Overview of Appendix 1

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- Table B - Chemical/Physical Properties
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A1.0 Introduction

This appendix provides various tables of values needed to determine default closure levels under RISC. A short narrative describing each table is provided below; the tables are provided following the text.

Table A

Table A is divided into two main sections, Residential and Commercial/ Industrial. Each of these is further divided into two subsections, Soil and Ground Water. Each section presents applicable closure levels and footnotes.

Both the Industrial and Residential Soil Closure Level sections provide concentrations for soil saturation (Csat); soil attenuation capacity (SAC); and construction worker, direct, and migration to ground water pathways. A final column presents the Default Closure Level, as determined by the lowest of Csat; SAC; and construction worker, direct, or migration to ground water closure levels for a given chemical. Default closure levels are considered protective of human health.

The ground water section provides concentrations for water solubility limits, maximum contaminant levels (MCL), and the respective ground water pathway closure levels. The default closure level for residential settings is the MCL, if the MCL has been established; if not, the default closure level is the lowest of either the ground water pathway or the solubility limit. The ground water default closure level for the commercial/industrial setting is the solubility limit if it is lower than any other level; if not, the default closure level is the highest of either the MCL or the ground water pathway level.

The default closure levels for all compounds, except beryllium and mercury, are used over a default soil pH range of 6.0 to 8.0. If site soils have a pH within this range, the default closure levels can be applied. If not, a site-specific, pH-dependent closure level must be developed for any ionizing organics and metals at the site. The K_d-dependent pH range applies only to metals and ionizing organics. These compounds are identified in the default closure level tables by footnote 6. In general, carboxylic acids, phenols, and amines are considered "ionizing organics." For those metals or ionizing organics not included in the table, a pH-specific K_{oc} or K_d will need to be determined. Guidance for determining the K_d or K_{oc} is presented in the 1996 EPA Soil Screening Guidance (EPA 540/R-95/128). K_d values for beryllium and mercury are very sensitive to slight changes in pH; therefore, a site-specific pH must be established and used to determine the K_d for these compounds. This value can be calculated by using Table C-4, Metal K_d Values as a Function of pH, as presented

in the EPA 1996 Soil Screening Guidance Users Guide (EPA/540/R-96-018).

Table B

Table B presents values for the following chemical and physical properties used to derive the values listed in Table A:

- Volatilization Factor
  - Diffusivity in air
  - Diffusivity in water
- K_{oc}/ Kd
- Henry's Law Constant
- Dermal absorbance
- Water solubility
- Maximum contaminant level (MCL)
- Melting point
- Boiling point
- Molecular weight

The chemical and physical parameter values were taken from the following references (in order of preference):

1. EPA. 1996. Soil Screening Guidance Document, Users Guide, 9355.4-23, EPA/540/R-96/018, April; Technical Background Document, 9355.4-17A, EPA/540/R-95/128, May.

2. Agency for Toxic Substances and Disease Registry Toxicological Profiles

3. EPA Region 9, Region 6, and Region 3 Preliminary Remediation Goals, Physical and Chemical Parameters; available online at **(links revised May 1, 2009)**: http://www.epa.gov/reg3hwmd/risk/human/index.htm http://www.epa.gov/region09/waste/sfund/prg/ and http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm

4. Other EPA sources, including the Superfund Chemical Data Matrix

5. Other State agency sources

6. Other published literature

Table C

Table C presents mathematical equations used to derive closure levels. The RISC default process considers three media of exposure or

pathways for commercial/industrial and residential land uses: surface soil, subsurface soil, and ground water. Subsurface soil is considered a medium because it presents a mechanism for contaminant transport to ground water when rain infiltrates and leaches material out of the soil. For this reason, the equations describing calculation of subsurface soil default closure levels are titled *Migration to Groundwater*; they are often referred to as "indirect" exposure pathway equations. The total exposure associated with each medium is the sum of the exposures from each significant absorption route (ingestion, dermal absorption, and inhalation) associated with that medium. The construction worker occupational exposure considers only soil exposure.

Residential and industrial direct soil exposure is determined by summing the intake from the ingestion, inhalation, and dermal absorption routes. Values listed for exposure resulting from soil contaminants migrating to ground water are protective for the ground water consumption pathway. Residential ground water exposure is determined by summing the intake from the inhalation and ingestion routes. Certain exposure routes in a given pathway were eliminated after considering potential exposure and dosage. The dermal route for residential ground water was assessed as an insignificant contributor to risk and was therefore eliminated from the calculation. Similarly, the inhalation route for industrial ground water was eliminated because industrial settings are typically well ventilated, and it is unlikely that most workers have any significant exposure.

Construction closure levels consider the intake from ingestion, dermal, and inhalation routes for direct soil contact. Water exposure was not considered because most utility or other construction work does not involve workers standing in water for long periods of time.

Separate equations are needed to determine carcinogenic and noncarcinogenic closure levels. Many compounds have both a carcinogenic and noncarcinogenic dose response. In such cases, each value was calculated separately, and the lowest result is used in the table.

Exposure to residential soil presents more significant exposure risks in children 6 years and younger. Children in this age group generally spend more time outdoors and ingest more soil than adults. To account for this special case, a "weighted approach" was used to calculate residential surface soil values. The body weight, exposure duration, skin-surface area, ingestion amounts, and inhalation rates were age-adjusted or "weighted" for each of the three principle soil absorption routes.

Five supporting models were used to account for the following factors: volatilization factor/particulate emissions, soil saturation, age

adjustments for soil ingestion, skin contact, and vapor inhalation. The volatilization and particulate emission models account for exposure potential for emission of vapors and particulates from surface soils. The models and equations are taken from the EPA Soil Screening Guidance (1996). Similarly, the models used for soil saturation levels were also taken from the Soil Screening Guidance. The equations (models) used to adjust values based on age were mathematically derived using exposure duration, body weight, skin surface area, and ingestion and inhalation rates of children and adults.

Tables D and E

Table D presents the Default Exposure Assumptions used in the equations presented in Table C. Quantification of exposure variables (such as exposure frequency, exposure duration, and exposed surface area) will change depending on land use, application, and whether the receptors are adults or children. Table E lists a reference source verifying each default value.

Generally speaking, the default assumption values are set at the 90 to 95th percentile of available and reliable data. This approach is more protective than using the average value and it is generally accepted as a reasonable working boundary on the population of sampled measurements (see EPA Risk Assessment Guidance for Superfund, EPA/540/1-89/002).

Table F

Table F presents the reference doses and slope factors for all of the chemicals listed in the closure tables. These values were taken from the following references (in order of preference):

1. EPA Integrated Risk Information System (IRIS) — Certain route-to-route extrapolations are acceptable. Guidance is presented below.

2. Health Effects Assessment Summary Tables (HEAST) — Assuming HEAST continues to be updated (if not, then this source moves to “Other Literature Sources”).

3. Agency for Toxic Substances and Disease Registry (ATSDR), National Center for Environmental Assessment, and EPA Regions 9 and 3 PRG Toxicity Values

4. Other literature sources — This may include derivations from literature sources.

5. Predictive Models — Predictive models such as Quantitative

Structure and Activity Relationship (QSARS)

In general, the organic chemicals in the default tables have both an inhalation and an oral reference dose (RfD) or slope factor (SF). These values are taken directly from experimentally derived animal or human data (when available). When sufficient data on the route was not available, IDEM used a route-to-route extrapolation. This approach assumes that toxicity is similar for both routes. While it is unlikely that there is a direct 1-to-1 correlation between the inhalation and oral routes, extrapolation of inhalation RfDs from oral RfDs for the more volatile chemicals tends to be reasonably close when compared to experimentally derived inhalation RfDs (EPA Soil Screening Guidance 1996).

IDEM considers such extrapolations of values for the more volatile compounds to compare reasonably well and will use route-to-route extrapolations. As the volatility of the compounds decreases, route-to-route extrapolations become less certain (EPA Soil Screening Guidance 1996). However, these extrapolations do provide some assurance that the pathways are being addressed, and IDEM will also use route-to-route extrapolations for these compounds.

Route-to-route extrapolations do not work as well for inorganics. For the carcinogenic metals, specifically beryllium, chromium, nickel, and cadmium, the experimental evidence involving increased cancer risk appears to be limited to the respiratory pathway, and it is unlikely that ingestion would contribute to the carcinogenic response. Therefore, a route-to-route extrapolation has not been performed.

With respect to noncarcinogenic inorganics, considerable difference exists in the absorption and toxicity dynamics between routes. The differences are significant enough to eliminate them from consideration for route-to-route extrapolation. In addition, IDEM's analysis of these compounds at default particulate exposure levels indicates that the particulate inhalation pathway is insignificant. IRIS and EPA Regions 3, 6, and 9 do not perform route-to-route extrapolations for inorganics. IDEM agrees with EPA and will not include the route-to-route extrapolation as a pathway for inorganic compounds. Therefore, route-to-route extrapolations were not performed for noncarcinogenic inorganic compounds.

Table G

The RISC default approach uses the "critical effect" of a noncarcinogenic chemical to establish the target organ. The critical effect is the first adverse effect, or its known precursor, that occurs to the most sensitive species as the dose is increased during toxicity testing. Therefore, it is a toxic effect on a target organ or tissue (for

example, an increase in liver weight or nephrotoxicity). Each critical effect will be categorized into one or more "critical effects categories." A critical effects category is a group of target organs or tissues subject to common absorption or a group of organs with similar or common functions. In certain cases, an effect occurring in one system may indirectly affect another system, and it will be necessary to consider effects as additive within both systems. In other cases, a chemical at the RfD dose may affect more than one critical effects category. Many chemicals have both a carcinogenic and a noncarcinogenic toxic effect. If the default value in the closure table is based on the carcinogenic response, then the additivity of the chemical is assessed only as a carcinogen.

The box on the following page lists the 10 critical effects categories and examples of the target organs or effects considered in that category. The list of critical effects and categories for each chemical is given in Table G.

Critical Effects Categories and Target Organs

1. Systemic: Liver, kidney, urinary tract
2. Circulatory: Arteries, veins, heart, and blood
3. Gastrointestinal: Buccal cavity, esophagus, stomach, intestines, and gall bladder
4. Musculoskeletal: Muscles, bone, and connective tissues
5. Respiratory: Lungs, trachea, and nasal passageway
6. Immunological: Lymph and tissue fluid, spleen, and lymph nodes
7. Neurological: Brain, spinal cord, and neurons
8. Reproductive/Endocrine: Testes, ovaries, thyroid, adrenal, pituitary, pancreas, and parathyroid
9. Developmental: Teratology, growth retardation, structural malformations, and abnormal development
10. Dermal/ Ocular: Skin and eyes

The primary critical effect and target organ for each chemical was obtained using the following sources (in order of preference):

1. IRIS (EPA 2000)
2. HEAST (EPA 1997)
3. ATSDR Toxicological Profiles
4. Hazardous Substance Databank (http://toxnet.nlm.nih.gov)

Exceptions include the following critical effects and target organs:

- Some compounds have an RfD based on the No Observed Adverse Effects Level (NOAEL), and information on toxic effects at higher doses was not available. In these cases, the critical effect of a surrogate compound (similar in structure and type) was used.

- Some compounds have an RfD established with the NOAEL and some toxic effects information. The toxic effects information was used to establish the critical effect.

- Some compounds have experimentally derived oral and inhalation reference doses. Where these values were within an order of magnitude of each other, critical effects from both routes were listed. These compounds should be considered as additive in both categories.

- Some compounds did not have an easily identified target organ within the critical effects category. These compounds were classified within a category as "nonspecific."

Table A

Residential Closure Levels
Commercial/Industrial Closure Levels

Table A – Residential Closure Levels

Contaminant[1,21]	CAS	Soil									Groundwater				
		Soil Attenuation Capacity	Soil Saturation (Csat)[2]	Construction[4]		Soil Direct		Migration to GW		Default Closure Level	Ground Water Solubility	MCL	Residential		Default Closure Level
		mg/kg	mg/kg	mg/kg				mg/kg		mg/kg	mg/l-	mg/l	mg/l		mg/l
Acenaphthene	83-32-9	6000/2000		50000	NC	9500	NC	130	NC	130	4.2		0.46	NC	0.46
Acenaphthylene	208-96-8	6000/2000		5900	NC	1100	NC	18	NC	18	3.9		0.071	NC	0.071
Acetochlor	34256-82-1	6000/2000		18000	NC	3700	NC	8.1	NC	8.1	220		0.73	NC	0.73
Acetone (2-Propanone)	67-64-1	6000/2000	200000	230000	NC	35000	NC	28	NC	28	1000000		6.9	NC	6.9
Acrolein[5]	107-02-8	6000/2000	50000	3.5	NC	0.5	NC	0.00027	NC	0.00027	210000		0.000055	NC	0.000055
Aldrin	309-00-2	6000/2000		27	NC	0.25	C	4.9	C	0.25	0.18		0.00005	C	0.00005
Anthracene[22]	120-12-7	6000/2000		250000	NC	47000	NC	**2700**	**NC**	**2000**	0.043		2.3	NC	**2.3**
Antimony and compounds[6]	7440-36-0	10000		460	NC	140	NC	5.4	MCL	5.4		0.006	0.015	NC	0.006
Arsenic[3 6 17]	7440-38-2	10000		320	NC	3.9	NC	5.8	MCL	3.9		0.01	0.00057	C	0.01
Atrazine	1912-24-9	6000/2000		2800	C	19	C	0.048	MCL	0.048	35	0.003	0.0039	C	0.003
Barium[6]	7440-39-3	10000		220000	NC	63000	NC	1600	MCL	1600		2	7.3	NC	2
Benzene	71-43-2	6000/2000	590	560	NC	8.4	C	0.034	MCL	0.034	1800	0.005	0.0055	C	0.005
Benzo(a)anthracene	56-55-3	6000/2000		790	C	5	C	19	C	5	0.0094		0.0012	C	0.0012
Benzo(a)pyrene	50-32-8	6000/2000		79	C	0.5	C	8.2	MCL	0.5	0.0016	0.0002	0.00012	C	0.0002
Benzo(b)fluoranthene	205-99-2	6000/2000		790	C	5	C	57	C	5	0.0015		0.0012	C	0.0012
Benzo(k)fluoranthene[22]	207-08-9	6000/2000		7900	C	50	C	**570**	**C**	**50**	0.0008		0.012	C	**0.012**
Benzoic acid[6]	65-85-0	6000/2000		1000000	NC	730000	NC	590	NC	590	3500		150	NC	150
Benzyl Alcohol	100-51-6	6000/2000	8800	270000	NC	55000	NC	48	NC	48	40000		11	NC	11
Beryllium and compounds[9]	7440-41-7	10000		2300	NC	680	NC	63	MCL	63		0.004	0.073	NC	0.004
Bis(2-chloro-1-methylethyl) ether	108-60-1	6000/2000	550	5200	C	30	C	0.027	C	0.027	1700		0.0042	C	0.0042
Bis(2-Chloroethyl)ether[5]	111-44-4	6000/2000	4000	280	C	1.6	C	0.0007	C	0.0007	17000		0.00015	C	0.00015
Bis(2-chloroisopropyl)ether[23]	**39638-32-9**														
Bis(2-ethylhexyl)phthalate	117-81-7	6000/2000	10000	18000	NC	300	C	3600	MCL	300	0.34	0.006	0.061	C	0.006
Bromodichloromethane[7]	75-27-4	6000/2000	2100	2100	C	10	C	0.51	MCL	0.51	6700	0.08	0.0029	C	0.08
Bromoform(tribromomethane)[7]	75-25-2	6000/2000	1200	7700	NC	280	C	0.6	MCL	0.6	3100	0.08	0.11	C	0.08
n-Butanol	71-36-3	6000/2000	16000	2700	NC	380	NC	16	NC	16	74000		3.6	NC	3.6
Butylbenzylphthalate[2 14]	85-68-7	6000/2000	310	180000	NC	37000	NC	6200	S	310	2.7		7.3	NC	2.7
Cadmium[3 6]	7440-43-9	10000		590	NC	12	NC	7.5	MCL	7.5		0.005	0.018	NC	0.005
Carbazole	86-74-8	6000/2000		31000	C	210	C	5.9	C	5.9	7.5		0.043	C	0.043
Carbon disulfide	75-15-0	6000/2000	480	6200	NC	900	NC	10	NC	10	1200		1.3	NC	1.3
Carbon tetrachloride	56-23-5	6000/2000	520	38	NC	3.3	C	0.066	MCL	0.066	790	0.005	0.0026	C	0.005
Chlordane	12789-03-6	6000/2000		510	NC	17	C	9.6	MCL	9.6	0.056	0.002	0.0024	C	0.002
p-Chloroaniline[6]	106-47-8	6000/2000		3600	NC	730	NC	0.97	NC	0.97	5300		0.15	NC	0.15
Chlorobenzene	108-90-7	6000/2000	310	2600	NC	380	NC	1.3	MCL	1.3	470	0.1	0.13	NC	0.1
Chloroethane	75-00-3	6000/2000	3000	16000	C	80	C	0.65	C	0.65	5700		0.062	C	0.062
Chloroform[7 10]	67-66-3	6000/2000	2300	650	C	3	C	0.47	MCL	0.47	7900	0.08	0.0028	C	0.08
2-Chloronapthalene	91-58-7	6000/2000		71000	NC	15000	NC	42	NC	42	12		0.61	NC	0.61
2-Chlorophenol[6]	95-57-8	6000/2000	22000	2200	NC	360	NC	0.75	NC	0.75	22000		0.038	NC	0.038

Table A – Residential Closure Levels

Contaminant[1,21]	CAS	Soil									Groundwater				
		Soil Attenuation Capacity	Soil Saturation (Csat)[2]	Construction[4]		Soil Direct		Migration to GW		Default Closure Level	Ground Water Solubility	MCL	Residential		Default Closure Level
		mg/kg	mg/kg	mg/kg				mg/kg		mg/kg	mg/l-	mg/l	mg/l		mg/l
Chromium III [6]	16065-83-1	10000		1000000	NC	520000	NC	1000000	MCL	10000		0.1	55	NC	0.1
Chromium VI [6 12]	18540-29-9	10000		3400	NC	430	C	38	MCL	38		0.1	0.11	NC	0.1
Chrysene [22]	218-01-9	6000/2000		79000	C	500	C	**1900**	**C**	**500**	0.0016		0.12	C	**0.12**
Copper [6]	7440-50-8	10000		46000	NC	14000	NC	920	MCL	920		1.3	1.5	NC	1.3
Cyanide, Free [13]	57-12-5	6000/2000		23000	NC	6900	NC	0.94	MCL	0.94	1000000	0.2	0.73	NC	0.2
Cyclohexane [2]	110-82-7	6000/2000	69	51000	NC	7200	NC	330	NC	69	55		13	NC	13
DDD	72-54-8	6000/2000		2200	NC	28	C	140	C	28	0.09		0.0035	C	0.0035
DDE	72-55-9	6000/2000		2200	C	20	C	450	C	20	0.12		0.0025	C	0.0025
DDT	50-29-3	6000/2000		540	NC	20	C	260	C	20	0.025		0.0025	C	0.0025
Dibenzo(a,h)anthracene	53-70-3	6000/2000		79	C	0.5	C	18	C	0.5	0.0025		0.00012	C	0.00012
Dibenzofuran	132-64-9	6000/2000		1800	NC	370	NC	4.9	NC	4.9	3.1		0.015	NC	0.015
1,2-Dibromoethane	106-93-4	6000/2000	1400	59	C	0.3	C	0.00034	MCL	0.00034	4300	5E-05	0.000086	C	0.00005
Dibutyl phthalate [2]	84-74-2	6000/2000	760	89000	NC	18000	NC	5000	NC	760	11		3.6	NC	3.6
1,2-Dichlorobenzene	95-50-1	6000/2000	220	18000	NC	2800	NC	17	MCL	17	160	0.6	0.48	NC	0.6
1,3-Dichlorobenzene	541-73-1	6000/2000	230	2200	NC	420	NC	2.3	NC	2.3	160		0.08	NC	0.08
1,4-Dichlorobenzene	106-46-7	6000/2000		8000	C	42	C	2.2	MCL	2.2	74	0.075	0.008	C	0.075
3,3-Dichlorobenzidine	91-94-1	6000/2000		1400	C	9.5	C	0.062	C	0.062	3.1		0.0019	C	0.0019
1,1-Dichloroethane	75-34-3	6000/2000	1400	8600	NC	1300	NC	5.6	NC	5.6	5100		0.99	NC	0.99
1,2-Dichloroethane	107-06-2	6000/2000	2000	150	NC	3.7	C	0.024	MCL	0.024	8500	0.005	0.002	C	0.005
1,1-Dichloroethylene	75-35-4	6000/2000	930	2200	NC	310	NC	0.058	MCL	0.058	2200	0.007	0.43	NC	0.007
cis-1,2-Dichloroethylene	156-59-2	6000/2000	1000	750	NC	110	NC	0.4	MCL	0.4	3500	0.07	0.077	NC	0.07
trans-1,2-Dichloroethylene	156-60-5	6000/2000	2100	1200	NC	180	NC	0.68	MCL	0.68	6300	0.1	0.15	NC	0.1
2,4-Dichlorophenol [6]	120-83-2	6000/2000		2700	NC	550	NC	1.1	NC	1.1	4500		0.11	NC	0.11
2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	6000/2000		9100	NC	2000	NC	0.35	MCL	0.35	680	0.07	0.36	NC	0.07
1,2-Dichloropropane	78-87-5	6000/2000	830	99	NC	4.5	C	0.03	MCL	0.03	2800	0.005	0.0026	C	0.005
1,3-Dichloropropene	542-75-6	6000/2000	1000	290	NC	9.5	C	0.04	C	0.04	2800		0.0056	C	0.0056
Dieldrin	60-57-1	6000/2000		39	C	0.27	C	0.046	C	0.046	0.2		0.000053	C	0.000053
Diethylphthalate	84-66-2	6000/2000	840	710000	NC	150000	NC	450	NC	450	1100		29	NC	29
N,N Dimethylformamide	68-12-2	6000/2000	200000	26000	NC	4000	NC	15	NC	15	1000000		3.6	NC	3.6
2,4-Dimethylphenol [6]	105-67-9	6000/2000		18000	NC	3700	NC	9	NC	9	7900		0.73	NC	0.73
Dimethylphthalate [2]	131-11-3	6000/2000	1100	1000000	NC	1000000	NC	2000	NC	1100	4000		360	NC	360
2,4-Dinitrophenol [6]	51-28-5	6000/2000		1800	NC	370	NC	0.29	NC	0.29	2800		0.073	NC	0.073
Dinitrotoluene mixture	25321-14-6	6000/2000		890	NC	6.3	C	0.0091	C	0.0091	230		0.0013	C	0.0013
Di-n-octyl phthalate [14]	117-84-0	6000/2000	3300	36000	NC	7300	NC	67000	S	2000	0.02		1.5	NC	0.02
Endosulfan	115-29-7	6000/2000		5300	NC	1100	NC	20	NC	20	0.51		0.22	NC	0.22
Endrin	72-20-8	6000/2000		270	NC	55	NC	0.99	MCL	0.99	0.25	0.002	0.011	NC	0.002
Ethyl acetate	141-78-6	6000/2000	25000	290000	NC	46000	NC	44	NC	44	80000		6.9	NC	6.9
Ethylbenzene	100-41-4	6000/2000	160	29000	NC	4600	NC	13	MCL	13	170	0.7	1.6	NC	0.7

