical-specific dermal and gastro-intestinal absorption fractions for the dermal contact pathway were obtained from EPA's *RAGS, Part E, Supplemental Guidance for Dermal Risk Assessment* (U.S. EPA, 2001).

All of the sources of the values listed in Exhibits C-1 through C-5 are regularly updated by EPA. In addition, the information in Exhibits C-6 and C-7 was obtained from *RAGS, Part E*. Therefore, prior to calculating SSLs for a site, regulatory/health benchmarks and chemical properties should be checked against the most recent versions of the appropriate sources to ensure that they are up to date. These sources may also be useful for identifying properties and benchmarks for additional contaminants of concern not included in this appendix. Several of these sources are available on-line at the following EPA web sites:

IRIS:	http://www.epa.gov/iriswebp/iris/index.html
NPDWRs:	http://www.epa.gov/safewater/mcl.html
SCDM:	http://www.epa.gov/superfund/resources/scdm/index.htm
CHEMDAT8:	http://www.epa.gov/ttn/chief/index.html
WATER8:	http://www.epa.gov/ttn/chief/index.html

[1] The K_{oc} value for 2,4-Dichlorophenoxyacetic acid was estimated using information from the *1996 Technical Background Document* and the *Chemical Database for HWIR99* (U.S. EPA, 1999) along with the Office of Solid Waste's Multimedia, Multipathway, and Multireceptor (3MRA) Assessment Model (U.S. EPA, 2001, Version 1.01).

[2] The National Primary Drinking Water Regulations can be found at www.epa.gov/safewater/mcl.html. Human health benchmarks are available through EPA's IRIS system which can be found at www.epa.gov/iris.

Exhibit C-1

CHEMICAL-SPECIFIC PROPERTIES USED IN SSL CALCULATIONS

CAS No.	Compound	K_{OC} (L/kg)	D_i (cm^2/s)	D_w (cm^2/s)	S (mg/L)	H' (dimensionless)
83-32-9	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	4.24E+00	6.36E-03
67-64-1	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03
309-00-2	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.80E-01	6.97E-03
120-12-7	Anthracene	2.95E+04	3.24E-02	7.74E-06	4.34E-02	2.67E-03
56-55-3	Benz(*a*)anthracene	3.98E+05	5.10E-02	9.00E-06	9.40E-03	1.37E-04
71-43-2	Benzene	5.89E+01	8.80E-02	9.80E-06	1.75E+03	2.28E-01
205-99-2	Benzo(*b*)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.55E-03
207-08-9	Benzo(*k*)fluoranthene	1.23E+06	2.26E-02	5.56E-06	8.00E-04	3.40E-05
65-85-0	Benzoic acid	5.76E-01	5.36E-02	7.97E-06	3.50E+03	6.31E-05
50-32-8	Benzo(*a*)pyrene	1.02E+06	4.30E-02	9.00E-06	1.62E-03	4.63E-05
111-44-4	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.38E-04
117-81-7	Bis(2-ethylhexyl)phthalate	1.51E+07	3.51E-02	3.66E-06	3.40E-01	4.18E-06
75-27-4	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.56E-02
75-25-2	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.19E-02
71-36-3	Butanol	6.92E+00	8.00E-02	9.30E-06	7.40E+04	3.61E-04
85-68-7	Butyl benzyl phthalate	5.75E+04	1.74E-02	4.83E-06	2.69E+00	5.17E-05
86-74-8	Carbazole	3.39E+03	3.90E-02	7.03E-06	7.48E+00	6.26E-07
75-15-0	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00
56-23-5	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.25E+00
57-74-9	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03
106-47-8	*p*-Chloroaniline	6.61E+01	4.83E-02	1.01E-05	5.30E+03	1.36E-05
108-90-7	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.52E-01
124-48-1	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.21E-02
67-66-3	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01
95-57-8	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02
218-01-9	Chrysene	3.98E+05	2.48E-02	6.21E-06	1.60E-03	3.88E-03
72-54-8	DDD	1.00E+06	1.69E-02	4.76E-06	9.00E-02	1.64E-04
72-55-9	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.61E-04
50-29-3	DDT	2.63E+06	1.37E-02	4.95E-06	2.50E-02	3.32E-04
53-70-3	Dibenz(*a*,*h*)anthracene	3.80E+06	2.02E-02	5.18E-06	2.49E-03	6.03E-07
84-74-2	Di-*n*-butyl phthalate	3.39E+04	4.38E-02	7.86E-06	1.12E+01	3.85E-08
95-50-1	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.79E-02
106-46-7	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.38E+01	9.96E-02
91-94-1	3,3-Dichlorobenzidine	7.24E+02	1.94E-02	6.74E-06	3.11E+00	1.64E-07
75-34-3	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01
107-06-2	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.01E-02
75-35-4	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00
156-59-2	*cis*-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01
156-60-5	*trans*-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.85E-01
120-83-2	2,4-Dichlorophenol	1.47E+02	3.46E-02	8.77E-06	4.50E+03	1.30E-04
94-75-7	2,4-Dichlorophenoxyacetic acid	2.62E+01	2.31E-02	7.31E-06	6.80E+02	4.10E-07
78-87-5	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01
542-75-6	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.26E-01
60-57-1	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.19E-04
84-66-2	Diethylphthalate	2.88E+02	2.56E-02	6.35E-06	1.08E+03	1.85E-05
105-67-9	2,4-Dimethylphenol	2.09E+02	5.84E-02	8.69E-06	7.87E+03	8.20E-05
51-28-5	2,4-Dinitrophenol	1.02E-02	2.73E-02	9.06E-06	2.79E+03	1.82E-05
121-14-2	2,4-Dinitrotoluene	9.55E+01	2.03E-01	7.06E-06	2.70E+02	3.80E-06
117-84-0	Di-*n*-octyl phthalate	8.32E+07	1.51E-02	3.58E-06	2.00E-02	2.74E-03