Table A – Residential Closure Levels

Contaminant[1,21]	CAS	Soil									Groundwater				
		Soil Attenuation Capacity	Soil Saturation (Csat)[2]	Construction[4]		Soil Direct		Migration to GW		Default Closure Level	Ground Water Solubility	MCL	Residential		Default Closure Level
		mg/kg	mg/kg	mg/kg				mg/kg		mg/kg	mg/l-	mg/l	mg/l		mg/l
Ethylene glycol[24]	**107-21-1**	**6000/2000**	**200000**	**1000000**	**NC**	**270000**	**NC**	**290**	**NC**	**290**	**1000000**		**73**	**NC**	**73**
Fluoranthene [22]	206-44-0	6000/2000		33000	NC	6300	NC	**6300**	**NC**	**2000**	0.21		1.5	NC	**1.5**
Fluorene	86-73-7	6000/2000		33000	NC	6300	NC	170	NC	170	2		0.31	NC	0.31
alpha-HCH(alpha-BHC)	319-84-6	6000/2000		120	C	0.99	C	0.0072	C	0.0072	2		0.00014	C	0.00014
beta-HCH(beta-BHC)	319-85-7	6000/2000		200	NC	3.3	C	0.026	C	0.026	0.24		0.00047	C	0.00047
gamma-HCH(Lindane)	58-89-9	6000/2000		310	NC	4.8	C	0.0094	MCL	0.0094	6.8	0.0002	0.00066	C	0.0002
Heptachlor	76-44-8	6000/2000		140	C	0.93	C	23	MCL	0.93	0.18	0.0004	0.00019	C	0.0004
Heptachlor epoxide	1024-57-3	6000/2000		12	NC	0.47	C	0.67	MCL	0.47	0.2	0.0002	0.000094	C	0.0002
Hexachloro-1,3-butadiene	87-68-3	6000/2000	350	270	NC	55	C	24	C	24	3.2		0.011	C	0.011
Hexachlorobenzene	118-74-1	6000/2000		390	C	2.7	C	2.2	MCL	2.2	6.2	0.001	0.00053	C	0.001
Hexachlorocyclopentadiene	77-47-4	6000/2000	720	5300	NC	1100	NC	400	MCL	400	1.8	0.05	0.22	NC	0.05
Hexachloroethane	67-72-1	6000/2000		660	NC	120	NC	2.8	NC	2.8	50		0.036	NC	0.036
n-Hexane	110-54-3	6000/2000	100	1200	NC	170	NC	120	NC	100	9.5		0.54	NC	0.54
Indeno(1,2,3-cd)pyrene [22]	193-39-5	6000/2000		790	C	5	C	**160**	**C**	**5**	0.000022		0.0012	C	**0.0012**
Isophorone	78-59-1	6000/2000	3500	180000	NC	4500	C	5.3	C	5.3	12000		0.9	C	0.9
Isopropylbenzene (Cumene)	98-82-8	6000/2000	42	9900	NC	1400	NC	11	NC	11	61		0.83	NC	0.83
Lead [8]	7439-92-1	10000		970	NC	400	NC	81	MCL	81		0.015	0.015	NC	0.015
Mercury and compounds [9 20]	7487-94-7	10000		340	NC	100	NC	2.1	MCL	2.1	69000	0.002	0.011	NC	0.002
Methoxychlor	72-43-5	6000/2000		4400	NC	910	NC	160	MCL	160	0.045	0.04	0.18	NC	0.04
Methyl bromide (bromomethane)	74-83-9	6000/2000	3700	69	NC	9.9	NC	0.052	NC	0.052	15000		0.011	NC	0.011
Methyl ethyl ketone (MEK)	78-93-3	6000/2000	28000	260000	NC	44000	NC	35	NC	35	140000		8.4	NC	8.4
Methyl tertiary butyl ether (MTBE) [16]	1634-04–4	6000/2000	11000	65000	C	350	C	0.18	C	0.18	48000		0.04	C	0.04
4-Methyl-2-pentanone (MIBK)	108-10-1	6000/2000	8700	64000	NC	12000	NC	20	NC	20	19000		2.2	NC	2.2
Methylene chloride	75-09-2	6000/2000	3000	22000	C	120	C	0.023	MCL	0.023	13000	0.005	0.063	C	0.005
2-Methylnaphthalene	91-57-6	6000/2000		3300	NC	630	NC	3.1	NC	3.1	25		0.031	NC	0.031
3-Methylphenol (m-cresol) [6]	108-39-4	6000/2000	6100	44000	NC	9100	NC	9.8	NC	9.8	23000		1.8	NC	1.8
4-Methylphenol (p-cresol) [6]	106-44-5	6000/2000		4400	NC	910	NC	1.1	NC	1.1	22000		0.18	NC	0.18
2-Methylphenol(o-cresol) [6]	95-48-7	6000/2000		39000	NC	7500	NC	14	NC	14	26000		1.8	NC	1.8
Metolachlor	51218-45-2	6000/2000	420	130000	NC	27000	NC	86	NC	86	530		5.5	NC	5.5
Naphthalene	91-20-3	6000/2000		17000	NC	3200	NC	0.7	NC	0.7	31		0.0083	NC	0.0083
Nickel, soluble salts [6]	various	10000		23000	NC	6900	NC	950	NC	950			0.73	NC	0.73
2-Nitroaniline	88-74-4	6000/2000		2700	NC	550	NC	0.67	NC	0.67	1500		0.11	NC	0.11
Nitrobenzene	98-95-3	6000/2000	690	440	NC	91	NC	0.028	NC	0.028	2100		0.0043	NC	0.0043
N-Nitrosodi-n-propylamine [5 6]	621-64-7	6000/2000	2500	89	C	0.61	C	0.0006	C	0.0006	9900		0.00012	C	0.00012
N-Nitrosodiphenylamine [6]	86-30-6	6000/2000		18000	NC	870	C	9.7	C	9.7	35		0.17	C	0.17
PCBs (polychlorinated biphenyls) [11]	1336-36-3	6000/2000		16	NC	1.8	C	6.2	MCL	1.8	0.7	0.0005	0.00043	C	0.0005
Pentachlorophenol [6]	87-86-5	6000/2000		3800	C	20	C	0.028	MCL	0.028	2000	0.001	0.0071	C	0.001
Phenanthrene	85-01-8	6000/2000		2500	NC	470	NC	13	NC	13	1.2		0.023	NC	0.023

Table A – Residential Closure Levels

Contaminant[1,21]	CAS	Soil									Groundwater				
		Soil Attenuation Capacity	Soil Saturation (Csat)[2]	Construction[4]		Soil Direct		Migration to GW		Default Closure Level	Ground Water Solubility	MCL	Residential		Default Closure Level
		mg/kg	mg/kg	mg/kg				mg/kg		mg/kg	mg/l-	mg/l	mg/l		mg/l
Phenol [6]	108-95-2	6000/2000		230000	NC	44000	NC	56	NC	56	83000		11	NC	11
n-Propylbenzene	103-65-1	6000/2000	300	10000	NC	1600	NC	36	NC	36	52		0.31	NC	0.31
Propylene glycol monomethyl ether[24]	**107-98-2**	**6000/2000**	**200000**	**440000**	**NC**	**79000**	**NC**	**100**	**NC**	**100**	**1000000**		**26**	**NC**	**26**
Pyrene [22]	129-00-0	6000/2000		25000	NC	4700	NC	**4600**	**NC**	**2000**	0.14		1.1	NC	**1.1**
Selenium [6]	7782-49-2	10000		5700	NC	1700	NC	5.2	MCL	5.2		0.05	0.18	NC	0.05
Silver [6]	7440-22-4	10000		5700	NC	1700	NC	31	NC	31			0.18	NC	0.18
Styrene	100-42-5	6000/2000	550	68000	NC	11000	NC	3.5	MCL	3.5	310	0.1	2	NC	0.1
1,1,1,2-Tetrachloroethane	630-20-6	6000/2000	1200	7400	C	39	C	0.053	C	0.053	3000		0.0069	C	0.0069
1,1,2,2-Tetrachloroethane	79-34-5	6000/2000	1200	960	C	5	C	0.007	C	0.007	3000		0.0009	C	0.0009
Tetrachloroethylene (PCE) [18]	127-18-4	6000/2000	120	660	NC	9.9	C	0.058	MCL	0.058	200	0.005	0.0065	C	0.005
Thallium (and compounds) [6]	7440-28-0	10000		80	NC	24	NC	2.8	MCL	2.8		0.002	0.0026	NC	0.002
Toluene	108-88-3	6000/2000	310	49000	NC	8800	NC	12	MCL	12	530	1	2.4	NC	1
Toxaphene	8001-35-2	6000/2000		560	C	3.9	C	31	MCL	3.9	0.74	0.003	0.00077	C	0.003
1,2,4-Trichlorobenzene	120-82-1	6000/2000	1100	8900	NC	1800	NC	5.3	MCL	5.3	300	0.07	0.0095	NC	0.07
1,1,1-Trichloroethane	71-55-6	6000/2000	640	34000	NC	5000	NC	1.9	MCL	1.9	1300	0.2	3.8	NC	0.2
1,1,2-Trichloroethane	79-00-5	6000/2000	1300	600	NC	9.4	C	0.03	MCL	0.03	4400	0.005	0.0032	C	0.005
Trichloroethylene (TCE) [19]	79-01-6	6000/2000	630	210	NC	4.9	C	0.057	MCL	0.057	1100	0.005	0.0028	C	0.005
Trichlorofluoromethane[24]	**75-69-4**	**6000/2000**	**970**	**6900**	**NC**	**980**	**NC**	**29**	**NC**	**29**	**1100**		**1.7**	**NC**	**1.7**
2,4,5-Trichlorophenol [6]	95-95-4	6000/2000		89000	NC	18000	NC	250	NC	250	1200		3.6	NC	3.6
2,4,6-Trichlorophenol [6]	88-06-2	6000/2000		89	NC	18	NC	0.07	NC	0.07	800		0.0036	NC	0.0036
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	93-76-5	6000/2000		8900	NC	1800	NC	2.2	NC	2.2	270		0.36	NC	0.36
1,2,4-Trimethylbenzene	95-63-6	6000/2000	430	920	NC	130	NC	2.5	NC	2.5	57		0.016	NC	0.016
1,3,5-Trimethylbenzene	108-67-8	6000/2000	90	380	NC	54	NC	0.61	NC	0.61	48		0.016	NC	0.016
Vinyl acetate	108-05-4	6000/2000	4200	7600	NC	1100	NC	2.3	NC	2.3	20000		0.55	NC	0.55
Vinyl chloride (chloroethene) [15]	75-01-4	6000/2000	930	**500**	C	1.5	C	0.013	MCL	0.013	2800	0.002	0.00053	C	0.002
Xylene mixed (total)	1330-20-7	6000/2000	170	4800	NC	690	NC	210	MCL	170	160	10	0.27	NC	10
Zinc	7440-66-6	10000		340000	NC	100000	NC	14000	NC	10000			11	NC	11

Footnotes

Bold text indicates that a change has been made from the previous 2006 Appendix 1 table.

1. Note each column in the closure level tables has a “c” or an “nc” next to the value. This designation indicates whether the numerical value is the result of calculation from a carcinogenic endpoint or a noncarcinogenic endpoint. Knowing the carcinogenic or noncarcinogenic designation is necessary when performing additivity. The user should be aware that there are many parameters used to calculate the closure levels, and a given compound may have closure levels that result from either carcinogenic or noncarcinogenic endpoints. Sometimes the endpoints may be different for different closure types. For instance, a direct soil value may have been generated from a carcinogenic endpoint, but the groundwater value may be from a noncarcinogenic endpoint. Most carcinogens are calculated using endpoints from both carcinogenic and noncarcinogenic toxicity information, and the system used to calculate the default closure level selects the lowest endpoint.
2. Certain chemicals that are considered liquids at soil temperatures have calculated soil saturation levels. The soil saturation level, or “Csat” value, is an indicator of the possibility there is free product present. In cases where the Csat value is lower than any other soil calculated value the Csat value becomes the default closure level. If the user does not think free product exists at the site but has concentrations that exceed Csat, but not other closure levels, then they should contact the IDEM site manager in order to verify there is no free product.
3. Residential soil direct contact values for arsenic and cadmium are based on the algorithms that measure the soil-plant-human uptake and not on the algorithms normally used to measure direct contact to surface soil.

4. Construction values are listed as the raw calculated values. When applying construction values to closures, the user should recognize that values for organic chemicals will be capped at the Soil Attenuation Capacity (SAC) value or the Csat, whichever is lower, or at 10,000 mg/kg for metals. Default SAC values are 6000 mg/kg for Direct Contact (surface soil) and 2000 mg/kg for Migration to Groundwater (subsurface soil). It is possible to raise the SAC value based on the organic carbon content in the soil, and the user is referred to the non-default chapter for further information.
5. Acrolein, Bis(2-chloroethyl)ether, and N-Nitroso-di-n-propylamine (as well as other compounds) may not have an analytical method available with a detection limit or quantitation limit that will meet the closure level. Appendix 2 should be consulted for suggested analytical procedures with detection limits that meet or approach meeting closure levels. If analytical methods capable of meeting closure levels for all site contaminants are not available, the IDEM site manager should be contacted to arrange for a conference with an IDEM chemist. Appendix II is currently being updated.
6. Koc and Kd values for ionizing organics and metals will vary depending on pH. If the source area pH is outside the range of 6.0-8.0, then see the discussion in Section A1.0, under Table A, pages A.1-1 and A.1-2. Default closure levels have been calculated using Koc and Kd values at pH 6.8.
7. A "trihalomethane" is an organic compound consisting of a single carbon atom with three "halogen" atoms (bromine, chlorine, fluorine, or iodine) and a hydrogen atom attached. The National Primary Drinking Water Standards now include a "Total Trihalomethane standard" (TTHM MCL) of 0.08 mg/L. Under certain circumstances, i.e., when more than one trihalomethane compound is present on site, the "trihalomethane" standard will apply to bromoform, chloroform and bromodichloromethane. The composite standard may reduce the individual closure levels because the total concentration may not exceed the TTHM MCL.
8. Lead values were calculated using:

The 1994 Integrated Exposure Uptake Biokinetic Model (see EPA/540/R-93/081, PB-963510),

The Methodology for Assessing Risks Associated with Adult Exposure to Lead in Soil SRC-GLD-F0162-209-Draft-7/21/96,

Review of the Methodology for Establishing Risk-Based Remediation Goals for Commercial Areas of the California Gultch Site, USEPA, Technical Review Workgroup for Lead, October 26, 1995 for industrial and construction exposures, and

The Drinking Water Regulation and Health Advisories EPA 822-R-96-001, February, 1996 action levels for residential groundwater and an extrapolation to determine industrial groundwater levels.

The Kd value for lead was taken from Sheppard and Thibault (Default Soil Solid Liquid Partition Coefficients, Kds for Four Major Soil Types: A Compendium, Health Physics Vol 59, No 4, pp 471-482, 1990) for sandy soils and is considered to be applicable anywhere in the state.
9. Closure levels for Beryllium and Mercury must be determined with a site specific pH. Please see the discussion in section A.1.0 under Table A, pages A.1-1 and A.1-2.
10. Chloroform no longer has an Oral Slope Factor; the Oral RfD at 0.01 mg/kg-day is considered to be protective of the carcinogenic endpoint from the oral route.
11. PCBs are assumed to be a mixture and that Aroclor 1016 and 1254 are present.
12. Total Chromium concentrations must be assumed to be 100% Chromium VI unless a species-specific ratio evaluation of Chromium VI to Chromium III is made. The Inhalation Slope Factor used for Chromium VI is from USEPA Region 09 and is based on a review of the available studies and literature.
13. Cyanide values apply to "free" cyanide only. The closure levels are not applicable to copper cyanide and other complexed cyanides. The physical constants used in the calculation of the free cyanide closure levels are based on hydrogen cyanide (non-complexed, ionic cyanide). Total cyanide concentrations may not be representative of, and in fact may over estimate, free cyanide concentrations.
14. Certain compounds have very low solubilities, and the groundwater closure values are defaulted to their respective solubility limits. Concentrations in excess of the solubility limit can be an indicator of the presence of free product. When the solubility limit has been exceeded and the user believes that free product does not exist, then the user should contact the project manager to determine a course of action to verify there is no free product.
15. Vinyl Chloride calculations are based on two different sets of slope factors. Industrial default closure levels use 0.75 $(mg/kg\text{-}d)^{-1}$ for the oral slope factor and 0.016 $(mg/kg\text{-}day)^{-1}$ for the inhalation slope factor. Residential default closure levels use 1.5 $(mg/kg\text{-}d)^{-1}$ for the oral slope factor and 0.031$(mg/kg\text{-}day)^{-1}$ for the inhalation slope factor. The values derived for industrial default closure levels are recommended for lifetime exposure beginning at adulthood. For exposures beginning at birth an additional twofold safety factor is recommended. This has been taken into account when deriving the default closure levels for residential areas. **May 1, 2009 Revision: The construction value for vinyl chloride in the 2006 Appendix 1 DCL tables was calculated incorrectly using the residential slope factors. This revision of the 2006 Appendix 1 Tables includes the corrected construction level, as calculated with the industrial slope factors.**
16. Residential Groundwater value from EPA Drinking Water and Health Advisories, EPA 822-R-04-038, USEPA, Office of Water, Winter 2004.
17. The new federal MCL for arsenic is 0.01mg/L, and is effective January 23, 2006.
18. IDEM is currently investigating the oral slope factor for tetrachloroethylene (PCE). Until IDEM reaches a conclusion, 0.052 $(mg/kg\text{-}day)^{-1}$ will be used as the health protective oral slope factor.
19. May 1, 2009 Revision: OLQ developed and adopted default slope factors for TCE of 0.1 $(mg/kg\text{-}day)^{-1}$ as the residential oral slope factor, 0.034 $(mg/kg\text{-}day)^{-1}$ as the industrial oral slope factor, and 0.054 $(mg/kg\text{-}day)^{-1}$ as the residential inhalation slope factor, 0.018 $(mg/kg\text{-}day)^{-1}$ as the industrial inhalation slope factor, in 2006. The previous 2006 default oral and inhalation slope factors of 0.4 $(mg/kg\text{-}day)^{-1}$, which have been removed from this revised table, may also be used. Please see the 2006 OLQ document "A Regulatory Approach for Deriving Trichloroethylene Cancer Potency Estimates for Use in the Development of Health Based Remediation Closure Levels" on the RISC website for more information.
20. The CAS# for "Mercury and compounds" has been changed to CAS# 7487-94-7. It is assumed that Mercury and compounds does not contain elemental Mercury. If your site contains elemental Mercury, please contact your project manager.

21. May 1, 2009 Revision: OLQ has placed two spreadsheet tools on the RISC website to make the Appendix 1 tables more user friendly. The first is a query system that will allow users to select compounds and receive customized information sheets about those compounds. The second is a calculator that is designed to assist the user in industrial non-default calculations. The programming language used to build these tools has a different rounding system than previously used by OLQ to develop the Appendix 1 values. As a result of using the new rounding system, a few of the compounds have very small differences in values. OLQ considers these changes to be insignificant.
22. May 1, 2009 Revision: In August 2006 RISC Staff determined the default ground waterclosure levels based on solubility for certain PAHs were problematic because the closure levels approached, or were below, analytical method detection limits and decided to use the health protective level as the groundwater default closure level instead.
23. May 1, 2009 Revision: Bis(2-chloroisopropyl)ether data has been removed from the revised 2006 Appendix 1 tables because IRIS has removed the toxicity factors from its database. Please contact your Project Manager for information on bis(2-chloroisopropyl)ether if it is a COC at your site.
24. May 1, 2009 Revision: This compound has been added to the 2006 Appendix 1 tables as a part of the May 1, 2009 revision.