Exhibit-C-1 (continued)

CHEMICAL-SPECIFIC PROPERTIES USED IN SSL CALCULATIONS

CAS No.	Compound	K_{OC} (L/kg)	D_i (cm^2/s)	D_w (cm^2/s)	S (mg/L)	H' (dimensionless)
115-29-7	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.59E-04
72-20-8	Endrin	1.23E+04	1.25E-02	4.74E-06	2.50E-01	3.08E-04
100-41-4	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.23E-01
206-44-0	Fluoranthene	1.07E+05	3.02E-02	6.35E-06	2.06E-01	6.60E-04
86-73-7	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.61E-03
76-44-8	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	4.47E-02
1024-57-3	Heptachlor epoxide	8.32E+04	1.32E-02	4.23E-06	2.00E-01	3.90E-04
118-74-1	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	6.20E+00	5.41E-02
87-68-3	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.23E+00	3.34E-01
319-84-6	"-HCH ("-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.35E-04
319-85-7	$-HCH ($-BHC)	1.26E+03	1.42E-02	7.34E-06	2.40E-01	3.05E-05
58-89-9	(-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	6.80E+00	5.74E-04
77-47-4	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.11E+00
67-72-1	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01
193-39-5	Indeno(1,2,3-*cd*)pyrene	3.47E+06	1.90E-02	5.66E-06	2.20E-05	6.56E-05
78-59-1	Isophorone	4.68E+01	6.23E-02	6.76E-06	1.20E+04	2.72E-04
7439-97-6	Mercury	---	3.07E-02	6.30E-06	---	4.67E-01
72-43-5	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	4.50E-02	6.48E-04
74-83-9	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.56E-01
75-09-2	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.98E-02
95-48-7	2-Methylphenol	9.12E+01	7.40E-02	8.30E-06	2.60E+04	4.92E-05
91-20-3	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02
98-95-3	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.84E-04
86-30-6	*N*-Nitrosodiphenylamine	1.29E+03	3.12E-02	6.35E-06	3.51E+01	2.05E-04
621-64-7	*N*-Nitrosodi-*n*-propylamine	2.40E+01	5.45E-02	8.17E-06	9.89E+03	9.23E-05
87-86-5	Pentachlorophenol	5.92E+02	5.60E-02	6.10E-06	1.95E+03	1.00E-06
108-95-2	Phenol	2.88E+01	8.20E-02	9.10E-06	8.28E+04	1.63E-05
129-00-0	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E-01	4.51E-04
100-42-5	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.13E-01
79-34-5	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.97E+03	1.41E-02
127-18-4	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.54E-01
108-88-3	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01
8001-35-2	Toxaphene	2.57E+05	1.16E-02	4.34E-06	7.40E-01	2.46E-04
120-82-1	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	3.00E+02	5.82E-02
71-55-6	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.05E-01
79-00-5	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.74E-02
79-01-6	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.10E+03	4.22E-01
95-95-4	2,4,5-Trichlorophenol	1.60E+03	2.91E-02	7.03E-06	1.20E+03	1.78E-04
88-06-2	2,4,6-Trichlorophenol	3.81E+02	3.18E-02	6.25E-06	8.00E+02	3.19E-04
108-05-4	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.10E-02
75-01-4	Vinyl chloride	1.86E+01	1.06E-01	1.23E-05	2.76E+03	1.11E+00
108-38-3	*m*-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.01E-01
95-47-6	*o*-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.13E-01
106-42-3	*p*-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.14E-01

K_{OC} = Organic carbon partition coefficient.
D_i = Diffusivity in air (25°C).
D_w = Diffusivity in water (25°C).
S = Solubility in water (20-25°C).
H' = Dimensionless Henry's Law Constant (HLC [atm-m^3/mol] * 41) (25° C).