Table A – Industrial Closure Levels

Contaminant[1,21]	CAS	Soil									Ground Water				
		Soil Attenuation Capacity	Soil Saturation (Csat)[2]	Construction[4]		Soil Direct		Migration to GW		Default Closure Level	Ground Water Solubility	MCL	Industrial		Default Closure Level
		mg/kg	mg/kg	mg/kg		mg/kg		mg/kg		mg/kg	mg/l-water	mg/l	mg/l		mg/l
Acenaphthene [22]	83-32-9	6000/2000		50000	NC	24000	NC	**1800**	**C**	**1800**	4.2		6.1	NC	**6.1**
Acenaphthylene	208-96-8	6000/2000		5900	NC	2800	NC	180	NC	180	3.9		0.73	NC	0.73
Acetochlor	34256-82-1	6000/2000		18000	NC	9800	NC	23	NC	23	220		2	NC	2
Acetone (2-Propanone)	67-64-1	6000/2000	200000	230000	NC	51000	NC	370	NC	370	1000000		92	NC	92
Acrolein [5]	107-02-8	6000/2000	50000	3.5	NC	0.64	NC	0.25	NC	0.25	210000		0.051	NC	0.051
Aldrin	309-00-2	6000/2000		27	NC	0.8	C	16	C	0.8	0.18		0.00017	C	0.00017
Anthracene [22]	120-12-7	6000/2000		250000	NC	120000	NC	**36000**	**NC**	**2000**	0.043		31	NC	**31**
Antimony and compounds [6]	7440-36-0	10000		460	NC	620	NC	37	NC	37		0.006	0.041	NC	0.041
Arsenic [3 6 17]	7440-38-2	10000		320	NC	20	C	5.8	MCL	5.8		0.01	0.0019	C	0.01
Atrazine	1912-24-9	6000/2000		2800	C	63	C	0.21	C	0.21	35	0.003	0.013	C	0.013
Barium [6]	7440-39-3	10000		220000	NC	230000	NC	17000	NC	10000		2	20	NC	20
Benzene	71-43-2	6000/2000	590	560	NC	14	C	0.35	C	0.35	1800	0.005	0.052	C	0.052
Benzo(a)anthracene	56-55-3	6000/2000		790	C	15	C	62	C	15	0.0094		0.0039	C	0.0039
Benzo(a)pyrene	50-32-8	6000/2000		79	C	1.5	C	16	C	1.5	0.0016	0.0002	0.00039	C	0.00039
Benzo(b)fluoranthene [22]	205-99-2	6000/2000		790	C	15	C	**190**	**C**	15	0.0015		0.0039	C	**0.0039**
Benzo(k)fluoranthene [22]	207-08-9	6000/2000		7900	C	150	C	**1900**	**C**	**150**	0.0008		0.039	C	**0.039**
Benzoic acid [6]	65-85-0	6000/2000		1000000	NC	1000000	NC	1600	NC	1600	3500		410	NC	410
Benzyl Alcohol	100-51-6	6000/2000	8800	270000	NC	150000	NC	140	NC	140	40000		31	NC	31
Beryllium and compounds [9]	7440-41-7	10000		2300	NC	2900	NC	3200	NC	2300		0.004	0.2	NC	0.2
Bis(2-chloro-1-methylethyl) ether	108-60-1	6000/2000	550	5200	C	61	C	0.26	C	0.26	1700		0.041	C	0.041
Bis(2-Chloroethyl)ether [5]	111-44-4	6000/2000	4000	280	C	3	C	0.012	C	0.012	17000		0.0026	C	0.0026
Bis(2-chloroisopropyl)ether[23]	**39638-32-9**														
Bis(2-ethylhexyl)phthalate	117-81-7	6000/2000	10000	18000	NC	980	C	120000	C	980	0.34	0.006	0.2	C	0.2
Bromodichloromethane [7]	75-27-4	6000/2000	2100	2100	C	17	C	0.51	MCL	0.51	6700	0.08	0.046	C	0.08
Bromoform(tribromomethane) [7]	75-25-2	6000/2000	1200	7700	NC	580	C	2.7	C	2.7	3100	0.08	0.36	C	0.36
n-Butanol	71-36-3	6000/2000	16000	2700	NC	490	NC	44	NC	44	74000		10	NC	10
Butylbenzylphthalate [2 14]	85-68-7	6000/2000	310	180000	NC	98000	NC	6200	S	310	2.7		20	NC	2.7
Cadmium [3 6]	7440-43-9	10000		590	NC	990	NC	77	NC	77		0.005	0.051	NC	0.051
Carbazole	86-74-8	6000/2000		31000	C	690	C	20	C	20	7.5		0.14	C	0.14
Carbon disulfide	75-15-0	6000/2000	480	6200	NC	1200	NC	82	NC	82	1200		10	NC	10
Carbon tetrachloride	56-23-5	6000/2000	520	38	NC	5.2	C	0.29	C	0.29	790	0.005	0.022	C	0.022
Chlordane	12789-03-6	6000/2000		510	NC	68	C	39	C	39	0.056	0.002	0.0082	C	0.0082
p-Chloroaniline [6]	106-47-8	6000/2000		3600	NC	2000	NC	2.7	NC	2.7	5300		0.41	NC	0.41
Chlorobenzene	108-90-7	6000/2000	310	2600	NC	510	NC	27	NC	27	470	0.1	2	NC	2
Chloroethane	75-00-3	6000/2000	3000	16000	C	120	C	10	C	10	5700		0.99	C	0.99
Chloroform [7 10]	67-66-3	6000/2000	2300	650	C	4.7	C	6	NC	4.7	7900	0.08	1	NC	1
2-Chloronapthalene	91-58-7	6000/2000		71000	NC	39000	NC	560	NC	560	12		8.2	NC	8.2
2-Chlorophenol [6]	95-57-8	6000/2000	22000	2200	NC	580	NC	10	NC	10	22000		0.51	NC	0.51

Table A – Industrial Closure Levels

Contaminant[1,21]	CAS	Soil									Ground Water				
		Soil Attenuation Capacity	Soil Saturation (Csat)[2]	Construction[4]		Soil Direct		Migration to GW		Default Closure Level	Ground Water Solubility	MCL	Industrial		Default Closure Level
		mg/kg	mg/kg	mg/kg		mg/kg		mg/kg		mg/kg	mg/l-water	mg/l	mg/l		mg/l
Chromium III [6]	16065-83-1	10000		1000000	NC	1000000	NC	1000000	NC	10000		0.1	150	NC	150
Chromium VI [6 12]	18540-29-9	10000		3400	NC	650	C	120	NC	120		0.1	0.31	NC	0.31
Chrysene [22]	218-01-9	6000/2000		79000	C	1500	C	**6200**	**C**	**1500**	0.0016		0.39	C	**0.39**
Copper [6]	7440-50-8	10000		46000	NC	62000	NC	2900	NC	2900		1.3	4.1	NC	4.1
Cyanide, Free [13]	57-12-5	6000/2000		23000	NC	31000	NC	9.6	NC	9.6	1000000	0.2	2	NC	2
Cyclohexane [2]	110-82-7	6000/2000	69	51000	NC	9300	NC	1400	S	69	55		170	NC	55
DDD	72-54-8	6000/2000		2200	NC	120	C	480	C	120	0.09		0.012	C	0.012
DDE	72-55-9	6000/2000		2200	C	86	C	1500	C	86	0.12		0.0084	C	0.0084
DDT	50-29-3	6000/2000		540	NC	86	C	890	C	86	0.025		0.0084	C	0.0084
Dibenzo(a,h)anthracene	53-70-3	6000/2000		79	C	1.5	C	60	C	1.5	0.0025		0.00039	C	0.00039
Dibenzofuran	132-64-9	6000/2000		1800	NC	980	NC	65	NC	65	3.1		0.2	NC	0.2
1,2-Dibromoethane	106-93-4	6000/2000	1400	59	C	0.49	C	0.0096	C	0.0096	4300	5E-05	0.0014	C	0.0014
Dibutyl phthalate [2]	84-74-2	6000/2000	760	89000	NC	49000	NC	14000	NC	760	11		10	NC	10
1,2-Dichlorobenzene	95-50-1	6000/2000	220	18000	NC	3900	NC	270	NC	220	160	0.6	9.2	NC	9.2
1,3-Dichlorobenzene	541-73-1	6000/2000	230	2200	NC	890	NC	8.9	NC	8.9	160		0.31	NC	0.31
1,4-Dichlorobenzene	106-46-7	6000/2000		8000	C	73	C	3.4	C	3.4	74	0.075	0.12	C	0.12
3,3-Dichlorobenzidine	91-94-1	6000/2000		1400	C	31	C	0.21	C	0.21	3.1		0.0064	C	0.0064
1,1-Dichloroethane	75-34-3	6000/2000	1400	8600	NC	1700	NC	58	NC	58	5100		10	NC	10
1,2-Dichloroethane	107-06-2	6000/2000	2000	150	NC	5.8	C	0.15	C	0.15	8500	0.005	0.031	C	0.031
1,1-Dichloroethylene	75-35-4	6000/2000	930	2200	NC	410	NC	42	NC	42	2200	0.007	5.1	NC	5.1
cis-1,2-Dichloroethylene	156-59-2	6000/2000	1000	750	NC	140	NC	5.8	NC	5.8	3500	0.07	1	NC	1
trans-1,2-Dichloroethylene	156-60-5	6000/2000	2100	1200	NC	230	NC	14	NC	14	6300	0.1	2	NC	2
2,4-Dichlorophenol [6]	120-83-2	6000/2000		2700	NC	1500	NC	3	NC	3	4500		0.31	NC	0.31
2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	6000/2000		9100	NC	5200	NC	5.2	NC	5.2	680	0.07	1	NC	1
1,2-Dichloropropane	78-87-5	6000/2000	830	99	NC	7.2	C	0.25	C	0.25	2800	0.005	0.042	C	0.042
1,3-Dichloropropene	542-75-6	6000/2000	1000	290	NC	16	C	0.2	C	0.2	2800		0.029	C	0.029
Dieldrin	60-57-1	6000/2000		39	C	0.86	C	0.15	C	0.15	0.2		0.00018	C	0.00018
Diethylphthalate	84-66-2	6000/2000	840	710000	NC	390000	NC	1300	NC	840	1100		82	NC	82
N,N Dimethylformamide	68-12-2	6000/2000	200000	26000	NC	5800	NC	42	NC	42	1000000		10	NC	10
2,4-Dimethylphenol [6]	105-67-9	6000/2000		18000	NC	9800	NC	25	NC	25	7900		2	NC	2
Dimethylphthalate [2]	131-11-3	6000/2000	1100	1000000	NC	1000000	NC	5600	NC	1100	4000		1000	NC	1000
2,4-Dinitrophenol [6]	51-28-5	6000/2000		1800	NC	980	NC	0.82	NC	0.82	2800		0.2	NC	0.2
Dinitrotoluene mixture	25321-14-6	6000/2000		890	NC	20	C	0.031	C	0.031	230		0.0042	C	0.0042
Di-n-octyl phthalate [14]	117-84-0	6000/2000	3300	36000	NC	20000	NC	67000	S	2000	0.02		4.1	NC	0.02
Endosulfan	115-29-7	6000/2000		5300	NC	2900	NC	46	S	46	0.51		0.61	NC	0.51
Endrin	72-20-8	6000/2000		270	NC	150	NC	15	NC	15	0.25	0.002	0.031	NC	0.031
Ethyl acetate	141-78-6	6000/2000	25000	290000	NC	69000	NC	590	NC	590	80000		92	NC	92
Ethylbenzene	100-41-4	6000/2000	160	29000	NC	6800	NC	200	NC	160	170	0.7	10	NC	10

Table A – Industrial Closure Levels

Contaminant[1,21]	CAS	Soil									Ground Water				
		Soil Attenuation Capacity	Soil Saturation (Csat)[2]	Construction[4]		Soil Direct		Migration to GW		Default Closure Level	Ground Water Solubility	MCL	Industrial		Default Closure Level
		mg/kg	mg/kg	mg/kg		mg/kg		mg/kg		mg/kg	mg/l-water	mg/l	mg/l		mg/l
Ethylene glycol[24]	**107-21-1**	**6000/2000**	**200000**	**1000000**	**NC**	**570000**	**NC**	**830**	**NC**	**830**	**1000000**		**200**	**NC**	**200**
Fluoranthene [22]	206-44-0	6000/2000		33000	NC	16000	NC	**18000**	**NC**	**2000**	0.21		4.1	NC	**4.1**
Fluorene [22]	86-73-7	6000/2000		33000	NC	16000	NC	**2300**	**NC**	**2000**	2		4.1	NC	**4.1**
alpha-HCH(alpha-BHC)	319-84-6	6000/2000		120	C	4	C	0.024	C	0.024	2		0.00045	C	0.00045
beta-HCH(beta-BHC)	319-85-7	6000/2000		200	NC	12	C	0.086	C	0.086	0.24		0.0016	C	0.0016
gamma-HCH(Lindane)	58-89-9	6000/2000		310	NC	19	C	0.1	C	0.1	6.8	0.0002	0.0022	C	0.0022
Heptachlor	76-44-8	6000/2000		140	C	2.9	C	36	C	2.9	0.18	0.0004	0.00064	C	0.00064
Heptachlor epoxide	1024-57-3	6000/2000		12	NC	1.5	C	1	C	1	0.2	0.0002	0.00031	C	0.00031
Hexachloro-1,3-butadiene	87-68-3	6000/2000	350	270	NC	150	NC	66	NC	66	3.2		0.031	NC	0.031
Hexachlorobenzene	118-74-1	6000/2000		390	C	8.6	C	3.9	C	3.9	6.2	0.001	0.0018	C	0.0018
Hexachlorocyclopentadiene	77-47-4	6000/2000	720	5300	NC	2900	NC	4900	NC	720	1.8	0.05	0.61	NC	0.61
Hexachloroethane	67-72-1	6000/2000		660	NC	240	NC	7.7	NC	7.7	50		0.1	NC	0.1
n-Hexane	110-54-3	6000/2000	100	1200	NC	220	NC	2100	S	100	9.5		61	NC	9.5
Indeno(1,2,3-cd)pyrene [22]	193-39-5	6000/2000		790	C	15	C	**540**	**C**	**15**	0.000022		0.0039	C	**0.0039**
Isophorone	78-59-1	6000/2000	3500	180000	NC	14000	C	18	C	18	12000		3	C	3
Isopropylbenzene (Cumene)	98-82-8	6000/2000	42	9900	NC	1900	NC	140	NC	42	61		10	NC	10
Lead [8]	7439-92-1	10000		970	NC	1300	NC	230		230		0.015	0.042	NC	0.042
Mercury and compounds [9 20]	7487-94-7	10000		340	NC	470	NC	32	NC	32	69000	0.002	0.031	NC	0.031
Methoxychlor [14]	72-43-5	6000/2000		4400	NC	2500	NC	180	S	180	0.045	0.04	0.51	NC	0.045
Methyl bromide (bromomethane)	74-83-9	6000/2000	3700	69	NC	13	NC	0.7	NC	0.7	15000		0.14	NC	0.14
Methyl ethyl ketone (MEK)	78-93-3	6000/2000	28000	260000	NC	70000	NC	250	NC	250	140000		61	NC	61
Methyl tertiary butyl ether (MTBE) [16]	1634-04–4	6000/2000	11000	65000	C	650	C	3.2	C	3.2	48000		0.72	C	0.72
4-Methyl-2-pentanone (MIBK)	108-10-1	6000/2000	8700	64000	NC	29000	NC	75	NC	75	19000		8.2	NC	8.2
Methylene chloride	75-09-2	6000/2000	3000	22000	C	200	C	1.8	C	1.8	13000	0.005	0.38	C	0.38
2-Methylnaphthalene	91-57-6	6000/2000		3300	NC	1600	NC	42	NC	42	25		0.41	NC	0.41
3-Methylphenol (m-cresol) [6]	108-39-4	6000/2000	6100	44000	NC	25000	NC	28	NC	28	23000		5.1	NC	5.1
4-Methylphenol (p-cresol) [6]	106-44-5	6000/2000		4400	NC	2500	NC	3	NC	3	22000		0.51	NC	0.51
2-Methylphenol(o-cresol) [6]	95-48-7	6000/2000		39000	NC	17000	NC	39	NC	39	26000		5.1	NC	5.1
Metolachlor	51218-45-2	6000/2000	420	130000	NC	74000	NC	240	NC	240	530		15	NC	15
Naphthalene	91-20-3	6000/2000		17000	NC	8000	NC	170	NC	170	31		2	NC	2
Nickel, soluble salts [6]	various	10000		23000	NC	31000	NC	2700	NC	2700			2	NC	2
2-Nitroaniline	88-74-4	6000/2000		2700	NC	1500	NC	1.9	NC	1.9	1500		0.31	NC	0.31
Nitrobenzene	98-95-3	6000/2000	690	440	NC	250	NC	0.34	NC	0.34	2100		0.051	NC	0.051
N-Nitrosodi-n-propylamine [5 6]	621-64-7	6000/2000	2500	89	C	2	C	0.002	C	0.002	9900		0.00041	C	0.00041
N-Nitrosodiphenylamine [6]	86-30-6	6000/2000		18000	NC	2800	C	32	C	32	35		0.58	C	0.58
PCBs (polychlorinated biphenyls) [11]	1336-36-3	6000/2000		16	NC	5.3	C	18	C	5.3	0.7	0.0005	0.0014	C	0.0014
Pentachlorophenol [6]	87-86-5	6000/2000		3800	C	54	C	0.66	C	0.66	2000	0.001	0.024	C	0.024
Phenanthrene	85-01-8	6000/2000		2500	NC	1200	NC	170	NC	170	1.2		0.31	NC	0.31

Table A – Industrial Closure Levels

Contaminant[1,21]	CAS	Soil									Ground Water				
		Soil Attenuation Capacity	Soil Saturation (Csat)[2]	Construction[4]		Soil Direct		Migration to GW		Default Closure Level	Ground Water Solubility	MCL	Industrial		Default Closure Level
		mg/kg	mg/kg	mg/kg		mg/kg		mg/kg		mg/kg	mg/l-water	mg/l	mg/l		mg/l
Phenol [6]	108-95-2	6000/2000		230000	NC	96000	NC	160	NC	160	83000		31	NC	31
n-Propylbenzene	103-65-1	6000/2000	300	10000	NC	2200	NC	480	NC	300	52		4.1	NC	4.1
Propylene glycol monomethyl ether[24]	**107-98-2**	**6000/2000**	**200000**	**440000**	**NC**	**150000**	**NC**	**290**	**NC**	**290**	**1000000**		**72**	**NC**	**72**
Pyrene [22]	129-00-0	6000/2000		25000	NC	12000	NC	**13000**	**NC**	**2000**	0.14		3.1	NC	**3.1**
Selenium [6]	7782-49-2	10000		5700	NC	7800	NC	53	NC	53		0.05	0.51	NC	0.51
Silver [6]	7440-22-4	10000		5700	NC	7800	NC	87	NC	87			0.51	NC	0.51
Styrene	100-42-5	6000/2000	550	68000	NC	16000	NC	720	NC	550	310	0.1	20	NC	20
1,1,1,2-Tetrachloroethane	630-20-6	6000/2000	1200	7400	C	67	C	0.85	C	0.85	3000		0.11	C	0.11
1,1,2,2-Tetrachloroethane	79-34-5	6000/2000	1200	960	C	8.7	C	0.11	C	0.11	3000		0.014	C	0.014
Tetrachloroethylene (PCE) [18]	127-18-4	6000/2000	120	660	NC	16	C	0.64	C	0.64	200	0.005	0.055	C	0.055
Thallium (and compounds) [6]	7440-28-0	10000		80	NC	110	NC	10	NC	10		0.002	0.0072	NC	0.0072
Toluene	108-88-3	6000/2000	310	49000	NC	16000	NC	96	NC	96	530	1	8.2	NC	8.2
Toxaphene	8001-35-2	6000/2000		560	C	12	C	31	MCL	12	0.74	0.003	0.0026	C	0.003
1,2,4-Trichlorobenzene	120-82-1	6000/2000	1100	8900	NC	4900	NC	77	NC	77	300	0.07	1	NC	1
1,1,1-Trichloroethane	71-55-6	6000/2000	640	34000	NC	6700	NC	280	NC	280	1300	0.2	29	NC	29
1,1,2-Trichloroethane	79-00-5	6000/2000	1300	600	NC	15	C	0.3	C	0.3	4400	0.005	0.05	C	0.05
Trichloroethylene (TCE) [19]	79-01-6	6000/2000	630	210	NC	24	C	0.35	NC	0.35	1100	0.005	0.031	NC	0.031
Trichlorofluoromethane[24]	**75-69-4**	**6000/2000**	**970**	**6900**	**NC**	**1300**	**NC**	**540**	**NC**	**540**	**1100**		**31**	**NC**	**31**
2,4,5-Trichlorophenol [6]	95-95-4	6000/2000		89000	NC	49000	NC	690	NC	690	1200		10	NC	10
2,4,6-Trichlorophenol [6]	88-06-2	6000/2000		89	NC	49	NC	0.2	NC	0.2	800		0.01	NC	0.01
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	93-76-5	6000/2000		8900	NC	4900	NC	6.1	NC	6.1	270		1	NC	1
1,2,4-Trimethylbenzene	95-63-6	6000/2000	430	920	NC	170	NC	780	NC	170	57		5.1	NC	5.1
1,3,5-Trimethylbenzene	108-67-8	6000/2000	90	380	NC	68	NC	190	NC	68	48		5.1	NC	5.1
Vinyl acetate	108-05-4	6000/2000	4200	7600	NC	1400	NC	430	NC	430	20000		100	NC	100
Vinyl chloride (chloroethene) [15]	75-01-4	6000/2000	930	**500**	C	6.4	C	0.027	C	0.027	2800	0.002	0.004	C	0.004
Xylene mixed (total)	1330-20-7	6000/2000	170	4800	NC	890	NC	430	NC	170	160	10	20	NC	20
Zinc	7440-66-6	10000		340000	NC	470000	NC	38000	NC	10000			31	NC	31

Footnotes

Bold text indicates that a change has been made from the previous 2006 Appendix 1 table.

1. Note each column in the closure level tables has a “c” or an “nc” next to the value. This designation indicates whether the numerical value is the result of calculation from a carcinogenic endpoint or a noncarcinogenic endpoint. Knowing the carcinogenic or noncarcinogenic designation is necessary when performing additivity. The user should be aware that there are many parameters used to calculate the closure levels, and a given compound may have closure levels that result from either carcinogenic or noncarcinogenic endpoints. Sometimes the endpoints may be different for different closure types. For instance, a direct soil value may have been generated from a carcinogenic endpoint, but the groundwater value may be from a noncarcinogenic endpoint. Most carcinogens are calculated using endpoints from both carcinogenic and noncarcinogenic toxicity information, and the system used to calculate the default closure level selects the lowest endpoint.
2. Certain chemicals that are considered liquids at soil temperatures have calculated soil saturation levels. The soil saturation level, or “Csat” value, is an indicator of the possibility there is free product present. In cases where the Csat value is lower than any other soil calculated value the Csat value becomes the default closure level. If the user does not think free product exists at the site but has concentrations that exceed Csat, but not other closure levels, then they should contact the IDEM site manager in order to verify there is no free product.
3. Residential soil direct contact values for arsenic and cadmium are based on the algorithms that measure the soil-plant-human uptake and not on the algorithms normally used to measure direct contact to surface soil.

4. Construction values are listed as the raw calculated values. When applying construction values to closures, the user should recognize that values for organic chemicals will be capped at the Soil Attenuation Capacity (SAC) value or the Csat, whichever is lower, or at 10,000 mg/kg for metals. Default SAC values are 6000 mg/kg for Direct Contact (surface soil) and 2000 mg/kg for Migration to Groundwater (subsurface soil). It is possible to raise the SAC value based on the organic carbon content in the soil, and the user is referred to the non-default chapter for further information.
5. Acrolein, Bis(2-chloroethyl)ether, and N-Nitroso-di-n-propylamine (as well as other compounds) may not have an analytical method available with a detection limit or quantitation limit that will meet the closure level. Appendix 2 should be consulted for suggested analytical procedures with detection limits that meet or approach meeting closure levels. If analytical methods capable of meeting closure levels for all site contaminants are not available, the IDEM site manager should be contacted to arrange for a conference with an IDEM chemist. Appendix II is currently being updated.
6. Koc and Kd values for ionizing organics and metals will vary depending on pH. If the source area pH is outside the range of 6.0-8.0, then see the discussion in Section A1.0, under Table A, pages A.1-1 and A.1-2. Default closure levels have been calculated using Koc and Kd values at pH 6.8.
7. A "trihalomethane" is an organic compound consisting of a single carbon atom with three "halogen" atoms (bromine, chlorine, fluorine, or iodine) and a hydrogen atom attached. The National Primary Drinking Water Standards now include a "Total Trihalomethane standard" (TTHM MCL) of 0.08 mg/L. Under certain circumstances, i.e., when more than one trihalomethane compound is present on site, the "trihalomethane" standard will apply to bromoform, chloroform and bromodichloromethane. The composite standard may reduce the individual closure levels because the total concentration may not exceed the TTHM MCL.
8. Lead values were calculated using:

The 1994 Integrated Exposure Uptake Biokinetic Model (see EPA/540/R-93/081, PB-963510),

The Methodology for Assessing Risks Associated with Adult Exposure to Lead in Soil SRC-GLD-F0162-209-Draft-7/21/96,

Review of the Methodology for Establishing Risk-Based Remediation Goals for Commercial Areas of the California Gultch Site, USEPA, Technical Review Workgroup for Lead, October 26, 1995 for industrial and construction exposures, and

The Drinking Water Regulation and Health Advisories EPA 822-R-96-001, February, 1996 action levels for residential groundwater and an extrapolation to determine industrial groundwater levels.

The Kd value for lead was taken from Sheppard and Thibault (Default Soil Solid Liquid Partition Coefficients, Kds for Four Major Soil Types: A Compendium, Health Physics Vol 59, No 4, pp 471-482, 1990) for sandy soils and is considered to be applicable anywhere in the state.
9. Closure levels for Beryllium and Mercury must be determined with a site specific pH. Please see the discussion in section A.1.0 under Table A, pages A.1-1 and A.1-2.
10. Chloroform no longer has an Oral Slope Factor; the Oral RfD at 0.01 mg/kg-day is considered to be protective of the carcinogenic endpoint from the oral route.
11. PCBs are assumed to be a mixture and that Aroclor 1016 and 1254 are present.
12. Total Chromium concentrations must be assumed to be 100% Chromium VI unless a species-specific ratio evaluation of Chromium VI to Chromium III is made. The Inhalation Slope Factor used for Chromium VI is from USEPA Region 09 and is based on a review of the available studies and literature.
13. Cyanide values apply to "free" cyanide only. The closure levels are not applicable to copper cyanide and other complexed cyanides. The physical constants used in the calculation of the free cyanide closure levels are based on hydrogen cyanide (non-complexed, ionic cyanide). Total cyanide concentrations may not be representative of, and in fact may over estimate, free cyanide concentrations.
14. Certain compounds have very low solubilities, and the groundwater closure values are defaulted to their respective solubility limits. Concentrations in excess of the solubility limit can be an indicator of the presence of free product. When the solubility limit has been exceeded and the user believes that free product does not exist, then the user should contact the project manager to determine a course of action to verify there is no free product.
15. Vinyl Chloride calculations are based on two different sets of slope factors. Industrial default closure levels use 0.75 $(mg/kg\text{-}d)^{-1}$ for the oral slope factor and 0.016 $(mg/kg\text{-}day)^{-1}$ for the inhalation slope factor. Residential default closure levels use 1.5 $(mg/kg\text{-}d)^{-1}$ for the oral slope factor and 0.031$(mg/kg\text{-}day)^{-1}$ for the inhalation slope factor. The values derived for industrial default closure levels are recommended for lifetime exposure beginning at adulthood. For exposures beginning at birth an additional twofold safety factor is recommended. This has been taken into account when deriving the default closure levels for residential areas. **May 1, 2009 Revision: The construction value for vinyl chloride in the 2006 Appendix 1 DCL tables was calculated incorrectly using the residential slope factors. This revision of the 2006 Appendix 1 Tables includes the corrected construction level, as calculated with the industrial slope factors.**
16. Residential Groundwater value from EPA Drinking Water and Health Advisories, EPA 822-R-04-038, USEPA, Office of Water, Winter 2004.
17. The new federal MCL for arsenic is 0.01mg/L, and is effective January 23, 2006.
18. IDEM is currently investigating the oral slope factor for tetrachloroethylene (PCE). Until IDEM reaches a conclusion, 0.052 $(mg/kg\text{-}day)^{-1}$ will be used as the health protective oral slope factor.
19. May 1, 2009 Revision: OLQ developed and adopted default slope factors for TCE of 0.1 $(mg/kg\text{-}day)^{-1}$ as the residential oral slope factor, 0.034 $(mg/kg\text{-}day)^{-1}$ as the industrial oral slope factor, and 0.054 $(mg/kg\text{-}day)^{-1}$ as the residential inhalation slope factor, 0.018 $(mg/kg\text{-}day)^{-1}$ as the industrial inhalation slope factor, in 2006. The previous 2006 default oral and inhalation slope factors of 0.4 $(mg/kg\text{-}day)^{-1}$, which have been removed from this revised table, may also be used. Please see the 2006 OLQ document "A Regulatory Approach for Deriving Trichloroethylene Cancer Potency Estimates for Use in the Development of Health Based Remediation Closure Levels" on the RISC website for more information.
20. The CAS# for "Mercury and compounds" has been changed to CAS# 7487-94-7. It is assumed that Mercury and compounds does not contain elemental Mercury. If your site contains elemental Mercury, please contact your project manager.

21. May 1, 2009 Revision: OLQ has placed two spreadsheet tools on the RISC website to make the Appendix 1 tables more user friendly. The first is a query system that will allow users to select compounds and receive customized information sheets about those compounds. The second is a calculator that is designed to assist the user in industrial non-default calculations. The programming language used to build these tools has a different rounding system than previously used by OLQ to develop the Appendix 1 values. As a result of using the new rounding system, a few of the compounds have very small differences in values. OLQ considers these changes to be insignificant.
22. May 1, 2009 Revision: In August 2006 RISC Staff determined the default groundwater closure levels based on solubility for certain PAHs were problematic because the closure levels approached, or were below, analytical method detection limits and decided to use the health protective level as the groundwater default closure level instead.
23. May 1, 2009 Revision: Bis(2-chloroisopropyl)ether data has been removed from the revised 2006 Appendix 1 tables because IRIS has removed the toxicity factors from its database. Please contact your Project Manager for information on bis(2-chloroisopropyl)ether if it is a COC at your site.
24. May 1, 2009 Revision: This compound has been added to the 2006 Appendix 1 tables as a part of the May 1, 2009 revision.

TABLE B

Chemical/Physical Properties

Table B – Chemical/Physical Properties

Contaminant	CAS	Di,a cm^2/s	Di,a Source	Di,w cm^2/s	Di,w Source	K_{oc} l/kg	K_{oc} Source	K_d l/kg	K_d Source	H' (Hx41)	H' Source
Acenaphthene	83-32-9	0.0421	SSG (2002)	0.00000769	SSG (2002)	7080	SSG (2002)			0.00636	SSG (2002)
Acenaphthylene	208-96-8	0.0439	RAIS	0.00000753	RAIS	6120	RAIS			0.0595	calc'd from H
Acetochlor	34256-82-1	0.08	IEMI	0.000008	IEMI	176	RAIS			0.000000912	RAIS
Acetone (2-Propanone)	67-64-1	0.124	SSG (2002)	0.0000114	SSG (2002)	0.575	SSG (2002)			0.00159	SSG (2002)
Acrolein	107-02-8	0.11	R9	0.000012	R9	21	R3,6,9			0.00125	calc'd from H
Aldrin	309-00-2	0.0132	SSG (2002)	0.00000486	SSG (2002)	2450000	SSG (2002)			0.00697	SSG (2002)
Anthracene	120-12-7	0.0324	SSG (2002)	0.00000774	SSG (2002)	29500	SSG (2002)			0.00267	SSG (2002)
Antimony and compounds	7440-36-0							45	SSG (1996)	0	
Arsenic	7440-38-2							29	SSG (2002)	0	
Atrazine	1912-24-9	0.08	IEMI	0.000008	IEMI	302	ATSDR			0.000000121	ATSDR
Barium	7440-39-3							41	SSG (2002)	0	
Benzene	71-43-2	0.088	SSG (2002)	0.0000098	SSG (2002)	58.9	SSG (2002)			0.228	SSG (2002)
Benzo(a)anthracene	56-55-3	0.051	SSG (2002)	0.000009	SSG (2002)	398000	SSG (2002)			0.000137	SSG (2002)
Benzo(a)pyrene	50-32-8	0.043	SSG (2002)	0.000009	SSG (2002)	1020000	SSG (2002)			0.0000463	SSG (2002)
Benzo(b)fluoranthene	205-99-2	0.0226	SSG (2002)	0.00000556	SSG (2002)	1230000	SSG (2002)			0.00455	SSG (2002)
Benzo(k)fluoranthene	207-08-9	0.0226	SSG (2002)	0.00000556	SSG (2002)	1230000	SSG (2002)			0.000034	SSG (2002)
Benzoic acid	65-85-0	0.0536	SSG (2002)	0.00000797	SSG (2002)	0.576	SSG (2002)			0.0000631	SSG (2002)
Benzyl Alcohol	100-51-6	0.0689	R6 HWC	0.00000938	R6 HWC	10.2	R6 HWC			0.0000155	calc'd from H
Beryllium and compounds	7440-41-7							790	SSG (2002)	0	
Bis(2-chloro-1-methylethyl) ether	108-60-1	0.063	R9	0.0000064	R9	61	R9			0.0046	R9
Bis(2-Chloroethyl)ether	111-44-4	0.0692	SSG (2002)	0.00000753	SSG (2002)	15.5	SSG (2002)			0.000738	SSG (2002)
Bis(2-chloroisopropyl)ether[2]	**39638-32-9**										
Bis(2-ethylhexyl)phthalate	117-81-7	0.0351	SSG (2002)	0.00000366	SSG (2002)	15100000	SSG (2002)			0.00000418	SSG (2002)
Bromodichloromethane	75-27-4	0.0298	SSG (2002)	0.0000106	SSG (2002)	55	SSG (2002)			0.0656	SSG (2002)
Bromoform(tribromomethane)	75-25-2	0.0149	SSG (2002)	0.0000103	SSG (2002)	87.1	SSG (2002)			0.0219	SSG (2002)
n-Butanol	71-36-3	0.08	SSG (2002)	0.0000093	SSG (2002)	6.92	SSG (2002)			0.000361	SSG (2002)
Butylbenzylphthalate	85-68-7	0.0174	SSG (2002)	0.00000483	SSG (2002)	57500	SSG (2002)			0.0000517	SSG (2002)
Cadmium	7440-43-9							75	SSG (2002)	0	SSG (2002)
Carbazole	86-74-8	0.039	SSG (2002)	0.00000703	SSG (2002)	3390	SSG (2002)			0.000000626	SSG (2002)

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Contaminant	CAS	Di,a cm^2/s	Di,a Source	Di,w cm^2/s	Di,w Source	K_{oc} l/kg	K_{oc} Source	K_d l/kg	K_d Source	H' (Hx41)	H' Source
Carbon disulfide	75-15-0	0.104	SSG (2002)	0.00001	SSG (2002)	45.7	SSG (2002)			1.24	SSG (2002)
Carbon tetrachloride	56-23-5	0.078	SSG (2002)	0.0000088	SSG (2002)	174	SSG (2002)			1.25	SSG (2002)
Chlordane	12789-03-6	0.0118	SSG (2002)	0.00000437	SSG (2002)	120000	SSG (2002)			0.00199	SSG (2002)
p-Chloroaniline	106-47-8	0.0483	SSG (2002)	0.0000101	SSG (2002)	66.1	SSG (2002)			0.0000136	SSG (2002)
Chlorobenzene	108-90-7	0.073	SSG (2002)	0.0000087	SSG (2002)	219	SSG (2002)			0.152	SSG (2002)
Chloroethane	75-00-3	0.1	R9	0.000012	R9	143	ATSDR (1999)			0.455	calc'd from H
Chloroform	67-66-3	0.104	SSG (2002)	0.00001	SSG (2002)	39.8	SSG (2002)			0.15	SSG (2002)
2-Chloronapthalene	91-58-7	0.035	R9	0.0000088	R9	1600	R9			0.013	R9
2-Chlorophenol	95-57-8	0.0501	SSG (2002)	0.00000946	SSG (2002)	388	SSG (2002)			0.016	SSG (2002)
Chromium III	16065-83-1							1800000	SSG (2002)	0	
Chromium VI	18540-29-9							19	SSG (2002)	0	
Chrysene	218-01-9	0.0248	SSG (2002)	0.00000621	SSG (2002)	398000	SSG (2002)			0.00388	SSG (2002)
Copper	7440-50-8							35	RAIS	0	
Cyanide, Free[1]	57-12-5	0.18	R9	0.000018	R9	17	R9		R9	0.0053	calc'd from H
Cyclohexane	110-82-7	0.08	R9	0.000009	R9	160	R9			8.2	R9
DDD	72-54-8	0.0169	SSG (2002)	0.00000476	SSG (2002)	1000000	SSG (2002)			0.000164	SSG (2002)
DDE	72-55-9	0.0144	SSG (2002)	0.00000587	SSG (2002)	4470000	SSG (2002)			0.000861	SSG (2002)
DDT	50-29-3	0.0137	SSG (2002)	0.00000495	SSG (2002)	2630000	SSG (2002)			0.000332	SSG (2002)
Dibenzo(a,h)anthracene	53-70-3	0.0202	SSG (2002)	0.00000518	SSG (2002)	3800000	SSG (2002)			0.000000603	SSG (2002)
Dibenzofuran	132-64-9	0.06	R9	0.00001	R9	7800	R9			0.00053	R9
1,2-Dibromoethane	106-93-4	0.073	R9	0.0000081	R9	66	ATSDR			0.0336	ATSDR
Dibutyl phthalate	84-74-2	0.0438	SSG (2002)	0.00000786	SSG (2002)	33900	SSG (2002)			3.85E-08	SSG (2002)
1,2-Dichlorobenzene	95-50-1	0.069	SSG (2002)	0.0000079	SSG (2002)	617	SSG (2002)			0.0779	SSG (2002)
1,3-Dichlorobenzene	541-73-1	0.069	R9	0.0000079	R9	620	R9			0.078	R9
1,4-Dichlorobenzene	106-46-7	0.069	SSG (2002)	0.0000079	SSG (2002)	617	SSG (2002)			0.0996	SSG (2002)
3,3-Dichlorobenzidine	91-94-1	0.0194	SSG (2002)	0.00000674	SSG (2002)	724	SSG (2002)			0.000000164	SSG (2002)
1,1-Dichloroethane	75-34-3	0.0742	SSG (2002)	0.0000105	SSG (2002)	31.6	SSG (2002)			0.23	SSG (2002)
1,2-Dichloroethane	107-06-2	0.104	SSG (2002)	0.0000099	SSG (2002)	17.4	SSG (2002)			0.0401	SSG (2002)
1,1-Dichloroethylene	75-35-4	0.09	SSG (2002)	0.0000104	SSG (2002)	58.9	SSG (2002)			1.07	SSG (2002)

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Contaminant	CAS	Di,a cm^2/s	Di,a Source	Di,w cm^2/s	Di,w Source	K_{oc} l/kg	K_{oc} Source	K_d l/kg	K_d Source	H' (Hx41)	H' Source
cis-1,2-Dichloroethylene	156-59-2	0.0736	SSG (2002)	0.0000113	SSG (2002)	35.5	SSG (2002)			0.167	SSG (2002)
trans-1,2-Dichloroethylene	156-60-5	0.0707	SSG (2002)	0.0000119	SSG (2002)	52.5	SSG (2002)			0.385	SSG (2002)
2,4-Dichlorophenol	120-83-2	0.0346	SSG (2002)	0.00000877	SSG (2002)	147	SSG (2002)			0.00013	SSG (2002)
2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	0.0231	SSG (2002)	0.00000731	SSG (2002)	26.2	SSG (2002)			0.00000041	SSG (2002)
1,2-Dichloropropane	78-87-5	0.0782	SSG (2002)	0.00000873	SSG (2002)	43.7	SSG (2002)			0.115	SSG (2002)
1,3-Dichloropropene	542-75-6	0.0626	SSG (2002)	0.00001	SSG (2002)	45.7	SSG (2002)			0.726	SSG (2002)
Dieldrin	60-57-1	0.0125	SSG (2002)	0.00000474	SSG (2002)	21400	SSG (2002)			0.000619	SSG (2002)
Diethylphthalate	84-66-2	0.0256	SSG (2002)	0.00000635	SSG (2002)	288	SSG (2002)			0.0000185	SSG (2002)
N,N Dimethylformamide	68-12-2	0.0939	RAIS	0.0000103	RAIS	2.411	RAIS			0.000003034	RAIS
2,4-Dimethylphenol	105-67-9	0.0584	SSG (2002)	0.00000869	SSG (2002)	209	SSG (2002)			0.000082	SSG (2002)
Dimethylphthalate	131-11-3	0.0568	RAIS	0.00000629	RAIS	37.1	RAIS			0.00000429	RAIS
2,4-Dinitrophenol	51-28-5	0.0273	SSG	0.00000906	SSG (2002)	0.0102	SSG (2002)			0.0000182	SSG (2002)
Dinitrotoluene mixture	25321-14-6	0.118	SSG (1996)	0.00000716	SSG (1996)	82.4	SSG (1996)			0.0000172	SSG (1996)
Di-n-octyl phthalate	117-84-0	0.0151	SSG (2002)	0.00000358	SSG (2002)	83200000	SSG (2002)			0.00274	SSG (2002)
Endosulfan	115-29-7	0.0115	SSG (2002)	0.00000455	SSG (2002)	2140	SSG (2002)			0.000459	SSG (2002)
Endrin	72-20-8	0.0125	SSG (2002)	0.00000474	SSG (2002)	12300	SSG (2002)			0.000308	SSG (2002)
Ethyl acetate	141-78-6	0.073	RAIS	0.0000097	RAIS	59	R9			0.0057	RAIS
Ethylbenzene	100-41-4	0.075	SSG (2002)	0.0000078	SSG (2002)	363	SSG (2002)			0.323	SSG (2002)
Ethylene glycol[3]	**107-21-1**	**0.108**	**RAIS**	**0.0000122**	**RAIS**	**1**	**ATSDR (2007)**			**0.00000246**	**calc'd from H**
Fluoranthene	206-44-0	0.0302	SSG (2002)	0.00000635	SSG (2002)	107000	SSG (2002)			0.00066	SSG (2002)
Fluorene	86-73-7	0.0363	SSG (2002)	0.00000788	SSG (2002)	13800	SSG (2002)			0.00261	SSG (2002)
alpha-HCH(alpha-BHC)	319-84-6	0.0142	SSG (2002)	0.00000734	SSG (2002)	1230	SSG (2002)			0.000435	SSG (2002)
beta-HCH(beta-BHC)	319-85-7	0.0142	SSG (2002)	0.00000734	SSG (2002)	1260	SSG (2002)			0.0000305	SSG (2002)
gamma-HCH(Lindane)	58-89-9	0.0142	SSG (2002)	0.00000734	SSG (2002)	1070	SSG (2002)			0.000574	SSG (2002)
Heptachlor	76-44-8	0.0112	SSG (2002)	0.00000569	SSG (2002)	1410000	SSG (2002)			0.0447	SSG (2002)
Heptachlor epoxide	1024-57-3	0.0132	SSG (2002)	0.00000423	SSG (2002)	83200	SSG (2002)			0.00039	SSG (2002)
Hexachloro-1,3-butadiene	87-68-3	0.0561	SSG (2002)	0.00000616	SSG (2002)	53700	SSG (2002)			0.334	SSG (2002)
Hexachlorobenzene	118-74-1	0.0542	SSG (2002)	0.00000591	SSG (2002)	55000	SSG (2002)			0.0541	SSG (2002)
Hexachlorocyclopentadiene	77-47-4	0.0161	SSG (2002)	0.00000721	SSG (2002)	200000	SSG (2002)			1.11	SSG (2002)