Exhibit C-2

K_{oc} VALUES FOR IONIZING ORGANICS AS A FUNCTION OF pH

pH	Benzoic Acid	2-Chloro-phenol	2,4-Dichloro-phenoxy-acetic acid	2,4-Dichloro-phenol	2,4-Dinitro-phenol	Penta-chloro-phenol	2,3,4,5-Tetrachloro-phenol	2,4,6-Tetrachloro-phenol	2,4,5-Trichloro-phenol	2,4,6-Trichloro-phenol
4.9	5.54E+00	3.98E+02	6.53E+01	1.59E+02	2.94E-02	9.05E+03	1.73E+04	4.45E+03	2.37E+03	1.04E+03
5.0	4.64E+00	3.98E+02	5.72E+01	1.59E+02	2.55E-02	7.96E+03	1.72E+04	4.15E+03	2.36E+03	1.03E+03
5.1	3.88E+00	3.98E+02	5.08E+01	1.59E+02	2.23E-02	6.93E+03	1.70E+04	3.83E+03	2.36E+03	1.02E+03
5.2	3.25E+00	3.98E+02	4.57E+01	1.59E+02	1.98E-02	5.97E+03	1.67E+04	3.49E+03	2.35E+03	1.01E+03
5.3	2.72E+00	3.98E+02	4.16E+01	1.59E+02	1.78E-02	5.10E+03	1.65E+04	3.14E+03	2.34E+03	9.99E+02
5.4	2.29E+00	3.98E+02	3.83E+01	1.58E+02	1.62E-02	4.32E+03	1.61E+04	2.79E+03	2.33E+03	9.82E+02
5.5	1.94E+00	3.97E+02	3.57E+01	1.58E+02	1.50E-02	3.65E+03	1.57E+04	2.45E+03	2.32E+03	9.62E+02
5.6	1.65E+00	3.97E+02	3.37E+01	1.58E+02	1.40E-02	3.07E+03	1.52E+04	2.13E+03	2.31E+03	9.38E+02
5.7	1.42E+00	3.97E+02	3.20E+01	1.58E+02	1.32E-02	2.58E+03	1.47E+04	1.83E+03	2.29E+03	9.10E+02
5.8	1.24E+00	3.97E+02	3.07E+01	1.58E+02	1.25E-02	2.18E+03	1.40E+04	1.56E+03	2.27E+03	8.77E+02
5.9	1.09E+00	3.97E+02	2.97E+01	1.57E+02	1.20E-02	1.84E+03	1.32E+04	1.32E+03	2.24E+03	8.39E+02
6.0	9.69E-01	3.96E+02	2.89E+01	1.57E+02	1.16E-02	1.56E+03	1.24E+04	1.11E+03	2.21E+03	7.96E+02
6.1	8.75E-01	3.96E+02	2.82E+01	1.57E+02	1.13E-02	1.33E+03	1.15E+04	9.27E+02	2.17E+03	7.48E+02
6.2	7.99E-01	3.96E+02	2.77E+01	1.56E+02	1.10E-02	1.15E+03	1.05E+04	7.75E+02	2.12E+03	6.97E+02
6.3	7.36E-01	3.95E+02	2.73E+01	1.55E+02	1.08E-02	9.98E+02	9.51E+03	6.47E+02	2.06E+03	6.44E+02
6.4	6.89E-01	3.94E+02	2.69E+01	1.54E+02	1.06E-02	8.77E+02	8.48E+03	5.42E+02	1.99E+03	5.89E+02
6.5	6.51E-01	3.93E+02	2.67E+01	1.53E+02	1.05E-02	7.81E+02	7.47E+03	4.55E+02	1.91E+03	5.33E+02
6.6	6.20E-01	3.92E+02	2.65E+01	1.52E+02	1.04E-02	7.03E+02	6.49E+03	3.84E+02	1.82E+03	4.80E+02
6.7	5.95E-01	3.90E+02	2.63E+01	1.50E+02	1.03E-02	6.40E+02	5.58E+03	3.27E+02	1.71E+03	4.29E+02
6.8	5.76E-01	3.88E+02	2.62E+01	1.47E+02	1.02E-02	5.92E+02	4.74E+03	2.80E+02	1.60E+03	3.81E+02
6.9	5.60E-01	3.86E+02	2.61E+01	1.45E+02	1.02E-02	5.52E+02	3.99E+03	2.42E+02	1.47E+03	3.38E+02
7.0	5.47E-01	3.83E+02	2.60E+01	1.41E+02	1.02E-02	5.21E+02	3.33E+03	2.13E+02	1.34E+03	3.00E+02
7.1	5.38E-01	3.79E+02	2.59E+01	1.38E+02	1.02E-02	4.96E+02	2.76E+03	1.88E+02	1.21E+03	2.67E+02
7.2	5.32E-01	3.75E+02	2.59E+01	1.33E+02	1.01E-02	4.76E+02	2.28E+03	1.69E+02	1.07E+03	2.39E+02
7.3	5.25E-01	3.69E+02	2.58E+01	1.28E+02	1.01E-02	4.61E+02	1.87E+03	1.53E+02	9.43E+02	2.15E+02
7.4	5.19E-01	3.62E+02	2.58E+01	1.21E+02	1.01E-02	4.47E+02	1.53E+03	1.41E+02	8.19E+02	1.95E+02
7.5	5.16E-01	3.54E+02	2.58E+01	1.14E+02	1.01E-02	4.37E+02	1.25E+03	1.31E+02	7.03E+02	1.78E+02
7.6	5.13E-01	3.44E+02	2.57E+01	1.07E+02	1.01E-02	4.29E+02	1.02E+03	1.23E+02	5.99E+02	1.64E+02
7.7	5.09E-01	3.33E+02	2.57E+01	9.84E+01	1.00E-02	4.23E+02	8.31E+02	1.17E+02	5.07E+02	1.53E+02
7.8	5.06E-01	3.19E+02	2.57E+01	8.97E+01	1.00E-02	4.18E+02	6.79E+02	1.13E+02	4.26E+02	1.44E+02
7.9	5.06E-01	3.04E+02	2.57E+01	8.07E+01	1.00E-02	4.14E+02	5.56E+02	1.08E+02	3.57E+02	1.37E+02
8.0	5.06E-01	2.86E+02	2.57E+01	7.17E+01	1.00E-02	4.10E+02	4.58E+02	1.05E+02	2.98E+02	1.31E+02

Exhibit C-3
PHYSICAL STATE OF ORGANIC CHEMICALS AT TYPICAL SOIL TEMPERATURES

Compounds Present in Liquid Phase			Compounds Present in Solid Phase		
CAS No.	**Chemical**	**Melting Point (°C)**	**CAS No.**	**Chemical**	**Melting Point (°C)**
67-64-1	Acetone	-94.8	83-32-9	Acenaphthene	93.4
71-43-2	Benzene	5.5	309-00-2	Aldrin	104
117-81-7	Bis(2-ethylhexyl)phthalate	-55	120-12-7	Anthracene	215
111-44-4	Bis(2-chloroethyl)ether	-51.9	56-55-3	Benz(*a*)anthracene	84
75-27-4	Bromodichloromethane	-57	50-32-8	Benzo(*b*)pyrene	176.5
75-25-2	Bromoform	8	205-99-2	Benzo(*b*)fluoranthene	168
71-36-3	Butanol	-89.8	207-08-9	Benzo(*k*)fluoranthene	217
85-68-7	Butyl benzyl phthalate	-35	65-85-0	Benzoic acid	122.4
75-15-0	Carbon disulfide	-115	86-74-8	Carbazole	246.2
56-23-5	Carbon tetrachloride	-23	57-74-9	Chlordane	106
108-90-7	Chlorobenzene	-45.2	106-47-8	*p*-Chloroaniline	72.5
124-48-1	Chlorodibromomethane	-20	218-01-9	Chrysene	258.2
67-66-3	Chloroform	-63.6	72-54-8	DDD	109.5
95-57-8	2-Chlorophenol	9.8	72-55-9	DDE	89
84-74-2	Di-*n*-butyl phthalate	-35	50-29-3	DDT	108.5
95-50-1	1,2-Dichlorobenzene	-16.7	53-70-3	Dibenzo(*a*,*h*)anthracene	269.5
75-34-3	1,1-Dichloroethane	-96.9	106-46-7	1,4-Dichlorobenzene	52.7
107-06-2	1,2-Dichloroethane	-35.5	91-94-1	3,3-Dichlorobenzidine	132.5
75-35-4	1,1Dichloroethylene	-122.5	120-83-2	2,4-Dichlorophenol	45
156-59-2	*cis*-1,2-Dichloroethylene	-80	94-75-7	2,4-Dichlorophenoxyacetic acid	140.5
156-60-5	*trans*-1,2-Dichloroethylene	-49.8	60-57-1	Dieldrin	175.5
78-87-5	1,2-Dichloropropane	-70	105-67-9	2,4-Dimethylphenol	24.5
542-75-6	1,3-Dichloropropene	N/A	51-28-5	2,4-Dinitrophenol	115-116
84-66-2	Diethylphthalate	-40.5	121-14-2	2,4-Dinitrotoluene	71
117-84-0	Di-*n*-octyl phthalate	-30	606-20-2	2,6-Dinitrotoluene	66
100-41-4	Ethylbenzene	-94.9	72-20-8	Endrin	200
87-68-3	Hexachloro-1,3-butadiene	-21	115-29-7	Endosulfan	106
77-47-4	Hexachlorocyclopentadiene	-9	206-44-0	Fluoranthene	107.8
78-59-1	Isophorone	-8.1	86-73-7	Fluorene	114.8
74-83-9	Methyl bromide	-93.7	76-44-8	Heptachlor	95.5
75-09-2	Methylene chloride	-95.1	1024-57-3	Heptachlor epoxide	160
98-95-3	Nitrobenzene	5.7	118-74-1	Hexachlorobenzene	231.8
100-42-5	Styrene	-31	319-84-6	α-HCH (α-BHC)	160
79-34-5	1,1,2,2-Tetrachloroethane	-43.8	319-85-7	β-HCH (β-BHC)	315
127-18-4	Tetrachloroethylene	-22.3	58-89-9	γ-HCH (Lindane)	112.5
108-88-3	Toluene	-94.9	67-72-1	Hexachloroethane	187
120-82-1	1,2,4-Trichlorobenzene	17	193-39-5	Indeno(1,2,3-*cd*)pyrene	161.5
71-55-6	1,1,1-Trichloroethane	-30.4	72-43-5	Methoxychlor	87
79-00-5	1,1,2-Trichloroethane	-36.6	95-48-7	2-Methylphenol	29.8
79-01-6	Trichloroethylene	-84.7	621-64-7	*N*-Nitrosodi-*n*-propylamine	N/A
108-05-4	Vinyl acetate	-93.2	86-30-6	*N*-Nitrosodiphenylamine	66.5
75-01-4	Vinyl chloride	-153.7	91-20-3	Naphthalene	80.2
108-38-3	*m*-Xylene	-47.8	87-86-5	Pentachlorophenol	174
95-47-6	*o*-Xylene	-25.2	108-95-2	Phenol	40.9
106-42-3	*p*-Xylene	13.2	129-00-0	Pyrene	151.2
			8001-35-2	Toxaphene	65-90
			95-95-4	2,4,5-Trichlorophenol	69
			88-06-2	2,4,6-Trichlorophenol	69

Exhibit C-4

METAL K_d VALUES (L/kg) AS A FUNCTION OF pH[a]