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Contaminant	CAS	Di,a cm^2/s	Di,a Source	Di,w cm^2/s	Di,w Source	K_{oc} l/kg	K_{oc} Source	K_d l/kg	K_d Source	H' (Hx41)	H' Source
Hexachloroethane	67-72-1	0.0025	SSG (2002)	0.0000068	SSG (2002)	1780	SSG (2002)			0.159	SSG (2002)
n-Hexane	110-54-3	0.2	R9	0.0000078	R9	2260	ATSDR (1999)			69.3	calculated
Indeno(1,2,3-cd)pyrene	193-39-5	0.019	SSG (2002)	0.00000566	SSG (2002)	3470000	SSG (2002)			0.0000656	SSG (2002)
Isophorone	78-59-1	0.0623	SSG (2002)	0.00000676	SSG (2002)	46.8	SSG (2002)			0.000272	SSG (2002)
Isopropylbenzene (Cumene)	98-82-8	0.075	R9	0.0000071	R9	220	R9			0.47	R9
Lead	7439-92-1							270	R6 HWC	0	
Mercury and compounds	7487-94-7							52	SSG (2002)	0	
Methoxychlor	72-43-5	0.0156	SSG (2002)	0.00000446	SSG (2002)	97700	SSG (2002)			0.000648	SSG (2002)
Methyl bromide (bromomethane)	74-83-9	0.0728	SSG (2002)	0.0000121	SSG (2002)	10.5	SSG (2002)			0.256	SSG (2002)
Methyl ethyl ketone (MEK)	78-93-3	0.09	R9	0.0000098	R9	3.55	ATSDR (1993)			0.00237	calc'd from H
Methyl tertiary butyl ether (MTBE)	1634-04–4	0.08	R9	0.00001	R9	11.2	ATSDR (1996)			0.0241	calc'd from H
4-Methyl-2-pentanone (MIBK)	108-10-1	0.075	R9	0.0000078	R9	130	R9			0.0057	R9
Methylene chloride	75-09-2	0.101	SSG (2002)	0.0000117	SSG (2002)	11.7	SSG (2002)			0.0898	SSG (2002)
2-Methylnaphthalene	91-57-6	0.048	RAIS	0.00000784	RAIS	2454	ATSDR(1995)			0.0205	ATSDR(1995)
3-Methylphenol (m-cresol)	108-39-4	0.074	RAIS	0.00001	RAIS	34.7	ATSDR(1993)			0.0000355	calc'd from H
4-Methylphenol (p-cresol)	106-44-5	0.074	RAIS	0.00001	RAIS	49	ATSDR(1993)			0.0000325	calc'd from H
2-Methylphenol(o-cresol)	95-48-7	0.074	SSG (2002)	0.0000083	SSG (2002)	91.2	SSG (2002)			0.0000492	SSG (2002)
Metolachlor	51218-45-2	0.08	IEMI	0.000008	IEMI	292	RAIS			0.00000037	RAIS
Naphthalene	91-20-3	0.059	SSG (2002)	0.0000075	SSG (2002)	2000	SSG (2002)			0.0198	SSG (2002)
Nickel, soluble salts	various							65	SSG (2002)	0	
2-Nitroaniline	88-74-4	0.0473	RAIS	0.00000858	RAIS	52.7	RAIS			0.00000241	RAIS
Nitrobenzene	98-95-3	0.076	SSG (2002)	0.0000086	SSG (2002)	64.6	SSG (2002)			0.000984	SSG (2002)
N-Nitrosodi-n-propylamine	621-64-7	0.0545	SSG (2002)	0.00000817	SSG (2002)	24	SSG (2002)			0.0000923	SSG (2002)
N-Nitrosodiphenylamine	86-30-6	0.0312	SSG (2002)	0.00000635	SSG (2002)	1290	SSG (2002)			0.000205	SSG (2002)
PCBs (polychlorinated biphenyls)	1336-36-3	0.08	IDEM	0.000008	IDEM	309000	IDEM			0.106	calc'd from H
Pentachlorophenol	87-86-5	0.056	SSG (2002)	0.0000061	SSG (2002)	592	SSG (2002)			0.000001	SSG (2002)
Phenanthrene	85-01-8	0.0324	TX RRC	0.00000774	TX RRC	14125	ATSDR(1995)			0.00105	calc'd from H
Phenol	108-95-2	0.082	SSG (2002)	0.0000091	SSG (2002)	28.8	SSG (2002)			0.0000163	SSG (2002)
n-Propylbenzene	103-65-1	0.076	NLM	0.0000079	NLM	2800	R9			0.431	Calc SRC

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Contaminant	CAS	Di,a cm^2/s	Di,a Source	Di,w cm^2/s	Di,w Source	K_{oc} l/kg	K_{oc} Source	K_d l/kg	K_d Source	H' (Hx41)	H' Source
Propylene glycol monomethyl ether[3]	**107-98-2**	**0.071728**	**RAIS**	**0.00000973**	**RAIS**	**1**	**RAIS**			**0.0000376**	**RAIS**
Pyrene	129-00-0	0.0272	SSG (2002)	0.00000724	SSG (2002)	105000	SSG (2002)			0.000451	SSG (2002)
Selenium	7782-49-2							5	SSG (2002)	0	
Silver	7440-22-4							8.3	SSG (2002)	0	
Styrene	100-42-5	0.071	SSG (2002)	0.000008	SSG (2002)	776	SSG (2002)			0.113	SSG (2002)
1,1,1,2-Tetrachloroethane	630-20-6	0.071	R9 (1,1,2,2-)	0.0000079	R9 (1,1,2,2-)	93.3	R9 (1,1,2,2-)			0.0141	R9 (1,1,2,2-)
1,1,2,2-Tetrachloroethane	79-34-5	0.071	SSG (2002)	0.0000079	SSG (2002)	93.3	SSG (2002)			0.0141	SSG (2002)
Tetrachloroethylene (PCE)	127-18-4	0.072	SSG (2002)	0.0000082	SSG (2002)	155	SSG (2002)			0.754	SSG (2002)
Thallium (and compounds)	7440-28-0							71	SSG (2002)	0	
Toluene	108-88-3	0.087	SSG (2002)	0.0000086	SSG (2002)	182	SSG (2002)			0.272	SSG (2002)
Toxaphene	8001-35-2	0.0116	SSG (2002)	0.00000434	SSG (2002)	257000	SSG (2002)			0.000246	SSG (2002)
1,2,4-Trichlorobenzene	120-82-1	0.03	SSG (2002)	0.00000823	SSG (2002)	1780	SSG (2002)			0.0582	SSG (2002)
1,1,1-Trichloroethane	71-55-6	0.078	SSG (2002)	0.0000088	SSG (2002)	110	SSG (2002)			0.705	SSG (2002)
1,1,2-Trichloroethane	79-00-5	0.078	SSG (2002)	0.0000088	SSG (2002)	50.1	SSG (2002)			0.0374	SSG (2002)
Trichloroethylene (TCE)	79-01-6	0.079	SSG (2002)	0.0000091	SSG (2002)	166	SSG (2002)			0.422	SSG (2002)
Trichlorofluoromethane[3]	**75-69-4**	**0.087**	**R9**	**0.000013**	**R9**	**160**	**R9**			**4.0**	**R9**
2,4,5-Trichlorophenol	95-95-4	0.0291	SSG (2002)	0.00000703	SSG (2002)	1600	SSG (2002)			0.000178	SSG (2002)
2,4,6-Trichlorophenol	88-06-2	0.0318	SSG (2002)	0.00000625	SSG (2002)	381	SSG (2002)			0.000319	SSG (2002)
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	93-76-5	0.0192	RAIS	0.0000067	RAIS	48.6	RAIS			0.000000356	calc'd from H
1,2,4-Trimethylbenzene	95-63-6	0.075	R9	0.00000071	R9	3700	R9			0.23	R9
1,3,5-Trimethylbenzene	108-67-8	0.075	R9	0.00000071	R9	820	R9			0.32	R9
Vinyl acetate	108-05-4	0.085	SSG (2002)	0.0000092	SSG (2002)	5.25	SSG (2002)			0.021	SSG (2002)
Vinyl chloride (chloroethene)	75-01-4	0.106	SSG (2002)	0.00000123	SSG (2002)	18.6	SSG (2002)			1.11	SSG (2002)
Xylene mixed (total)	1330-20-7	0.07	SSG (2002)	0.0000078	SSG (2002)	407	SSG (2002)			0.301	SSG (2002)
Zinc	7440-66-6							62	SSG (2002)	0	

Table B – Chemical/Physical Properties

Contaminant	CAS	ABS	ABS Source	S mg/l-water	S Source	MCL mg/l	MCL Source	MP °C	MP Source	BP °C	BP Source	MW g/mol	MW Source
Acenaphthene	83-32-9	0.13	SSG 2002	4.24	SSG (2002)			95	ATSDR(1995)	279	RAIS	154	ATSDR(1995)
Acenaphthylene	208-96-8	0.13	SSG 2002	3.93	ATSDR(1995)			92.5	ATSDR(1995)	280	SCDM	152.2	ATSDR(1995)
Acetochlor	34256-82-1	0.1	R9	223	RAIS			128.4	RAIS	378	RAIS	270	RAIS
Acetone (2-Propanone)	67-64-1	0.1	PEA	1000000	SSG (2002)			-95.4	ATSDR(1995)	56.2	ATSDR(1995)	58.1	ATSDR(1995)
Acrolein	107-02-8	0.1	PEA	206000	ATSDR(1991)			-86.9	ATSDR(1991)	53	ATSDR(1991)	56.1	ATSDR(10991)
Aldrin	309-00-2	0.1	SSG (2002)	0.18	SSG (2002)			104	ATSDR(2003)	145	RAIS	364.9	ATSDR(2003)
Anthracene	120-12-7	0.13	SSG 2002	0.0434	SSG (2002)			218	ATSDR(1995)	340	ATSDR(1995)	178	ATSDR(1995)
Antimony and compounds	7440-36-0	0.01	PEA	0		0.006	NPDWS	630	ATSDR(1993)	1750	ATSDR(1993)	121.8	ATSDR(1993)
Arsenic	7440-38-2	0.03	SSG 2002	0		0.01	NPDWS	817	ATSDR(2000)	613	ATSDR(2000)	74.9	ATSDR(2000)
Atrazine	1912-24-9	0.1	R9	34.7	ATSDR	0.003	NPDWS	174	ATSDR	313	RAIS	215.7	ATSDR
Barium	7440-39-3	0.01	PEA	0		2	NPDWS	725	ATSDR(1993)	1640	ATSDR(1993)	137	ATSDR(1993)
Benzene	71-43-2	0.1	PEA	1750	SSG (2002)	0.005	NPDWS	5.5	ATSDR(1998)	80.1	ATSDR(1998)	78.1	ATSDR(1998
Benzo(a)anthracene	56-55-3	0.13	SSG 2002	0.0094	SSG (2002)			159	ATSDR(1995)	435	ATSDR(1995)	228.3	ATSDR(1995)
Benzo(a)pyrene	50-32-8	0.13	SSG 2002	0.00162	SSG (2002)	0.0002	NPDWS	179	ATSDR(1995)	443	RAIS	252.3	ATSDR(1995)
Benzo(b)fluoranthene	205-99-2	0.13	SSG (2002)	0.0015	SSG (2002)			168	ATSDR(1995)	443	RAIS	252.3	ATSDR(1995)
Benzo(k)fluoranthene	207-08-9	0.13	SSG (2002)	0.0008	SSG (2002)			216	ATSDR(1995)	480	ATSDR(1995)	252.3	ATSDR(1995)
Benzoic acid	65-85-0	0.1	SSG 2002	3500	SSG (2002)			122	RAIS	249.2	RAIS	122	RAIS
Benzyl Alcohol	100-51-6	0.1	SSG 2002	40000	R6 HWC			-15.2	CRC	205.3	CRC	108.1	R6 HWC
Beryllium and compounds	7440-41-7	0.01	PEA	0		0.004	NPDWS	1290	ATSDR(2003)	2970	ATSDR(2003)	9.01	ATSDR(2003)
Bis(2-chloro-1-methylethyl) ether	108-60-1	0.1	SSG 2002	1700	R9			-97	RAIS	187	RAIS	171	RAIS
Bis(2-Chloroethyl)ether	111-44-4	0.1	SSG 2002	17200	SSG (2002)			-24.5	ATSDR(1990)	178	ATSDR(1990)	143.01	ATSDR(1990)
Bis(2-chloroisopropyl)ether[2]	**39638-32-6**												
Bis(2-ethylhexyl)phthalate	117-81-7	0.1	SSG 2002	0.34	SSG (2002)	0.006	NPDWS	-47	ATDSR(2003)	384	ATDSR(2003)	390.6	ATDSR(2003)
Bromodichloromethane	75-27-4	0.1	PEA	6740	SSG (2002)	0.08	NPDWS	-57.1	ATSDR(1990)	90	ATSDR(1990)	163.8	ATSDR(1990)
Bromoform(tribromomethane)	75-25-2	0.1	PEA	3100	SSG (2002)	0.08	NPDWS	8	ATSDR(1991)	149	ATSDR(1991)	252.8	ATSDR(1991)
n-Butanol	71-36-3	0.1	PEA	74000	SSG (2002)			-89.8	RAIS	118	RAIS	74.1	RAIS
Butylbenzylphthalate	85-68-7	0.1	SSG 2002	2.69	SSG (2002)			-35	CFC	370	RAIS	312.4	RAIS
Cadmium	7440-43-9	0.001	SSG 2002	0	SSG (2002)	0.005	NPDWS	321	ATSDR(1999)	765	ATSDR(1999)	112.4	ATSDR(1999)
Carbazole	86-74-8	0.1	SSG 2002	7.48	SSG (2002)			246.2	RAIS	355	RAIS	167.2	RAIS

Table B – Chemical/Physical Properties

Contaminant	CAS	ABS	ABS Source	S mg/l-water	S Source	MCL mg/l	MCL Source	MP °C	MP Source	BP °C	BP Source	MW g/mol	MW Source
Carbon disulfide	75-15-0	0.1	PEA	1190	SSG (2002)			-112	ATSDR(1997)	46.5	ATSDR(1997)	76.1	ATSDR(1997)
Carbon tetrachloride	56-23-5	0.1	PEA	793	SSG (2002)	0.005	NPDWS	-23	ATSDR(1995)	76.5	ATSDR(1995)	153.9	ATSDR(1995)
Chlordane	12789-03-6	0.04	SSG 2002	0.056	SSG (2002)	0.002	NPDWS	106	ATSDR(1994)	175	RAIS	409.8	ATSDR(1994)
p-Chloroaniline	106-47-8	0.1	SSG 2002	5300	SSG (2002)			72.5	RAIS	232	RAIS	128	RAIS
Chlorobenzene	108-90-7	0.1	PEA Cal	472	SSG (2002)	0.1	NPDWS	-45.6	ATSDR(1990)	131.5	ATSDR(1990)	112.6	ATSDR(1990)
Chloroethane	75-00-3	0.1	PEA	5740	ATSDR (1999)			-138.7	ATSDR (1999)	12.3	CRC	64.5	ATSDR (1999)
Chloroform	67-66-3	0.1	PEA	7920	SSG (2002)	0.08	NPDWS	-63.6	RAIS	61.5	RAIS	119.4	RAIS
2-Chloronapthalene	91-58-7	0.1	SSG 2002	12	R9			61	RAIS	256	RAIS	163	R9
2-Chlorophenol	95-57-8	0.1	PEA	22000	SSG (2002)			9.3	ATSDR (1999)	175	ATSDR (1999)	129	ATSDR (1999)
Chromium III	16065-83-1	0.01	PEA			0.1	NPDWS	1900	ATSDR	2672	ATSDR	52	ATSDR
Chromium VI	18540-29-9	0.01	PEA	0		0.1	NPDWS	1900	ATSDR	2672	ATSDR	52	ATSDR
Chrysene	218-01-9	0.13	SSG (2002)	0.0016	SSG (2002)			256	ATSDR(1995)	448	ATSDR(1995)	228.3	ATSDR(1995)
Copper	7440-50-8	0.01	PEA			1.3	NPDWS	1083	ATSDR	2595	ATSDR	63.6	ATSDR
Cyanide, Free[1]	57-12-5	0.01	PEA	1000000	R9	0.2		-13.4	ATSDR (1998)	25.7	ATSDR (1998)	26	R6
Cyclohexane	110-82-7	0.1	PEA	55	R9			6.59	CRC	80.7	CRC	84.2	CRC
DDD	72-54-8	0.03	Based on DDT	0.09	SSG (2002)			109.5	RAIS	193	ATSDR(2002)	320	RAIS
DDE	72-55-9	0.03	Based on DDT	0.12	SSG (2002)			89	RAIS	336	RAIS	318	ATSDR
DDT	50-29-3	0.03	SSG 2002	0.025	SSG (2002)			108.5	RAIS	368	RAIS	354.5	RAIS
Dibenzo(a,h)anthracene	53-70-3	0.13	SSG (2002)	0.00249	SSG (2002)			278	ATSDR(1995)	524	RAIS	278.4	ATSDR(1995)
Dibenzofuran	132-64-9	0.1	SSG (2002)	3.1	R9			86.5	CRC	287	CRC	168	CRC
1,2-Dibromoethane	106-93-4	0.1	PEA	4280	ASTDR	0.00005	EPA	10	ATSDR	132	ATSDR	188	ATSDR
Dibutyl phthalate	84-74-2	0.1	SSG (2002)	11.2	SSG (2002)			-35	ATSDR(2001)	340	ATSDR(2001)	278.3	ATSDR(2001)
1,2-Dichlorobenzene	95-50-1	0.1	PEA	156	SSG (2002)	0.6	NPDWS	-16.7	RAIS	180.5	RAIS	147	R9
1,3-Dichlorobenzene	541-73-1	0.1	PEA	160	R9			-24.8	CRC	173	CRC	147	R9
1,4-Dichlorobenzene	106-46-7	0.1	PEA	73.8	SSG (2002)	0.075	NPDWS	52.7	RAIS	174	RAIS	147	R9
3,3-Dichlorobenzidine	91-94-1	0.1	SSG (2002)	3.11	SSG (2002)			132.5	RAIS	368	RAIS	253.1	RAIS
1,1-Dichloroethane	75-34-3	0.1	PEA	5060	SSG (2002)			-96.9	RAIS	57.3	RAIS	99	RAIS
1,2-Dichloroethane	107-06-2	0.1	PEA	8520	SSG (2002)	0.005	NPDWS	-35.5	RAIS	83.5	RAIS	99	RAIS
1,1-Dichloroethylene	75-35-4	0.1	PEA	2250	SSG (2002)	0.007	NPDWS	-122.5	RAIS	31.7	RAIS	97	RAIS

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Contaminant	CAS	ABS	ABS Source	S mg/l-water	S Source	MCL mg/l	MCL Source	MP °C	MP Source	BP °C	BP Source	MW g/mol	MW Source
cis-1,2-Dichloroethylene	156-59-2	0.1	PEA	3500	SSG (2002)	0.07	NPDWS	-57	RAIS	55	RAIS	97	RAIS
trans-1,2-Dichloroethylene	156-60-5	0.1	PEA	6300	SSG (2002)	0.1	NPDWS	-57	RAIS	55	RAIS	97	RAIS
2,4-Dichlorophenol	120-83-2	0.1	SSG (2002)	4500	SSG (2002)			45	RAIS	210	RAIS	163	RAIS
2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	0.05	SSG (2002)	680	SSG (2002)	0.07	NPDWS	141	RAIS	160	RAIS	221	RAIS
1,2-Dichloropropane	78-87-5	0.1	PEA	2800	SSG (2002)	0.005	NPDWS	-100	RAIS	96.37	ATSDR	113	ATSDR
1,3-Dichloropropene	542-75-6	0.1	PEA	2800	SSG (2002)			-50	RAIS	112	ATSDR	110	ATSDR
Dieldrin	60-57-1	0.1	SSG (2002)	0.195	SSG (2002)			226	RAIS	330	RAIS	380.9	RAIS
Diethylphthalate	84-66-2	0.1	SSG (2002)	1080	SSG (2002)			-40.5	RAIS	295	RAIS	222.3	RAIS
N,N Dimethylformamide	68-12-2	0.1	RAIS	1000000	RAIS			-60.4	RAIS	153	RAIS	73.1	RAIS
2,4-Dimethylphenol	105-67-9	0.1	SSG (2002)	7870	SSG (2002)			24.5	RAIS	211	RAIS	122.2	RAIS
Dimethylphthalate	131-11-3	0.1	SSG (2002)	4000	RAIS			5.5	RAIS	284	RAIS	194	RAIS
2,4-Dinitrophenol	51-28-5	0.1	SSG (2002)	2790	SSG (2002)			114	ATSDR	332.13	RAIS	184	RAIS
Dinitrotoluene mixture	25321-14-6	0.1	SSG 2002	226	SSG (1996)			68.5	ATSDR(1999)	293	ATSDR(1999)	182	ATSDR(1999)
Di-n-octyl phthalate	117-84-0	0.1	SSG (2002)	0.02	SSG (2002)			-25	ATSDR	220	ATSDR	390	ATSDR
Endosulfan	115-29-7	0.1	SSG (2002)	0.51	SSG (2002)			106	ATSDR	401	RAIS	406.9	ATSDR
Endrin	72-20-8	0.1	SSG (2002)	0.25	SSG (2002)	0.002	NPDWS	235	ATSDR	245	ATSDR	380.9	RAIS
Ethyl acetate	141-78-6	0.1	R9	80000	RAIS			-83.6	RAIS	77.1	RAIS	88	RAIS
Ethylbenzene	100-41-4	0.1	PEA	169	SSG (2002)	0.7	NPDWS	-94.9	RAIS	136.5	RAIS	106.2	RAIS
Ethylene glycol[3]	**107-21-1**	**0.1**	**PEA**	**1000000**	**ATSDR (2007)**			**-12.69**	**ATSDR(2007)**	**197.3**	**ATSDR(2007)**	**62.07**	**ATSDR(2007)**
Fluoranthene	206-44-0	0.13	SSG (2002)	0.206	SSG (2002)			108	RAIS	384	RAIS	202.4	ATSDR(1995)
Fluorene	86-73-7	0.13	SSG (2002)	1.98	SSG (2002)			117	ATSDR(1995)	295	ATSDR(1995)	166.2	ATSDR(1995)
alpha-HCH(alpha-BHC)	319-84-6	0.04	gamma-HCH	2	SSG (2002)			160	ATSDR	288	ATSDR	290.8	ATSDR
beta-HCH(beta-BHC)	319-85-7	0.04	gamma-HCH	0.24	SSG (2002)			315	ATSDR	60	ATSDR	290.8	ATSDR
gamma-HCH(Lindane)	58-89-9	0.04	SSG (2002)	6.8	SSG (2002)	0.0002	NPDWS	112.5	ATSDR	323	ATSDR	290.4	ATSDR
Heptachlor	76-44-8	0.1	SSG (2002)	0.18	SSG (2002)	0.0004	NPDWS	95.5	ATSDR (1993)	135	CFC	373.4	ATSDR(1993)
Heptachlor epoxide	1024-57-3	0.1	SSG (2002)	0.2	SSG (2002)	0.0002	NPDWS	160	ATSDR (1993)	200	RAIS	389.3	ATSDR (1993)
Hexachloro-1,3-butadiene	87-68-3	0.1	SSG (2002)	3.23	SSG (2002)			-21	RAIS	215	RAIS	260.8	RAIS
Hexachlorobenzene	118-74-1	0.1	SSG (2002)	6.2	SSG (2002)	0.001	NPDWS	231.8	RAIS	325	RAIS	284.8	RAIS
Hexachlorocyclopentadiene	77-47-4	0.1	SSG (2002)	1.8	SSG (2002)	0.05	NPDWS	-9	RAIS	239	RAIS	272.8	RAIS

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Contaminant	CAS	ABS	ABS Source	S mg/l-water	S Source	MCL mg/l	MCL Source	MP °C	MP Source	BP °C	BP Source	MW g/mol	MW Source
Hexachloroethane	67-72-1	0.1	SSG (2002)	50	SSG (2002)			187	RAIS	187	ATSDR	236.7	ATSDR
n-Hexane	110-54-3	0.1	PEA	9.5	ATSDR(1999)			-95	ATSDR(1999)	69	ATSDR(1999)	86.2	ATSDR(1999)
Indeno(1,2,3-cd)pyrene	193-39-5	0.13	SSG (2002)	0.000022	SSG (2002)			164	ATSDR(1995)	530	ATSDR(1995)	276	ATSDR(1995)
Isophorone	78-59-1	0.1	SSG (2002)	12000	SSG (2002)			-8.1	RAIS	215.3	RAIS	138.2	RAIS
Isopropylbenzene (Cumene)	98-82-8	0.1	R9	61	R9			-96	RAIS	152	RAIS	120	R9
Lead	7439-92-1	0.01	PEA			0.015	NPDWS	327	ATSDR(1999)	1740	ATSDR(1999)	207	ATSDR(1999)
Mercury and compounds	7487-94-7	0.01	PEA	69000	ATSDR	0.002	(as Hg)	277	ATSDR(1999)	302	ATSDR(1999)	272	ATSDR(1999)
Methoxychlor	72-43-5	0.1	SSG (2002)	0.045	SSG (2002)	0.04	NPDWS	87	RAIS	346	RAIS	345.7	RAIS
Methyl bromide (bromomethane)	74-83-9	0.1	PEA	15200	SSG (2002)			-93.7	RAIS	3.56	RAIS	95	RAIS
Methyl ethyl ketone (MEK)	78-93-3	0.1	PEA	136000	ATSDR (1993)			-86.3	ATSDR (1993)	79.6	ATSDR (1993)	72.1	ATSDR (1993)
Methyl tertiary butyl ether (MTBE)	1634-04–4	0.1	PEA	48000	ATSDR (1996)	0.04		-109	ATSDR (1996)	55.2	ATSDR (1996)	88.2	ATSDR (1996)
4-Methyl-2-pentanone (MIBK)	108-10-1	0.1	PEA	19000	R9			-84	RAIS	117	RAIS	100	RAIS
Methylene chloride	75-09-2	0.1	PEA	13000	SSG (2002)	0.005	NPDWS	-95.1	RAIS	39.75	RAIS	84.9	RAIS
2-Methylnaphthalene	91-57-6	0.13	SSG 2002	24.6	ATSDR(1995)			34.6	ATSDR(1995)	241	ATSDR(1995)	142.2	ATSDR(1995)
3-Methylphenol (m-cresol)	108-39-4	0.1	SSG (2002)	22700	ATSDR(1993)			12.2	ATSDR(1993)	202	ATSDR(1993)	108	ATSDR(1993)
4-Methylphenol (p-cresol)	106-44-5	0.1	SSG 2002	21500	ATSDR(1993)			34.7	ATSDR(1993)	202	ATSDR(1993)	108.1	ATSDR(1993)
2-Methylphenol(o-cresol)	95-48-7	0.1	SSG (2002)	26000	SSG (2002)			30.9	ATSDR(1993)	191	ATSDR(1993)	108.1	ATSDR(1993)
Metolachlor	51218-45-2	0.1	R9	530	IEMI			-40	RAIS	282	RAIS	284	RAIS
Naphthalene	91-20-3	0.13	SSG (2002)	31	SSG (2002)			80.5	ATSDR(1995)	218	ATSDR(1995)	128.2	ATSDR(1995)
Nickel, soluble salts	various	0.01	PEA	0				1455	ATSDR	2730	ATSDR	58.7	ATSDR
2-Nitroaniline	88-74-4	0.1	SSG (2002)	1470	RAIS/CFC			71.2	RAIS	284	RAIS	138.1	RAIS
Nitrobenzene	98-95-3	0.1	SSG (2002)	2090	SSG (2002)			5.7	RAIS	211	RAIS	123.1	RAIS
N-Nitrosodi-n-propylamine	621-64-7	0.1	SSG (2002)	9890	SSG (2002)			6.6	RAIS	206	RAIS	130.19	RAIS
N-Nitrosodiphenylamine	86-30-6	0.1	SSG (2002)	35.1	SSG (2002)			66.5	ATSDR(1993)	359	RAIS	198.23	RAIS
PCBs (polychlorinated biphenyls)	1336-36-3	0.14	RAGS Part E	0.7	IDEM	0.0005	NPDWS	>24	ATSDR	>200	ATSDR	268.4	ATSDR
Pentachlorophenol	87-86-5	0.25	SSG (2002)	1950	SSG (2002)	0.001	NPDWS	174	RAIS	310	RAIS	266.4	RAIS
Phenanthrene	85-01-8	0.13	SSG (2002)	1.2	ATSDR(1995)			100	ATSDR(1995)	340	ATSDR(1995)	178.2	ATSDR(1995)
Phenol	108-95-2	0.1	SSG (2002)	82800	SSG (2002)			40.9	RAIS	182	RAIS	94.1	RAIS
n-Propylbenzene	103-65-1	0.1	R9	52.2	SRC			-99.5	SRC	159	SRC	120	SRC

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Contaminant	CAS	ABS	ABS Source	S mg/l-water	S Source	MCL mg/l	MCL Source	MP °C	MP Source	BP °C	BP Source	MW g/mol	MW Source
Propylene glycol monomethyl ether[3]	**107-98-2**	**0.1**	**PEA**	**1000000**	**RAIS**			**-142**	**RAIS**	**119**	**RAIS**	**90.12**	**RAIS**
Pyrene	129-00-0	0.13	SSG (2002)	0.135	SSG (2002)			156	ATSDR(1995)	404	ATSDR(1995)	202.3	ATSDR(1995)
Selenium	7782-49-2	0.01	PEA	0		0.05	NPDWS	220	ATSDR	684	ATSDR	79	ATSDR
Silver	7440-22-4	0.01	PEA	0			SDWR	962	ATSDR	2212	ATSDR	107.9	ATSDR
Styrene	100-42-5	0.1	PEA	310	SSG (2002)	0.1	NPDWS	-30.6	ATSDR(1993)	145	ATSDR(1993)	104.2	ATSDR(1993)
1,1,1,2-Tetrachloroethane	630-20-6	0.1	PEA	2970	R9 (1,1,2,2-)			-70.2	RAIS	130.5	RAIS	167.9	RAIS
1,1,2,2-Tetrachloroethane	79-34-5	0.1	PEA	2970	SSG (2002)			-43.8	RAIS	146.5	RAIS	167.9	RAIS
Tetrachloroethylene (PCE)	127-18-4	0.1	PEA	200	SSG (2002)	0.005	NPDWS	-22.3	RAIS	121	RAIS	165.8	RAIS
Thallium (and compounds)	7440-28-0	0.01	PEA	0		0.002	NPDWS	303.5	ATSDR	1457	ATSDR	204.4	ATSDR
Toluene	108-88-3	0.1	PEA	526	SSG (2002)	1	NPDWS	-94.9	RAIS	110.6	RAIS	92.1	RAIS
Toxaphene	8001-35-2	0.1	SSG (2002)	0.74	SSG (2002)	0.003	NPDWS	78	RAIS	155	RAIS	181.4	ATSDR (1996)
1,2,4-Trichlorobenzene	120-82-1	0.1	PEA	300	SSG (2002)	0.07	NPDWS	17	RAIS	213	RAIS	181.4	RAIS
1,1,1-Trichloroethane	71-55-6	0.1	PEA	1330	SSG (2002)	0.2	NPDWS	-30.4	RAIS	74.1	RAIS	133.4	RAIS
1,1,2-Trichloroethane	79-00-5	0.1	PEA	4420	SSG (2002)	0.005	NPDWS	-36.6	RAIS	114	RAIS	133.4	RAIS
Trichloroethylene (TCE)	79-01-6	0.1	PEA	1100	SSG (2002)	0.005	NPDWS	-84.7	RAIS	86.7	RAIS	131.4	RAIS
Trichlorofluoromethane[3]	**75-69-4**	**0.1**	**PEA**	**1100**	**R9**			**-111.1**	**RAIS**	**23.7**	**RAIS**	**140**	**R9**
2,4,5-Trichlorophenol	95-95-4	0.1	SSG (2002)	1200	SSG (2002)			69	RAIS	253	ATSDR	197.5	ATSDR
2,4,6-Trichlorophenol	88-06-2	0.1	SSG (2002)	800	SSG (2002)			69	RAIS	247	RAIS	197.5	RAIS
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	93-76-5	0.1	SSG (2002)	268	CFC			154	CFC	>200	CFC	256	CFC
1,2,4-Trimethylbenzene	95-63-6	0.1	SSG (2002)	57	R9			-43.8	CRC	169	CRC	120	CRC
1,3,5-Trimethylbenzene	108-67-8	0.1	SSG (2002)	48	R9			-44.7	CRC	165	CRC	120	CRC
Vinyl acetate	108-05-4	0.1	PEA	20000	SSG (2002)			-93.2	RAIS	72.7	RAIS	86.1	RAIS
Vinyl chloride (chloroethene)	75-01-4	0.1	PEA	2760	SSG (2002)	0.002	NPDWS	-153.7	RAIS	-13	RAIS	62.5	RAIS
Xylene mixed (total)	1330-20-7	0.1	PEA	161	SSG (2002)	10	NPDWS	-25.2	RAIS	141	ATSDR	106.2	ATSDR
Zinc	7440-66-6	0.01	PEA	0				419.5	ATSDR	908	ATSDR	65.4	ATSDR

Above parameters are listed for 25° C and 760 mm Hg.

Footnotes

Bold text indicates that a change has been made from the previous 2006 Appendix 1 table.

1. Cyanide as CN- is assumed to be non-volatile as it is in pH 6.8 soil and nonacidic water

2. May 1, 2009 Revision: Bis(2-chloroisopropyl)ether data has been removed from the revised 2006 Appendix 1 tables because IRIS has removed the toxicity factors from its database. Please contact your Project Manager for information on bis(2-chloroisopropyl)ether if it is a COC at your site.

3. May 1, 2009 Revision: This compound has been added to the 2006 Appendix 1 tables as a part of the May 1, 2009 revision.

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Key of terms

Di,a	diffusivity in air
Di,w	diffusivity in water
Koc	soil organic carbon-water partitioning coefficient
Kd	Soil-water partition coefficient
H'	Dimensionless Henry's Law constant (a measure of the affinity of a compound to volatilize from water)
ABS	fraction absorbed through skin
S	water solubility
MCL	Safe Drinking Water Act maximum contaminant level
MP	melting point
BP	boiling point
MW	molecular weight

Key of Physical/Chemical Data Sources

ATSDR	Agency for Toxic Substances and Disease Registry
C	California EPA
CFC	Chemfinder.com
CRC	Handbook of Chemistry & Physics, 71st edition 1990-1991
D	Default
FFHPVC	The Flavor & Fragrance High Production Volume Consortia
H	HEAST
HSDB	Hazardous Substance Data Bank
IDEM	Indiana Department of Environmental Management
IEMI	IDEM, extrapolated from Michigan Guidance
IPCS	International Programme on Chemical Safety – INTOX database
MI10	Merck Index 10th Edition
n	NCEA(USEPA National Center for Environmental Assessment draft value
NLM	National Library of Medicine, Specialized Information Services
NPDWS	National Primary Drinking Water Standards
NYDEC	New York Department of Environmental Conservation
o	other
OLC	other, low confidence
p	USEPA Provisional Peer-Reviewed Toxicity Value (PPRTV)
PEA	Preliminary Endangerment Assessment Guidance, EPA-CA, 1994
r	route extrapolated
R3	USEPA Region 3 Risk-Based Concentration (RBC) Tables
R6	USEPA Region 6 Human Health-Medium Specific Screening Levels Tables
R6 HWC	USEPA Region 6 Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, volume 2 Appendix A: Chemical-Specific Data
R9	USEPA Region 9 Preliminary Remediation Goal (PRG) Tables
RAIS	Risk Assessment Information System
SCDM	Superfund Chemical Data Matrix
S-XX	Other State
SSG	USEPA Soil Screening Guidance: Technical Background Document and/or User's Guide (2002)
SRC	Syracuse Research Corporation
TXRRC	Texas Rail Road Commission

Table C

Exposure Equations

Equation Number	Equation Name	Table C - Exposure Equations
A1-1	Residential Groundwater (Carcinogens)	$C_{gwrc} = \frac{TR \times BW_a \times AT_c \times 365^{day}/_{year}}{EF_r \times ED_r \times \left[\left(SF_o \times IngR_{raw}\right) + \left(SF_i \times InhR_{raagw} \times K\right)\right]}$
A1-2	Residential Groundwater (Non-carcinogens)	$C_{gwrn} = \frac{THQ \times BW_a \times AT_n \times 365^{days}/_{year}}{EF_r \times ED_r \left[\left(\frac{IngR_{raw}}{RFD_o}\right) + \left(\frac{InhR_{raagw}}{RFD_i} \times K\right)\right]}$
A1-3	Residential Soil Direct Contact (Carcinogens)	$C_{ssrc} = \frac{TR \times AT_c \times 365^{days}/_{year}}{EF_{rs}\left[\frac{SF_o\left(IngF_{adj} + \left(SFS_{adj} \times ABS\right)\right)}{10^6\ {}^{mg}/_{kg}} + InhF_{adj} \times SF_i\left(\frac{1}{VF} + \frac{1}{PEF}\right)\right]}$
A 1-4	Residential Direct Contact (Non-carcinogens)	$C_{ssrn} = \frac{THQ \times AT_n \times 365^{days}/_{year}}{EF_{rs}\left[\left(\frac{IngF_{adj} + \left(SFS_{adj} \times ABS\right)}{RFD_o \times 10^6\ {}^{mg}/_{kg}}\right) + \frac{InhF_{adj}}{RFD_i}\left(\frac{1}{VF} + \frac{1}{PEF}\right)\right]}$
A 1-5	Residential Soil Migration to GW (Carcinogens)	$C_{sbsrc} = C_{gwrc} \times 20\left[K_d + \frac{\theta_{w\rho} + \left(\theta_{a\rho} \times H'\right)}{\rho_b}\right]$
A 1-6	Residential Soil Migration to GW (Non-carcinogens)	$C_{sbsrn} = C_{gwrn} \times 20\left[K_d + \frac{\theta_{w\rho} + \left(\theta_{a\rho} \times H'\right)}{\rho_b}\right]$

Equation Number	Equation Name	Table C - Exposure Equations
A 1-7	Commercial / Industrial Groundwater (Carcinogens)	$C_{gwic} = \frac{TR \times BW_a \times AT_c \times 365\ {}^{days}/_{year}}{EF_i \times ED_i \times (SF_o \times IngR_{iaw})}$
A 1-8	Commercial/ Industrial Groundwater (Non-carcinogens)	$C_{gwin} = \frac{THQ \times BW_a \times AT_n \times 365\ {}^{days}/_{year}}{EF_i \times ED_i \left(\frac{IngR_{iaw}}{RFD_o}\right)}$
A 1-9	Commercial/Industrial Soil Direct Contact (Carcinogens)	$C_{ssic} = \frac{TR \times BW_a \times AT_c \times 365\ {}^{days}/_{year}}{EF_i \times ED_i \left[SF_o \times \left(\frac{IngR_{ias} + (SA_{ias} \times M \times ABS)}{10^6\ {}^{mg}/_{kg}}\right) + SF_i \times InhR_{iaa}\left(\frac{1}{VF} + \frac{1}{PEF}\right)\right]}$
A1-10	Commercial/ Industrial Soil Direct Contact (Non-carcinogens)	$C_{ssin} = \frac{THQ \times BW_a \times AT_n \times 365\ {}^{days}/_{year}}{EF_i \times ED_i \left[\frac{(IngR_{ias} + (SA_{ias} \times M \times ABS))}{RFD_o (10^6\ {}^{mg}/_{kg})} + \frac{InhR_{iaa}}{RFD_i}\left(\frac{1}{VF} + \frac{1}{PEF}\right)\right]}$
A1-11	Commercial/ Industrial Soil Migration to GW (Carcinogens)	$C_{sbsic} = C_{gwic} \times 20\left[K_d + \frac{\theta_{w\rho} + (\theta_{a\rho} \times H')}{\rho_b}\right]$

Equation Number	Equation Name	Table C - Exposure Equations
A 1-12	Commercial/Industrial Migration to GW Contact (Non-carcinogens)	$C_{sbsin} = C_{gwin} \times 20\left[K_d + \frac{\theta_{w\rho} + (\theta_{a\rho} \times H')}{\rho_b}\right]$
A 1-13	Construction Soils (Carcinogens)	$C_{sscc} = \frac{TR \times BW_a \times AT_c \times 365\ {}^{days}/_{year}}{EF_{co} \times ED_{co}\left[SF_o \times \frac{(IngR_{cas} + (SA_{cas} \times M \times ABS))}{10^6\ {}^{mg}/_{kg}} + SF_i \times InhR_{caa}\left[\frac{1}{VF} + \frac{1}{PEF}\right]\right]}$
A 1-14	Construction Soils (Non-carcinogens)	$C_{sscn} = \frac{THQ \times BW_a \times AT_n \times 365\ {}^{days}/_{year}}{ED_{co} \times EF_{co}\left[\frac{(IngR_{cas} + (SA_{cas} \times M \times ABS))}{RFD_o\left(10^6\ {}^{mg}/_{kg}\right)} + \frac{InhR_{caa}}{RFD_i}\left[\frac{1}{VF} + \frac{1}{PEF}\right]\right]}$
A 1-15	Volatilization Factor	$VF = \frac{\frac{Q}{C_{vf}} \times (3.14 \times D_a \times T)^{\frac{1}{2}} \times 10^{-4}\ {}^{m^2}/_{cm^2}}{(2 \times \rho_b \times D_a)}$ Where: $D_a = \frac{\left[\frac{\left(\theta_{avf}{}^{10/3} D_{i,a} H' + \theta_{wvf}{}^{10/3} D_{i,w}\right)}{n^2}\right]}{\rho_b K_d + \theta_{wvf} + \theta_{avf} H'}$

Equation Number	Equation Name	Table C - Exposure Equations
A 1-16	Particulate Emission Factor Equation	$PEF = Q/C_{\rho} \times \left[\frac{3{,}600\ s/h}{0.036 \times (1 - V) \times \left(\frac{U_m}{U_t}\right)^3 \times F(x)} \right]$
A 1-17	Ingestion Soil - Age Adjusted	$IngF_{adj} \frac{mg\text{-}yr}{Kg\text{-}day} = \frac{ED_{ch} \times IngR_{rcs}}{BW_c} + \frac{(ED_r - ED_{ch}) \times IngR_{ras}}{BW_a}$
A 1-18	Skin Contact - Age Adjusted	$SFS_{adj} \frac{mg\text{-}yr}{Kg\text{-}day} = \frac{ED_{ch} \times M \times SA_{rcs}}{BW_c} + \frac{(ED_r - ED_{ch}) \times M \times SA_{ras}}{BW_a}$
A 1-19	Inhalation - Age Adjusted	$InhF_{adj} \frac{M^3\text{-}yr}{Kg\text{-}day} = \frac{ED_{ch} \times InhR_{rca}}{BW_c} + \frac{(ED_r - ED_{ch}) \times InhR_{raas}}{BW_a}$
7-1	Soil to Groundwater Partitioning Model	$CCL = C_w \times DAF \times \left[K_d + \frac{\theta_w + \theta_a H'}{\rho_b} \right]$
7-3	Soil Saturation Limit Equation	$C_{sat} = \frac{S}{\rho_b}(K_d \rho_b + \theta_w + H'\theta_a)$
7-4	Soil Attenuation Capacity	Site Specific Soil Attenuation Capacity = f_{oc} X 10^6