pH	Arsenic	Barium	Beryllium	Cadmium	Chromium (+III)	Chromium (+VI)	Mercury	Nickel	Silver	Selenium	Thallium	Zinc
4.9	2.5E+01	1.1E+01	2.3E+01	1.5E+01	1.2E+03	3.1E+01	4.0E-02	1.6E+01	1.0E-01	1.8E+01	4.4E+01	1.6E+01
5.0	2.5E+01	1.2E+01	2.6E+01	1.7E+01	1.9E+03	3.1E+01	6.0E-02	1.8E+01	1.3E-01	1.7E+01	4.5E+01	1.8E+01
5.1	2.5E+01	1.4E+01	2.8E+01	1.9E+01	3.0E+03	3.0E+01	9.0E-02	2.0E+01	1.6E-01	1.6E+01	4.6E+01	1.9E+01
5.2	2.6E+01	1.5E+01	3.1E+01	2.1E+01	4.9E+03	2.9E+01	1.4E-01	2.2E+01	2.1E-01	1.5E+01	4.7E+01	2.1E+01
5.3	2.6E+01	1.7E+01	3.5E+01	2.3E+01	8.1E+03	2.8E+01	2.0E-01	2.4E+01	2.6E-01	1.4E+01	4.8E+01	2.3E+01
5.4	2.6E+01	1.9E+01	3.8E+01	2.5E+01	1.3E+04	2.7E+01	3.0E-01	2.6E+01	3.3E-01	1.3E+01	5.0E+01	2.5E+01
5.5	2.6E+01	2.1E+01	4.2E+01	2.7E+01	2.1E+04	2.7E+01	4.6E-01	2.8E+01	4.2E-01	1.2E+01	5.1E+01	2.6E+01
5.6	2.6E+01	2.2E+01	4.7E+01	2.9E+01	3.5E+04	2.6E+01	6.9E-01	3.0E+01	5.3E-01	1.1E+01	5.2E+01	2.8E+01
5.7	2.7E+01	2.4E+01	5.3E+01	3.1E+01	5.5E+04	2.5E+01	1.0E+00	3.2E+01	6.7E-01	1.1E+01	5.4E+01	3.0E+01
5.8	2.7E+01	2.6E+01	6.0E+01	3.3E+01	8.7E+04	2.5E+01	1.6E+00	3.4E+01	8.4E-01	9.8E+00	5.5E+01	3.2E+01
5.9	2.7E+01	2.8E+01	6.9E+01	3.5E+01	1.3E+05	2.4E+01	2.3E+00	3.6E+01	1.1E+00	9.2E+00	5.6E+01	3.4E+01
6.0	2.7E+01	3.0E+01	8.2E+01	3.7E+01	2.0E+05	2.3E+01	3.5E+00	3.8E+01	1.3E+00	8.6E+00	5.8E+01	3.6E+01
6.1	2.7E+01	3.1E+01	9.9E+01	4.0E+01	3.0E+05	2.3E+01	5.1E+00	4.0E+01	1.7E+00	8.0E+00	5.9E+01	3.9E+01
6.2	2.8E+01	3.3E+01	1.2E+02	4.2E+01	4.2E+05	2.2E+01	7.5E+00	4.2E+01	2.1E+00	7.5E+00	6.1E+01	4.2E+01
6.3	2.8E+01	3.5E+01	1.6E+02	4.4E+01	5.8E+05	2.2E+01	1.1E+01	4.5E+01	2.7E+00	7.0E+00	6.2E+01	4.4E+01
6.4	2.8E+01	3.6E+01	2.1E+02	4.8E+01	7.7E+05	2.1E+01	1.6E+01	4.7E+01	3.4E+00	6.5E+00	6.4E+01	4.7E+01
6.5	2.8E+01	3.7E+01	2.8E+02	5.2E+01	9.9E+05	2.0E+01	2.2E+01	5.0E+01	4.2E+00	6.1E+00	6.6E+01	5.1E+01
6.6	2.8E+01	3.9E+01	3.9E+02	5.7E+01	1.2E+06	2.0E+01	3.0E+01	5.4E+01	5.3E+00	5.7E+00	6.7E+01	5.4E+01
6.7	2.9E+01	4.0E+01	5.5E+02	6.4E+01	1.5E+06	1.9E+01	4.0E+01	5.8E+01	6.6E+00	5.3E+00	6.9E+01	5.8E+01
6.8	2.9E+01	4.1E+01	7.9E+02	7.5E+01	1.8E+06	1.9E+01	5.2E+01	6.5E+01	8.3E+00	5.0E+00	7.1E+01	6.2E+01
6.9	2.9E+01	4.2E+01	1.1E+03	9.1E+01	2.1E+06	1.8E+01	6.6E+01	7.4E+01	1.0E+01	4.7E+00	7.3E+01	6.8E+01
7.0	2.9E+01	4.2E+01	1.7E+03	1.1E+02	2.5E+06	1.8E+01	8.2E+01	8.8E+01	1.3E+01	4.3E+00	7.4E+01	7.5E+01
7.1	2.9E+01	4.3E+01	2.5E+03	1.5E+02	2.8E+06	1.7E+01	9.9E+01	1.1E+02	1.6E+01	4.1E+00	7.6E+01	8.3E+01
7.2	3.0E+01	4.4E+01	3.8E+03	2.0E+02	3.1E+06	1.7E+01	1.2E+02	1.4E+02	2.0E+01	3.8E+00	7.8E+01	9.5E+01
7.3	3.0E+01	4.4E+01	5.7E+03	2.8E+02	3.4E+06	1.6E+01	1.3E+02	1.8E+02	2.5E+01	3.5E+00	8.0E+01	1.1E+02
7.4	3.0E+01	4.5E+01	8.6E+03	4.0E+02	3.7E+06	1.6E+01	1.5E+02	2.5E+02	3.1E+01	3.3E+00	8.2E+01	1.3E+02
7.5	3.0E+01	4.6E+01	1.3E+04	5.9E+02	3.9E+06	1.6E+01	1.6E+02	3.5E+02	3.9E+01	3.1E+00	8.5E+01	1.6E+02
7.6	3.1E+01	4.6E+01	2.0E+04	8.7E+02	4.1E+06	1.5E+01	1.7E+02	4.9E+02	4.8E+01	2.9E+00	8.7E+01	1.9E+02
7.7	3.1E+01	4.7E+01	3.0E+04	1.3E+03	4.2E+06	1.5E+01	1.8E+02	7.0E+02	5.9E+01	2.7E+00	8.9E+01	2.4E+02
7.8	3.1E+01	4.9E+01	4.6E+04	1.9E+03	4.3E+06	1.4E+01	1.9E+02	9.9E+02	7.3E+01	2.5E+00	9.1E+01	3.1E+02
7.9	3.1E+01	5.0E+01	6.9E+04	2.9E+03	4.3E+06	1.4E+01	1.9E+02	1.4E+03	8.9E+01	2.4E+00	9.4E+01	4.0E+02
8.0	3.1E+01	5.2E+01	1.0E+05	4.3E+03	4.3E+06	1.4E+01	2.0E+02	1.9E+03	1.1E+02	2.2E+00	9.6E+01	5.3E+02

[a] Non pH-dependent inorganic K_d values for antimony, cyanide, and vanadium are 45, 9.9, and 1,000 (L/kg), respectively.

Exhibit C-5

REGULATORY AND HUMAN HEALTH BENCHMARKS USED TO DEVELOP SSLs

CAS No.	Compound	Maximum Contaminant Level Goal (mg/L)		Maximum Contaminant Level (mg/L)		Water Health Based Limit (mg/L)		Cancer Slope Factor $(mg/kg\text{-}d)^{-1}$			Unit Risk Factor $(\mu g/m^3)^{-1}$			Reference Dose (mg/kg-d)		Reference Concentration (mg/m^3)	
		MCLG (PCMLG)	Ref[a]	MCL (PMCL)	Ref[a]	HBL[b]	Basis[a]	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	6E-03	3	6E-03	3									4.0E-04	1		
7440-38-2	Arsenic			5E-02	3			A	1.5E+00	1	A	4.3E-03	1	3.0E-04	1		
7440-39-3	Barium	2E+00	3	2E+00	3									7.0E-02	1	5.0E-04	2b
56-55-3	Benz(*a*)anthracene					1E-04	SF_O	B2	7.3E-01	4	B2						
71-43-2	Benzene			5E-03	3			A	5.5E-02	1	A	7.8E-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			2E-04	3			B2	7.3E+00	1	B2						
7440-41-7	Beryllium	4E-03	3	4E-03	3						B1	2.4E-03	1	2.0E-03	1	2.0E-05	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			6E-03	3			B2	1.4E-02	1	B2			2.0E-02	1		
75-27-4	Bromodichloromethane			1E-01*	3			B2	6.2E-02	1	B2			2.0E-02	1		
75-25-2	Bromoform (tribromomethane)			1E-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	5E-03	3	5E-03	3						B1	1.8E-03	1	1.0E-03†	1		
86-74-8	Carbazole					4E-03	SF_O	B2	2.0E-02	2a							
75-15-0	Carbon disulfide					4E+00	RfD							1.0E-01	1	7.0E-01	1
56-23-5	Carbon tetrachloride			5E-03	3			B2	1.3E-01	1	B2	1.5E-05	1	7.0E-04	1		
57-74-9	Chlordane			2E-03	3			B2	3.5E-01	1	B2	1.0E-04	1	5.0E-04	1	7.0E-04	1
106-47-8	*p*-Chloroaniline					1E-01	RfD							4.0E-03	1		
108-90-7	Chlorobenzene	1E-01	3	1E-01	3			D			D			2.0E-02	1	6.0E-02	5
124-48-1	Chlorodibromomethane	6E-02	3	1E-01*	3			C	8.4E-02	1	C			2.0E-02	1		
67-66-3	Chloroform			1E-01*	3			B2			B2			1.0E-02	1		

* Proposed MCL = 0.08 mg/L, *Drinking Water Regulations and Health Advisories,* U.S. EPA (1995).
† Cadmium RfD is based on dietary exposure.

Exhibit C-5 (Continued)

REGULATORY AND HUMAN HEALTH BENCHMARKS USED TO DEVELOP SSLs

CAS No.	Compound	Maximum Contaminant Level Goal (mg/L)		Maximum Contaminant Level (mg/L)		Water Health Based Limit (mg/L)		Cancer Slope Factor $(mg/kg\text{-}d)^{-1}$			Unit Risk Factor $(\mu g/m^3)^{-1}$			Reference Dose (mg/kg-d)		Reference Concentration (mg/m^3)	
		MCLG (PCMLG)	Ref[a]	MCL (PMCL)	Ref[a]	HBL[b]	Basis[a]	Carc. Class[c]	SF_o	Ref[a]	Carc. Class[c]	URF	Ref[a]	RfD	Ref[a]	RfC	Ref[a]
95-57-8	2-Chlorophenol					2E-01	RfD							5.0E-03	1		
7440-47-3	Chromium	1E-01	3	1E-01	3			A			A	1.2E-02	1	3.0E-03	1		
16065-83-1	Chromium (III)					4E+01	RfD							1.5E+00	1		
18540-29-9	Chromium (VI)			1E-01*	3			A			A	1.2E-02	1	3.0E-03	1	1.0E-04‡	1
218-01-9	Chrysene					1E-02	SF_O	B2	7.3E-03	4							
57-12-5	Cyanide (amenable)	2E-01	3	2E-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	6E-01	3	6E-01	3			D			D			9.0E-02	1	2.0E-01	2b
106-46-7	1,4-Dichlorobenzene	7E-02	3	7E-02	3			C	2.4E-02	2a	C					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	2a	5.0E-01	2b
107-06-2	1,2-Dichloroethane			5E-03	3			B2	9.1E-02	1	B2	2.6E-05	1				
75-35-4	1,1-Dichloroethylene	7E-03	3	7E-03	3			C			C			5.0E-02	1	2.0E-01	1
156-59-2	*cis*-1,2-Dichloroethylene	7E-02	3	7E-02	3			D			D			1.0E-02	5		
156-60-5	*trans*-1,2-Dichloroethylene	1E-01	3	1E-01	3									2.0E-02	1		
120-83-2	2,4-Dichlorophenol					1E-01	RfD							3.0E-03	1		
94-75-7	2,4-Dichlorophenoxyacetic acid	7E-02	3	7E-02	3									1.0E-02	1		
78-87-5	1,2-Dichloropropane			5E-03	3			B2	6.8E-02	2a	B2					4.0E-03	1
542-75-6	1,3-Dichloropropene					5E-04	SF_O	B2	1.0E-01	1	B2	4.0E-06	1	3.0E-02	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	2a		
117-84-0	Di-*n*-octyl phthalate					7E-01	RfD							2.0E-02	2a		