TABLE D

Equation Parameters/Exposure Assumptions

Symbol	Parameter	Value
θ_{ap}	Air Filled Soil Porosity Partitioning model	0.134 l air/l soil
θ_{avf}	Air Filled Soil Porosity - volatilization	0.284 l air /l soil
θ_{wp}	Water Filled Soil Porosity Partitioning model	0.3 l water/l soil
θ_{wvf}	Water Filled Soil Porosity - volatilization	0.15 l water /l soil
ABS	Skin Absorbance Factor (Absorbed fraction)	Chemical Specific (unitless see Table B)
AT_c AT_n	Averaging Time (subscript dictates chemical type)	C = 70 Years carcinogens N = 30 Years residential non-carcinogens 25 years industrial noncarcinogens 1 year construction noncarcinogens
BW_a	Body Weight Adult	70 kg
BW_c	Body Weight Child	15 kg
C_{gw}	Default Closure Level Groundwater	Chemical Specific (mg/l)
C_{gwrc}	Default Level Groundwater Concentration for Residential Carcinogen	Chemical Specific (mg/l)
C_{gwrn}	Default Level Groundwater Concentration for Residential Non-carcinogen	Chemical Specific (mg/l)
C_{igwc}	Default Level Commercial/Industrial Groundwater Concentration for Carcinogen	Chemical Specific mg/l
C_{igwn}	Default Level Commercial/Industrial Groundwater Concentration for Non-carcinogen	Chemical Specific mg/l
C_{sat}	Soil Saturation Limit	Chemical Specific (mg/kg)
C_{sb}	Default Closure Level Subsurface Soil	Chemical Specific (mg/kg)
C_{sbrsc}	Default Closure Level Subsurface Soil Residential Carcinogen	Chemical Specific (mg/kg)
C_{sbrsn}	Default Closure Level Subsurface Soil Residential Non-carcinogen	Chemical Specific (mg/kg)
C_{sbsic}	Default Closure Level Subsurface Soil Commercial/Industrial Carcinogen	Chemical Specific (mg/kg)

Symbol	Parameter	Value
C_{sbsin}	Default Closure Level Subsurface Soil Commercial/Industrial Non-carcinogen	Chemical Specific (mg/kg)
C_{scc}	Default Closure Level Soil Concentration Construction Carcinogenic	Chemical specific (mg/kg)
C_{scn}	Default Closure Level Soil Concentration Construction Non-carcinogenic	Chemical specific (mg/kg)
C_{ssic}	Default Closure Level Surface Soil Commercial/Industrial Carcinogen	Chemical Specific (mg/kg)
C_{ssin}	Default Closure Level Surface Soil Commercial/Industrial Non-carcinogen	Chemical Specific (mg/kg)
C_{ssrc}	Default Closure Level Residential Surface Soil Concentration Carcinogenic (direct contact)	Chemical specific (mg/kg)
C_{ssrn}	Default Closure Level Residential Surface Soil Concentration Non-carcinogenic (direct contact)	Chemical specific (mg/kg)
D_a	Apparent Diffusivity	Chemical Specific cm^2/s
$D_{i,a}$	Diffusivity in Air	Chemical Specific cm^2/s
$D_{i,w}$	Diffusivity in Water	Chemical Specific cm^2/s
ED_{ch}	Exposure Duration Child	6 years
ED_{co}	Exposure Duration Construction	1 year
ED_i	Exposure Duration Commercial/Industrial	25 years
ED_r	Exposure Duration Residential	30 years
EF_{co}	Exposure Frequency Construction	45 days
EF_i	Exposure Frequency Commercial/Industrial	250 days/yr
EF_r	Exposure Frequency Residential	350 days/year
EF_{rs}	Exposure Frequency Residential Soil	250 days/year
F(x)	Function dependent on U_m/U_t	0.194 (unitless)
f_{oc}	Fraction Soil Organic Carbon (Fraction)	0.002 for subsurface soil 0.006 for surface soil

Symbol	Parameter	Value
H'	Henry's Law Constant x 41	Chemical Specific (unitless)
$IngF_{adj}$	Ingestion Factor Soil Age Adjusted	114 mg-yr/kg-day
$IngR_{cas}$	Ingestion Rate Construction Adult Soil	480 mg/day
$IngR_{ias}$	Ingestion Rate Commercial/Industrial Adult Soil	50 mg/day
$IngR_{iaw}$	Ingestion Rate Commercial/Industrial Adult Water	1.0 l/day
$IngR_{ras}$	Ingestion Rate Residential Adult Soil	100 mg/day
$IngR_{raw}$	Ingestion Rate Residential Adult Water	2.0 1/day
$IngR_{rcs}$	Ingestion Rate Residential Child Soil	200 mg/day
$InhF_{adj}$	Inhalation Factor Age Adjusted	10.9 m^3-yr/kg-day
$InhR_{caa}$	Inhalation Rate Construction Adult Air	20 m^3/day
$InhR_{iaa}$	Inhalation Rate Commercial/Industrial Adult Air	20 m^3/day
$InhR_{raagw}$	Inhalation Rate Residential Adult Air – Ground Water Equations	15 m^3/day
$InhR_{raas}$	Inhalation Rate Residential Adult Air – Soil Equations	20 m^3/day
$InhR_{rca}$	Inhalation Rate Residential Child Air	10 m^3/day
K	Indoor Volatilization Factor (Inhalation from volatiles in groundwater)	0.5 (unitless)
K_d	Soil/Water Partition Coefficient(See Table B) K_d = Table Values for Metals(See Table B) $K_d = K_{oc} \times f_{oc}$ for Organics(See Table B)	Chemical Specific (l/kg) Chemical Specific (l/kg) Chemical Specific (l/kg)
K_{oc}	Soil Organic Carbon/Water Partition Coefficient(See Table B)	Chemical Specific (l/kg)
M	Soil to Skin Adherence Factor	0.5 mg/cm^2-day
n	Total Soil Porosity	0.433962264 l pore/l soil

Symbol	Parameter	Value
P_b	Dry Soil Bulk Density	1.5 kg/l
PEF	Particulate Emission Factor (See Table C)	1.316×10^9 m^3/kg
P_s	Soil particle density	2.65 g/cm^3
Q/C_{vf}	Inverse of the mean concentration at the center of a 0.5 acre source - volatilization factor	68.81 $\frac{g/m^2\text{-}s}{kg/m^3}$
Q/C_p	Inverse of the mean concentration at the center of a 0.5 acre source - particulates	$\frac{90.80\ g/m^2\text{-}Sec}{kg/m^3}$
RFD_i	Reference Dose Inhalation	Chemical Specific (mg/Kg - day)
RFD_o	Reference Dose Oral	Chemical Specific (mg/Kg - day)
S	Solubility in Water	Chemical Specific (mg/l-water)
SA_{cas}	Surface Area Construction Exposed Adult Skin	3160 cm^2
SA_{ias}	Surface Area Commercial/Industrial Exposed Adult Skin	3160 cm^2
SA_{ras}	Surface Area Residential Exposed Adult Skin	5000 cm^2
SA_{rcs}	Surface Area Residential Exposed Child Skin	2000 cm^2
SF_i	Carcinogenic Potency Slope Inhalation	Chemical Specific $(mg/Kg\text{ - }day)^{-1}$
SF_o	Carcinogenic Potency Slope Oral	Chemical Specific $(mg/Kg\text{ - }day)^{-1}$
SFS_{adj}	Skin Factor Soil Age Adjusted (See Table C)	1257 mg-yr/kg-day
T	Exposure interval Volatilization Equation	9.5×10^8 s
THQ	Target Hazard Quotient	1 (unitless)
TR	Target Risk	1×10^{-5} (unitless)
U_m	Mean annual wind speed	4.69 m/s
U_t	Equivalent threshold value of wind speed at 7 m	11.32 m/s
V	Fraction of vegetative cover	0.5 (unitless, = 50%)
VF	Volatilization Factor (See Table C)	Chemical Specific m^3/kg

TABLE E

Default Exposure Assumption References

Table E DEFAULT EXPOSURE ASSUMPTION REFERENCES		
PARAMETER	**VALUE**	**REFERENCE**
Target Risk	10^{-5} (unitless)	IDEM draft policy
Target Hazard Quotient	1.0	IDEM draft policy
Target Hazard Index	1.0	IDEM draft policy
Cancer Slope Factor	Chemical Specific Oral or Inhalation $(mg/kg\text{-}day)^{-1}$	IRIS, HEAST, NCEA, Regions 3, 6, 9
Reference Dose Oral or Inhalation	Chemical Specific (mg/kg-day)	IRIS, HEAST, NCEA, Regions 3, 6, 9
Body Weight Adult	70kg	RAGS (Part A) EPA 1989 EPA/540/1-89/002
Averaging Time	Carcinogen-70 yrs Noncarcinogen-Exposure Duration	RAGS (Part A) EPA 1989 EPA/540/1-89/002
Skin Surface Area Adult	5000 cm^2(25%)	Exposure Factors, EPA 1989 OSWER No. 9285.6-03
Skin Surface Area Child	2000 cm^2(25%)	Dermal Assessment, EPA 1992 EPA/600/8-91/011B
Skin Surface Area Adult Construction in Industrial	3160 cm^2	Dermal Assessment 1992, Construction , (heads, hands, forearms)
Adherence Factor	0.5 mg/cm^{-5}-day	Dermal Assessment, EPA 1992
Skin Absorption	0.1 most organics 0.01 most metals (Select compounds have other values)	EPA, Cal-EPA-(DTSC, 1994)
Inhalation Rate Adult Residential Indoor Inhalation Rate Adult Residential Outdoor	15 m^3/day 20 m^3/ day	RAGS Part B OSHWER No. 9285.6-03

Table E DEFAULT EXPOSURE ASSUMPTION REFERENCES		
PARAMETER	**VALUE**	**REFERENCE**
Inhalation Rate Adult Occupational	20 m^3/day	RAGS Part B OSHWER No. 9285.6-03
Inhalation Rate Child	10 m^3/day	EPA Region 6, 9 (Referencing RAGS Part A, EPA/540/1-89/002)
Drinking Water Ingestion Adult	2.0 1/day	RAGS Part A
Drinking Water Ingestion Child	1.0 1/day	PEA, Cal-EPA (DTSC, 1994)
Drinking Water Ingestion Occupational	1.0 1/day	IDEM VRP (OER, October 1995)
Soil Ingestion Adult	100 mg/day	OSHWER No. 9285.6-03 RAGS 1989
Soil Ingestion Child	200 mg/day	OSHWER No. 9285.6-03 RAGS 1989
Soil Ingestion Adult Occupational	50 mg/day	OSHWER No. 9285.6-03
Soil Ingestion Adult Construction	480 mg/day	OSWER Directive: 9285.6-03 Attachment B
Exposure Frequency Residential	350 days/yr	OSHWER No. 9285.6-03
Exposure Frequency Occupational	250 days/yr	OSHWER No. 9285.6-03
Exposure Frequency Construction	45 days/yr	IDEM Policy Region V RCRA Correspondence 9/30/96
Exposure Frequency Residential soil	250 days	IDEM Policy EPA 1984, EPA/600/8-84/031
Exposure Duration Residential	30 years	OSWER Directive: 9285.6-03
Exposure Duration Occupational	25 years	OSWER Directive: 9285.6-03
Exposure Duration Construction	1 year	IDEM Policy Region V RCRA Correspondence 9/30/96
Indoor Volatilization Factor	0.5	RAGS Part B
Particulate Emission Factor Model	1.32×10^9 m^3/kg	EPA 1996, EPA 540/R-96/18 Defaults as listed in same

Table E DEFAULT EXPOSURE ASSUMPTION REFERENCES		
PARAMETER	**VALUE**	**REFERENCE**
Volatilization Factor Outdoor Soil Model	Chemical Specific m^3/kg	EPA 1996, EPA 540/R-96/18 Defaults as listed in same
Soil Partition to Groundwater Model	Chemical Specific mg/kg	EPA 1996, EPA 540/R-96/18 Defaults as listed in same
Soil Saturation Limit	Chemical Specific mg/kg	EPA 1996, EPA 540/R-96/18 Defaults as listed in same
Age Adjusted Factors		
Ingestion soils	114 mg-yr/kg-day	RAGS Part B
Skin Contact	1257 mg-yr/kg-day	RAGS Part B by analogy
Inhalation	10.9 m^3 -yr/kg-day	RAGS Part B by analogy

TABLE F

Human Health Toxicity Parameters

Table F – Human Health Toxicity Parameters

Contaminant	CAS	Chronic								Sub-Chronic			
		SF_o $(mg/kg\text{-}day)^{-1}$		RfD_o mg/kd-day		SF_i $(mg/kg\text{-}day)^{-1}$		RfD_i mg/kd-day		RfD_o mg/kd-day		RfD_i mg/kd-day	
		Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source
Acenaphthene	83-32-9			0.06	I			0.06	R6,9(r)				
Acenaphthylene	208-96-8			0.0071	S-MI			0.01	S-MI				
Acetochlor	34256-82-1			0.02	IRIS			0.02	R9(r)				
Acetone (2-Propanone)	67-64-1			0.9	I			0.9	R9(r)				
Acrolein	107-02-8			0.0005	I			0.0000057	I				
Aldrin	309-00-2	17	I	0.00003	I	17	I	0.00003	RR6,9(r)	0.00003	H	0.00003	H
Anthracene	120-12-7			0.3	I			0.3	R6,9(r)	3			
Antimony and compounds	7440-36-0			0.0004	I								
Arsenic	7440-38-2	1.5	I	0.0003	I	15	I			0.0003			
Atrazine	1912-24-9	0.22	R3,9(H)	0.035	IRIS	0.22	R9(r)	0.035	R9(r)				
Barium	7440-39-3			0.2	I			0.000143	H				
Benzene	71-43-2	0.055	I	0.004	I	0.027	I	0.0086	I				
Benzo(a)anthracene	56-55-3	0.73	RR3,6,9(n)			0.73	R9(r)						
Benzo(a)pyrene	50-32-8	7.3	I			7.3	R9(r)						
Benzo(b)fluoranthene	205-99-2	0.73	RR3,6,9(n)			0.73	R9(r)						
Benzo(k)fluoranthene	207-08-9	0.073	RR3,6,9(n)			0.073	R9(r)						
Benzoic acid	65-85-0			4	I			4	R9(r)				
Benzyl Alcohol	100-51-6			0.3	H			0.3	R6,9(r)				
Beryllium and compounds	7440-41-7			0.002	I	8.4	I	0.0000057	I				
Bis(2-chloro-1-methylethyl) ether	108-60-1	0.07	R9(w),3(H)	0.04	R9(I)	0.035	R9(w),3(H)	0.04	R9(r)				
Bis(2-Chloroethyl)ether	111-44-4	1.1	I			1.2	I						
Bis(2-chloroisopropyl)ether[3]	**39638-32-9**												
Bis(2-ethylhexyl)phthalate	117-81-7	0.014	I	0.02	I	0.014	R3(n),R6,9(r)	0.022	R6,9(r)				
Bromodichloromethane	75-27-4	0.062	I	0.02	I	0.062	R6,9(r)	0.02	R6,9(r)				
Bromoform(tribromomethane)	75-25-2	0.0079	I	0.02	I	0.0039	I	0.02	R6,9(r)				
n-Butanol	71-36-3			0.1	I			0.0026	R9(n)				
Butylbenzylphthalate	85-68-7			0.2	I			0.2	R6,9(r)				
Cadmium	7440-43-9			0.0005	I	6.3	I	0.0000575	R3,6(n)				
Carbazole	86-74-8	0.02	H			0.02	R6,9(r)						
Carbon disulfide	75-15-0			0.1	I			0.2	I				
Carbon tetrachloride	56-23-5	0.13	I	0.0007	I	0.053	I	0.0007	R9(r)		ATSDR	0.054	ATSDR
Chlordane	12789-03-6	0.35	I	0.0005	I	0.35	I	0.0002	I				
p-Chloroaniline	106-47-8			0.004	I			0.004	R6,9(r)				
Chlorobenzene	108-90-7			0.02	I			0.017	RR3,6,9(n)				
Chloroethane	75-00-3	0.0029	R3,9(n)	0.4	R3,9(n)	0.0029	R9(r)	2.9	I				
Chloroform	67-66-3			0.01	I	0.081	I	0.014	R3,9(n)				
2-Chloronapthalene	91-58-7			0.08	I			0.08	R6,9(r)				
2-Chlorophenol	95-57-8			0.005	I			0.005	R6,9(r)	0.05	R	0.05	R
Chromium III	16065-83-1			1.5	I								

Table F – Human Health Toxicity Parameters

Contaminant	CAS	Chronic								Sub-Chronic			
		SF_o $(mg/kg\text{-}day)^{-1}$		RfD_o mg/kd-day		SF_i $(mg/kg\text{-}day)^{-1}$		RfD_i mg/kd-day		RfD_o mg/kd-day		RfD_i mg/kd-day	
		Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source
Chromium VI	18540-29-9			0.003	I	290	R9(I)	0.000029	I				
Chrysene	218-01-9	0.0073	RR3,6,9(n)			0.0073	R9(r)						
Copper	7440-50-8			0.04	R3,9(H)								
Cyanide, Free	57-12-5			0.02	I								
Cyclohexane	110-82-7			1.7	R9(r)			1.7	I				
DDD	72-54-8	0.24	I	0.002	R3(p)	0.24	R6,9(r)						
DDE	72-55-9	0.34	I			0.34	R6,9(r)						
DDT	50-29-3	0.34	I	0.0005	I	0.34	I	0.0005	R6,9(r)				
Dibenzo(a,h)anthracene	53-70-3	7.3	R3,9(n)			7.3	R9(r)						
Dibenzofuran	132-64-9			0.002	R3(n)			0.002	R9(r)				
1,2-Dibromoethane	106-93-4	2	IRIS	0.009	IRIS	2.1	IRIS	0.0026	IRIS				
Dibutyl phthalate	84-74-2			0.1	I			0.1	R6,9(r)				
1,2-Dichlorobenzene	95-50-1			0.09	I			0.05714	H				
1,3-Dichlorobenzene	541-73-1			0.003	R3(n)			0.03	R9(r)				
1,4-Dichlorobenzene	106-46-7	0.024	H	0.03	RR3,6,9(n)	0.022	R3,9(n)	0.22856	I				
3,3-Dichlorobenzidine	91-94-1	0.45	I			0.45	R6,9(r)						
1,1-Dichloroethane	75-34-3			0.1	H			0.14	H				
1,2-Dichloroethane	107-06-2	0.091	I	0.02	R3(p),6,9(n)	0.091	I	0.0014	R6,9(n)				
1,1-Dichloroethylene	75-35-4			0.05	I			0.057	I				
cis-1,2-Dichloroethylene	156-59-2			0.01	R6,9(p)			0.01	R6,9(r)				
trans-1,2-Dichloroethylene	156-60-5			0.02	I			0.02	R6,9(r)				
2,4-Dichlorophenol	120-83-2			0.003	I			0.003	R6,9(r)				
2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7			0.01	I			0.01	R6,9(r)				
1,2-Dichloropropane	78-87-5	0.068	H	0.0011	R6,9(r)	0.068	R6,9(r)	0.0011	I				
1,3-Dichloropropene	542-75-6	0.1	I	0.03	I	0.014	I	0.005714	I	0.003		0.0057	
Dieldrin	60-57-1	16	I	0.00005	I	16	I	0.00005	R6,9(r)				
Diethylphthalate	84-66-2			0.8	I			0.8	R6,9(r)				
N,N Dimethylformamide	68-12-2			0.1	R9(H)			0.0086	I				
2,4-Dimethylphenol	105-67-9			0.02	I			0.02	R6,9(r)				
Dimethylphthalate	131-11-3			10	R3,6,9(H)			10	R6,9(r)				
2,4-Dinitrophenol	51-28-5			0.002	I			0.002	R6,9(r)				
Dinitrotoluene mixture	25321-14-6	0.68	I	0.001	H	0.68	R6,9(r)	0.001	R9(r)				
Di-n-octyl phthalate	117-84-0			0.04	R6,9(r,p)			0.04	R6,9(r,p)				
Endosulfan	115-29-7			0.006	I			0.006	R6,9(r)				
Endrin	72-20-8			0.0003	I			0.0003	R6,9(r)				
Ethyl acetate	141-78-6			0.9	I			0.9	R6,9(r)				
Ethylbenzene	100-41-4			0.1	I			0.29	I		ATSDR	1.24	ATSDR
Ethylene glycol[4]	**107-21-1**			**2.0**	**I**			**2.0**	**R6,9(r)**				
Fluoranthene	206-44-0			0.04	I			0.04	R6,9(r)				