* MCL for total chromium is based on Cr (VI) toxicity.
† Cancer Slope Factor is for 2,4-, 2,6-Dinitrotoluene mixture.
‡ RfC for Chromium (VI) is based on exposure to Cr (VI) particulates.

Exhibit C-5 (Continued)

REGULATORY AND HUMAN HEALTH BENCHMARKS USED TO DEVELOP SSLs

CAS No.	Compound	Maximum Contaminant Level Goal (mg/L)		Maximum Contaminant Level (mg/L)		Water Health Based Limit (mg/L)		Cancer Slope Factor $(mg/kg\text{-}d)^{-1}$			Unit Risk Factor $(\mu g/m^3)^{-1}$			Reference Dose (mg/kg-d)		Reference Concentration (mg/m^3)	
		MCLG (PCMLG)	Ref[a]	MCL (PMCL)	Ref[a]	HBL[b]	Basis[a]	Carc. Class[c]	SF_o	Ref[a]	Carc. Class[c]	URF	Ref[a]	RfD	Ref[a]	RfC	Ref[a]
115-29-7	Endosulfan					2E-01	RfD							6.0E-03	1		
72-20-8	Endrin	2E-03	3	2E-03	3			D			D			3.0E-04	1		
100-41-4	Ethylbenzene	7E-01	3	7E-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			4E-04	3			B2	4.5E+00	1	B2	1.3E-03	1	5.0E-04	1		
1024-57-3	Heptachlor Epoxide			2E-04	3			B2	9.1E+00	1	B2	2.6E-03	1	1.3E-05	1		
118-74-1	Hexachlorobenzene			1E-03	3			B2	1.6E+00	1	B2	4.6E-04	1	8.0E-04	1		
87-68-3	Hexachloro-1,3-butadiene	1E-03	3			1E-03	SF_O	C	7.8E-02	1	C	2.2E-05	1	2.0E-04	2a		
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)	2E-04	3	2E-04	3			B2	1.3E+00	2a	C			3.0E-04	1		
77-47-4	Hexachlorocyclopentadiene	5E-02	3	5E-02	3			D			D			6.0E-03	1	2.0E-04	1
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-*cd*)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	2E-03	3	2E-03	3			D			D			3.0E-04*	2a	3.0E-04	1
72-43-5	Methoxychlor	4E-02	3	4E-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			5E-03	3			B2	7.5E-03	1	B2	4.7E-07	1	6.0E-02	1	3.0E+00	2a
95-48-7	2-Methylphenol (*o*-cresol)					2E+00	RfD	C			C			5.0E-02	1		
91-20-3	Naphthalene					1E+00	RfD	C			C			2.0E-02	1	3.0E-03	1
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	2b
86-30-6	*N*-Nitrosodiphenylamine					2E-02	SF_O	B2	4.9E-03	1	B2						
621-64-7	*N*-Nitrosodi-*n*-propylamine					1E-05	SF_O	B2	7.0E+00	1	B2						
87-86-5	Pentachlorophenol			1E-03	3			B2	1.2E-01	1	B2			3.0E-02	1		
108-95-2	Phenol					2E+01	RfD	D			D			3.0E-01	1		
129-00-0	Pyrene					1E+00	RfD	D			D			3.0E-02	1		
7782-49-2	Selenium	5E-02	3	5E-02	3			D			D			5.0E-03	1		
7440-22-4	Silver						RfD	D			D			5.0E-03	1		

* RfD is for mercuric chloride (CAS No. 007847-94-7).

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

Exhibit C-5 (Continued)

REGULATORY AND HUMAN HEALTH BENCHMARKS USED TO DEVELOP SSLs

CAS No.	Compound	Maximum Contaminant Level Goal (mg/L)		Maximum Contaminant Level (mg/L)		Water Health Based Limit (mg/L)		Cancer Slope Factor $(mg/kg\text{-}d)^{-1}$			Unit Risk Factor $(\mu g/m^3)^{-1}$			Reference Dose (mg/kg-d)		Reference Concentration (mg/m^3)	
		MCLG (PCMLG)	Ref[a]	MCL (PMCL)	Ref[a]	HBL[b]	Basis[a]	Carc. Class[c]	SF_o	Ref[a]	Carc. Class[c]	URF	Ref[a]	RfD	Ref[a]	RfC	Ref[a]
100-42-5	Styrene	1E-01	3	1E-01	3									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				
127-18-4	Tetrachloroethylene			5E-03	3				5.4E-01	6		5.9E-06	6	1.0E-02	1		
7440-28-0	Thallium	5E-04	3	2E-03	3									8.0E-05	1		
108-88-3	Toluene	1E+00	3	1E+00	3			D			D			2.0E-01	1	4.0E-01	1
8001-35-2	Toxaphene			3E-03	3			B2	1.1E+00	1	B2	3.2E-04	1				
120-82-1	1,2,4-Trichlorobenzene	7E-02	3	7E-02	3			D			D			1.0E-02	1	2.0E-01	2a
71-55-6	1,1,1-Trichloroethane	2E-01	3	2E-01	3			D			D					2.2E+00	5
79-00-5	1,1,2-Trichloroethane	3E-03	3	5E-03	3			C	5.7E-02	1	C	1.6E-05	1	4.0E-03	1		
79-01-6	Trichloroethylene^	zero	3	5E-03	3				4.0E-01*	5		1.1E-04**	5	3.0E-04	5	4.0E-02	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	2a		
108-05-4	Vinyl acetate					4E+01	RfD							1.0E+00	2a	2.0E-01	1
75-01-4	Vinyl chloride[d] (chloroethene)			2E-03	3			A	7.2E-01 (Adult) 1.5E+00 (Lifetime)	1 1	A	4.4E-06 (Adult) 8.8E-06 (Lifetime)	1 1	3.0E-03	1	1.0E-01	1
108-38-3	*m*-Xylene[e]	1E+01	3	1E+01	3			D			D			2.0E+00	2a		
95-47-6	*o*-Xylene[e]	1E+01	3	1E+01	3			D			D			2.0E+00	2a		
106-42-3	*p*-Xylene[e]	1E+01	3	1E+01	3			D			D			2.0E+00	1		
7440-66-6	Zinc					1E+01	RfD	D			D			3.0E-01	1		

^ Health benchmark values are based on NCEA's *Trichloroethylene Health Risk Assessment: Synthesis and Characterization - External Review Draft* (ORD, August, 2001). The trichloroethylene draft risk assessment is still under review. As a result, the health benchmark values are subject to change.

* The cancer slope factor is the upper end of the range given in the risk assessment. This conservative value is appropriate given that the SSL is used for screening purposes.

** The unit risk factor is extrapolated from an upper bound cancer slope factor of $4x10^{-1}$ per mg/kg-d. This extrapolation is supported by evidence of similar carcinogenic effects via both inhalation and ingestion pathways.

[a] References:

1 = IRIS, U.S. EPA (2002c)
2a = HEAST, U.S. EPA (1997c)
2b = HEAST values from alternative tables, U.S. EPA (1997c)
3 = National Primary Drinking Water Standards, U.S. EPA (2002d)
4 = Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, Office of Health and Environmental Assessment, U.S. EPA (1993)
5 = National Center for Environmental Assessment (NCEA), personal communication (2002)
6 = California EPA, Toxicity Criteria Database, www.oehha.ca.gov/risk/chemicaldb (2002)
Note:OHEA is now part of the National Center for Environmental Assessment (NCEA).

[b] Health Based Limits calculated for 30-year exposure duration, 10^{-6} cancer risk or hazard quotient=1. Assumes an ingestion rate of 2 L / day. RfD = 2 mg/kg-day

[c] Carcinogen Class based on 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 human carcinogenicity
Group E: evidence of non-carcinogenicity for humans

[d] Both adult and lifetime cancer slope factors and unit risk factors are listed for vinyl chloride. The lifetime exposure pathway is used to calculate the SSL in the direct contact exposure pathway (ingestion-dermal) for the residential scenario. The adult value is appropriate for the other residential pathways & the commercial/industrial pathways.

[e] Values listed are those for total xylenes: [CAS No. 1330-20-7] MCLG/MCL = 10 mg/L

Exhibit C-6

DERMAL ABSORPTION FRACTION FROM SOIL

Compound	Dermal Absorption Fraction (ABS_d)[a]	Reference
Arsenic	0.03	Wester, *et al.* (1993a)
Cadmium	0.001	Wester, *et al.* (1992a) U.S. EPA (1992a)
Chlordane	0.04	Wester, *et al.* (1992b)
DDT	0.03	Wester, *et al.* (1990)
2,4-Dichlorophenoxyacetic acid	0.05	Wester, *et al.* (1996)
Lindane	0.04	Duff & Kissel (1996)
PAHs	0.13	Wester, *et al.* (1990)
Pentachlorophenol	0.25	Wester, *et al.* (1993c)
Generic default *for screening*		
Semivolatile organic compounds	0.1	

[a] The values presented are mean values from empirical data.

Source: *RAGS Part E*, U.S. EPA, 2001.

Exhibit C-7

GASTROINTESTINAL ABSORPTION EFFICIENCIES AND ADJUSTMENT OF DERMAL TOXICITY FACTORS

CAS Number	Compound	Percent Absorbed*	ABS_{GI}
Organics			
57-74-9	Chlordane	80%	1
50-29-3	DDT	70-90%	1
94-75-7	2,4-Dichlorophenoxyacetic acid	>90%	1
87-86-5	Pentachlorophenol	76-100%	1
N/A	Polycyclic aromatic hydrocarbons (PAHs)	58-89%	1
N/A	All other organic compounds	generally >50%	1
Inorganics			
7440-38-2	Arsenic	95%	1
7440-43-9	Cadmium	2.5-5%	0.025

* *RAGS Part E*, U.S. EPA, 2001.