Table F – Human Health Toxicity Parameters

Contaminant	CAS	Chronic								Sub-Chronic			
		SF_o $(mg/kg\text{-}day)^{-1}$		RfD_o mg/kd-day		SF_i $(mg/kg\text{-}day)^{-1}$		RfD_i mg/kd-day		RfD_o mg/kd-day		RfD_i mg/kd-day	
		Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source
Fluorene	86-73-7			0.04	I			0.04	R6,9(r)				
alpha-HCH(alpha-BHC)	319-84-6	6.3	I	0.0005	R9(n)	6.3	I	0.0005	R9(r)				
beta-HCH(beta-BHC)	319-85-7	1.8	I	0.0002	R9(n)	1.9	I	0.0002	R9(r)				
gamma-HCH(Lindane)	58-89-9	1.3	H	0.0003	I	1.3	R6,9(r)	0.0003	R6,9(r)				
Heptachlor	76-44-8	4.5	I	0.0005	I	4.6	I	0.0005	R6,9(r)				
Heptachlor epoxide	1024-57-3	9.1	I	0.000013	I	9.1	I	0.000013	R6,9(r)				
Hexachloro-1,3-butadiene	87-68-3	0.078	I	0.0003	R9(n)	0.077	I	0.0003	R9(r)				
Hexachlorobenzene	118-74-1	1.6	I	0.0008	I	1.6	I	0.0008	R6,9(r)				
Hexachlorocyclopentadiene	77-47-4			0.006	I			0.000057	I	0.0002	H	0.07	H
Hexachloroethane	67-72-1	0.014	I	0.001	I	0.014	I	0.001	R6,9(r)				
n-Hexane	110-54-3			0.6	ATSDR			0.057	I				
Indeno(1,2,3-cd)pyrene	193-39-5	0.73	RR3,6,9(n)			0.73	R9(r)						
Isophorone	78-59-1	0.00095	I	0.2	I	0.00095	R6,9(r)	0.2	R6,9(r)				
Isopropylbenzene (Cumene)	98-82-8			0.1	I			0.11	I				
Lead	7439-92-1												
Mercury and compounds	7487-94-7			0.0003	I								
Methoxychlor	72-43-5			0.005	I			0.005	R6,9(r)				
Methyl bromide (bromomethane)	74-83-9			0.0014	I			0.0014	I				
Methyl ethyl ketone (MEK)	78-93-3			0.6	I			1.4	I				
Methyl tertiary butyl ether (MTBE)	1634-04–4	0.004	R3(o)	0.86	R9(r)	0.00091	R9(c)	0.86	I				
4-Methyl-2-pentanone (MIBK)	108-10-1			0.08	R3,6,9(H)			0.86	I				
Methylene chloride	75-09-2	0.0075	I	0.06	I	0.0016	I	0.86	H				
2-Methylnaphthalene	91-57-6			0.004	I			0.004	IDEM(r)				
3-Methylphenol (m-cresol)	108-39-4			0.05	I			0.05	R6,9(r)				
4-Methylphenol (p-cresol)	106-44-5			0.005	H			0.005	R6,9(r)				
2-Methylphenol(o-cresol)	95-48-7			0.05	I			0.05	R6,9(r)				
Metolachlor	51218-45-2			0.15	I			0.15	R9(r)				
Naphthalene	91-20-3			0.02	I			0.00086	I				
Nickel, soluble salts	various			0.02	I	0.84	I						
2-Nitroaniline	88-74-4			0.003	R9(p)			0.00003	R9(p)				
Nitrobenzene	98-95-3			0.0005	I			0.00057	H				
N-Nitrosodi-n-propylamine	621-64-7	7	I			7	R6,9(r)						
N-Nitrosodiphenylamine	86-30-6	0.0049	I	0.02	R9(p)	0.0049	R6,9(r)	0.02	R9(p)				
PCBs (polychlorinated biphenyls)	1336-36-3	2	I	0.00002	I	2	I	0.00002	R9(r)				
Pentachlorophenol	87-86-5	0.12	I	0.03	I	0.12	R6,9(r)	0.03	R6,9(r)				
Phenanthrene	85-01-8			0.003	IDEM			0.003	IDEM				
Phenol	108-95-2			0.3	I			0.3	R9(r)				
n-Propylbenzene	103-65-1			0.04	9(n)			0.04	9(r)				
Propylene glycol monomethyl ether[4]	**107-98-2**			**0.7**	**R3,6,9(H)**			**0.57**	**I**				

Table F – Human Health Toxicity Parameters

Contaminant	CAS	Chronic								Sub-Chronic			
		SF_o $(mg/kg\text{-}day)^{-1}$		RfD_o mg/kd-day		SF_i $(mg/kg\text{-}day)^{-1}$		RfD_i mg/kd-day		RfD_o mg/kd-day		RfD_i mg/kd-day	
		Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source
Pyrene	129-00-0			0.03	I			0.03	R6,9(r)				
Selenium	7782-49-2			0.005	I								
Silver	7440-22-4			0.005	I								
Styrene	100-42-5			0.2	I			0.29	I				
1,1,1,2-Tetrachloroethane	630-20-6	0.026	I	0.03	I	0.026	I	0.03	R6,9(r)				
1,1,2,2-Tetrachloroethane	79-34-5	0.2	I	0.04	R3(ATSDR))	0.2	I	0.06	R6,9(r)				
Tetrachloroethylene (PCE)	127-18-4	0.052	IDEM	0.01	I	0.021	R3,6(o),9(c)	0.01	R3(ATSDR),6(n)				
Thallium (and compounds)	7440-28-0			0.00007	IDEM								
Toluene	108-88-3			0.08	I			1.4	I			0.26	RAIS
Toxaphene	8001-35-2	1.1	I			1.1	I						
1,2,4-Trichlorobenzene	120-82-1			0.01	I			0.001	R3,6,9(p)	0.01	H	0.57	H
1,1,1-Trichloroethane	71-55-6			0.28	R3,9(n)			0.63	R3,9(n)				
1,1,2-Trichloroethane	79-00-5	0.057	I	0.004	I	0.056	I	0.004	R6,9(r)				
Trichloroethylene (TCE) [1]	79-01-6	0.1	IDEM	0.0003	R3,6,9(n)	0.054	IDEM	0.01	R3,9(n)			0.15	ATSDR
Trichlorofluoromethane[4]	**75-69-4**			**0.3**	**I**			**0.2**	**R9(H)**				
2,4,5-Trichlorophenol	95-95-4			0.1	I			0.1	R6,9(r)				
2,4,6-Trichlorophenol	88-06-2	0.011	I	0.0001	R9(n)	0.011	I	0.0001	R9(r)				
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	93-76-5			0.01	I			0.01	R6,9(r)				
1,2,4-Trimethylbenzene	95-63-6			0.05	R3,6,9(n)			0.0017	R3,6,9(n)				
1,3,5-Trimethylbenzene	108-67-8			0.05	R3,6,9(n)			0.0017	R3,6,9(n)				
Vinyl acetate	108-05-4			1	H			0.05714	I	1	H	0.057	H
Vinyl chloride (chloroethene)[2]	75-01-4	1.5	I	0.003	I	0.031	I	0.029	I				
Xylene mixed (total)	1330-20-7			0.2	I			0.029	I			0.87	ATSDR
Zinc	7440-66-6			0.3	I								

Footnotes

Bold text indicates that a change has been made from the previous 2006 Appendix 1 table.

1. May 1, 2009 Revision: OLQ developed and adopted default slope factors for TCE of 0.1 $(mg/kg\text{-}day)^{-1}$ as the residential oral slope factor, 0.034 $(mg/kg\text{-}day)^{-1}$ as the industrial oral slope factor, and 0.054 $(mg/kg\text{-}day)^{-1}$ as the residential inhalation slope factor, 0.018 $(mg/kg\text{-}day)^{-1}$ as the industrial inhalation slope factor, in 2006. This table presents the residential slope factors only. The previous 2006 default oral and inhalation slope factors of 0.4 $(mg/kg\text{-}day)^{-1}$, which have been removed from this revised table, may also be used. Please see the 2006 OLQ document "A Regulatory Approach for Deriving Trichloroethylene Cancer Potency Estimates for use in the Development of Health Based Remediation Closure Levels" on the RISC website for more information.

2. May 1, 2009 Revision: Vinyl Chloride calculations are based on two different sets of slope factors. The residential toxicity factors are presented in this table. Industrial default closure levels use 0.75 $(mg/kg\text{-}d)^{-1}$ for the oral slope factor and 0.016 $(mg/kg\text{-}day)^{-1}$ for the inhalation slope factor. The values derived for industrial default closure levels are recommended for lifetime exposure beginning at adulthood. For exposures beginning at birth an additional twofold safety factor is recommended. This has been taken into account when deriving the default closure levels for residential areas.

3. May 1, 2009 Revision: Bis(2-chloroisopropyl)ether data has been removed from the revised 2006 Appendix 1 tables because IRIS has removed the toxicity factors from its database. Please contact your Project Manager for information on bis(2-chloroisopropyl)ether if it is a COC at your site.

4. May 1, 2009 Revision: This compound has been added to the 2006 Appendix 1 tables as a part of the May 1, 2009 revision.

Table F – Human Health Toxicity Parameters

Source Key:

ATSDR	Agency for Toxic Substances and Disease Registry
c	California EPA
H	HEAST
I	IRIS
IDEM	Indiana Department of Environmental Management
IEMI	IDEM, extrapolated from Michigan Guidance
n	NCEA(USEPA National Center for Environmental Assessment draft value
o	Other
OLC	other, low confidence
p	USEPA Provisional Peer-Reviewed Toxicity Value (PPRTV)
r	route extrapolated
R3	USEPA Region 3 Risk-Based Concentration (RBC) Tables
R6	USEPA Region 6 Human Health-Medium Specific Screening Levels Tables
R6-HWC	USEPA Region 6 Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, volume 2 Appendix A: Chemical-Specific Data
R9	USEPA Region 9 Preliminary Remediation Goal (PRG) Tables
S-XX	Other State
USACHPPM	US Army Center for Health Promotion & Preventive Medicine
w	withdrawn from IRIS or HEAST

Table G

Critical Effects

Chemical	CAS No.	Critical Effects Category / Primary Critical Effect	Exposure Pathway(s) Affected	Source
Acenaphthene	83-32-9	Systemic (Liver)	Oral, *[Inhalation(R)]*	IRIS
Acenaphthylene	208-96-8	Systemic (Liver)	Oral, *[Inhalation(R)]*	Similar PAHs (ATSDR 1995)
Acetochlor	34256-82-1	Systemic	Oral *[Inhalation(r)]*	IRIS
Acetone	67-64-1	Systemic (Kidney, liver)	Oral	IRIS
		Neurological (Nonspecific)	Inhalation	IRIS
Acrolein	107-02-8	Systemic (Nonspecific)	Oral	IRIS
		Respiratory (Nasal passageway, lungs)	Inhalation	IRIS
Anthracene	120-12-7	Systemic (Liver)	Oral, *[Inhalation(R)]*	ATSDR
Antimony	7440-36-0	Circulatory (Heart, blood)	Oral	IRIS
		Systemic (Nonspecific)		
Atrazine	1912-24-9	Circulatory, Systemic	Oral *[Inhalation(r)]*	IRIS
Barium	7440-39-3	Systemic (Kidney)	Oral	IRIS
		Reproductive/Developmental (Nonspecific)	Inhalation	HEAST
Benzoic acid	65-85-0	Systemic (Nonspecific)	Oral, *[Inhalation(R)]*	IRIS
Benzyl alcohol	100-51-6	Gastrointestinal (Stomach)	Oral, *[Inhalation(R)]*	HEAST
Beryllium	7440-41-7	Gastrointestinal (Intestines)	Oral	IRIS
n-Butanol	71-36-3	Neurological (Central nervous system)	Oral	IRIS
		Neurological (Central nervous system), Systemic (Liver), Circulatory (Blood)	Inhalation	NCEA
n-Butylbenzene	104-51-8	Liver, Kidney	Oral*[Inhalation(r)]*	S-CA
sec-Butylbenzene	135-98-8	Kidney	Oral*[Inhalation(r)]*	S-CA
tert-Butylbenzene	98-06-6	Kidney	Oral*[Inhalation(r)]*	S-CA
Butylbenzylphthalate	85-68-7	Systemic (Liver)	Oral, *[Inhalation(R)]*	IRIS

Chemical	CAS No.	Critical Effects Category / Primary Critical Effect	Exposure Pathway(s) Affected	Source
Cadmium	7440-43-9	Systemic (Kidney)	Oral	IRIS
Carbon disulfide	75-15-0	Developmental (Teratology, nonspecific)	Oral	IRIS
		Neurological (Peripheral nervous system)	Inhalation	IRIS
4-Chloroaniline	106-47-8	Musculoskeletal (Connective tissue)	Oral, *[Inhalation(R)]*	IRIS
Chlorobenzene	108-90-7	Systemic (Liver)	Oral	IRIS
		Systemic (Liver)	Inhalation	NCEA
Chloroethane (Ethyl Chloride)	75-00-3	Developmental (Growth Retardation)	Inhalation	IRIS
Chloroform	67-66-3	Systemic (Liver)	Oral	IRIS
		Systemic (Liver, kidney)	Inhalation	NCEA
2-Chloronapthalene	91-58-7	Systemic (Liver)	Oral, *[Inhalation(R)]*	IRIS
2-Chlorophenol	95-57-8	Reproductive (Nonspecific)	Oral, *[Inhalation(R)]*	IRIS
Chromium III	16065-83-1	Respiratory (Lung)	Oral	ATSDR
Chromium VI	18540-29-9	Respiratory (Nasal passageway, lung)	Inhalation	IRIS
Copper	7440-50-8	Gastrointestinal (Stomach)	Oral	ATSDR
Cyanide (free)	57-12-5	Endocrine (Thyroid), Neurological (Neurons)	Oral	IRIS
Cyclohexane	110-82-7	Developmental (Nonspecific)	Inhalation, *[Oral (R)]*	IRIS
Dibenzofuran	132-64-9	Systemic (Kidney)	Oral, *[Inhalation(R)]*	NCEA
Di-n-butyl phthalate	84-74-2	Developmental (Teratology)	Oral, *[Inhalation(R)]*	IRIS
1,2-Dichlorobenzene	95-50-1	Systemic (Liver)	Oral	IRIS
		Systemic (Nonspecific)	Inhalation	HEAST
1,3-Dichlorobenzene	541-73-1	Systemic (Liver)	Oral	NCEA
1,1-Dichloroethane	75-34-3	Systemic (Kidney)	Inhalation, *[Oral (R)]*	HEAST

Chemical	CAS No.	Critical Effects Category / Primary Critical Effect	Exposure Pathway(s) Affected	Source
		Neurological (Central nervous system)	Inhalation	ATSDR
cis-1,2-Dichloroethene	156-59-2	Circulatory (Blood)	Oral, *[Inhalation(R)]*	HEAST
trans-1,2-Dichloroethene	156-60-5	Circulatory (Blood)	Oral, *[Inhalation(R)]*	IRIS
1,1 Dichloroethylene	75-35-4	Liver	Oral, Inhalation	IRIS
2,4-Dichlorophenol	120-83-2	Immunological (Lymph)	Oral, *[Inhalation(R)]*	IRIS
2,4-Dichlorophenoxyacetic acid (2,4-D)	94-75-7	Systemic (Liver, kidney), Circulatory (Blood)	Oral, *[Inhalation(R)]*	IRIS
Diethyl phthalate	84-66-2	Developmental (Growth retardation)	Oral, *[Inhalation(R)]*	IRIS
N,N Dimethylformamide	68-12-2	Systemic, Systemic (liver)	Oral (r)	IRIS
2,4-Dimethylphenol	105-67-9	Neurological (Central nervous system), Circulatory (Blood)	Oral, *[Inhalation(R)]*	IRIS
Dimethyl phthalate	131-11-3	Systemic (Kidney, liver)	Inhalation *[Oral(R)]*	HSDB
2,4-Dinitrophenol	51-28-5	Dermal/Ocular (eye)	Oral, *[Inhalation(R)]*	IRIS
Di-n-octyl phthalate	117-84-0	Systemic (Liver, kidney)	Oral, *[Inhalation(R)]*	HEAST
Endosulfan	115-29-7	Systemic (Kidney), Circulatory (Blood vessel)	Oral, *[Inhalation(R)]*	IRIS
Endrin	72-20-8	Systemic (Liver)	Oral, *[Inhalation(R)]*	IRIS
Ethyl Acetate	141-78-6	Systemic	Inhalation (r)	IRIS
Ethylbenzene	100-41-4	Systemic (Liver, kidney)	Oral	IRIS
		Developmental (Teratology)	Inhalation	IRIS
Fluoranthene	206-44-0	Systemic (Liver, kidney), Circulatory (Blood)	Oral, *[Inhalation(R)]*	IRIS
Fluorene	86-73-7	Circulatory (Blood)	Oral, *[Inhalation(R)]*	IRIS
n-Hexane	110-54-3	Neurological (Nonspecific)	Oral	HEAST

Chemical	CAS No.	Critical Effects Category / Primary Critical Effect	Exposure Pathway(s) Affected	Source
		Neurological (Nonspecific)	Inhalation	IRIS
Hexachlorocyclopentadiene	77-47-4	Gastrointestinal (Stomach)	Oral	IRIS
		Respiratory (Nasal passageway)	Inhalation	IRIS
Isopropylbenzene	98-82-8	Kidney, Reproductive/Endocrine	Oral, Inhalation	IRIS
Lead	7439-92-1	Neurological (Central nervous system)	Oral, Inhalation	ATSDR
Mercury and compounds	7487-94-7	Systemic (Kidney), Immunological (Autoimmune effects)	Oral	IRIS
Mercury, elemental	7439-97-6	Neurological (Central nervous system)	Inhalation	IRIS
Methoxychlor	72-43-5	Developmental (Nonspecific), Reproductive (Nonspecific)	Oral, *[Inhalation(R)]*	IRIS
Methyl bromide (Bromomethane)	74-83-9	Gastrointestinal (Stomach)	Oral	IRIS
		Respiratory (Nasal cavity)	Inhalation	IRIS
Methyl ethyl ketone (n-Butanone, MEK)	78-93-3	Developmental (Nonspecific)	Oral	IRIS
		Developmental (Structural malformations)	Inhalation	IRIS
4-Methyl-2-pentanone (Methyl isobutyl ketone, MIBK)	108-10-1	Systemic (Liver, Kidney)	Oral	HEAST
		Developmental (Nonspecific)	Inhalation	IRIS
2-Methylnaphthalene	91-57-6	Respiratory (Lungs, nasal passageways)	Oral	IRIS
		Respiratory (Nasal cavity and passageways)	Inhalation	ATSDR *(09/2003 Draft)*
2-Methylphenol (o-Cresol)	95-48-7	Neurological (Central nervous system)	Oral, *[Inhalation(R)]*	IRIS
3-Methylphenol (m-Cresol)	108-39-4	Neurological (Central nervous system)	Oral, *[Inhalation(R)]*	IRIS
4-Methylphenol (p-Cresol)	106-44-5	Neurological (Central nervous system)	Oral, *[Inhalation(R)]*	HEAST
Metolachlor	51218-45-2	Systemic	Oral *[Inhalation(r)]*	IRIS
Naphthalene	91-20-3	Systemic (Nonspecific)	Oral	IRIS
		Respiratory (Nasal)	Inhalation	IRIS

Chemical	CAS No.	Critical Effects Category / Primary Critical Effect	Exposure Pathway(s) Affected	Source
Nickel, soluble salts	Various	Circulatory (Heart), Systemic (Liver), Immunological (Spleen)	Oral	IRIS
2-Nitroaniline	88-74-4	Circulatory (Blood)	Inhalation *[Oral(R)]*	HEAST
Nitrobenzene	98-95-3	Systemic (Liver, kidney), Endocrine (Adrenals), Circulatory (Blood)	Oral	IRIS
			Inhalation	HEAST
Phenanthrene	85-01-8	Systemic (Liver)	Oral, *[Inhalation(R)]*	Similar PAHs (ATSDR 1995)
Phenol	108-95-2	Developmental (Nonspecific)	Oral	IRIS
n-Propylbenzene	103-65-1	Liver, Kidney	Oral *[Inhalation(r)]*	S-CA
Pyrene	129-00-0	Systemic (Kidney)	Oral, *[Inhalation(R)]*	IRIS
Selenium	7782-49-2	Dermal/Ocular (Skin), Neurological (Central nervous system)	Oral	IRIS
Silver	7440-22-4	Dermal/Ocular (Skin)	Oral	IRIS
Styrene	100-42-5	Circulatory(Blood), Systemic (Liver)	Oral	IRIS
		Neurological (Central nervous system)	Inhalation	IRIS
Thallium and compounds	7440-28-0	Systemic (Liver),	Oral	IRIS
Toluene	108-88-3	Systemic (Liver, Kidney)	Oral	IRIS
		Neurological (Central nervous system)	Inhalation	IRIS
1,2,4-Trichlorobenzene	120-82-1	Endocrine (Adrenal)	Oral	IRIS
		Systemic (Liver)	Inhalation	HEAST
1,1,1-Trichloroethane	71-55-6	Systemic (Liver), Neurological (Central nervous system)	Oral	NCEA
			Inhalation	NCEA
2,4,5-Trichlorophenol	95-95-4	Systemic (Liver, kidney)	Oral, *[Inhalation(R)]*	IRIS

Chemical	CAS No.	Critical Effects Category / Primary Critical Effect	Exposure Pathway(s) Affected	Source
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	93-76-5	Systemic (Urinary tract) Developmental (Nonspecific)	Oral, *[Inhalation(R)]*	IRIS
1,2,4-Trimethylbenzene	95-63-6	Systemic (Nonspecific)	Oral	NCEA
		Neurological (Central nervous system)	Inhalation	NCEA
1,3,5-Trimethylbenzene	108-67-8	Systemic (Systemic Nonspecific)	Oral	NCEA
		Neurological (Central nervous system)	Inhalation	NCEA
Vinyl acetate	108-05-4	Systemic (Kidney)	Oral	HEAST
		Respiratory (Nasal)	Inhalation	IRIS
Xylenes (mixed isomers)	1330-20-7	Systemic (Nonspecific)	Oral	IRIS
		Neurological (Central nervous system)	Inhalation	IRIS
Zinc	7440-66-6	Circulatory (Blood)	Oral	IRIS

[Pathway(R)] indicates that the reference dose (RfD) for the pathway in brackets was based on a route-to-route extrapolation from the RfD for a pathway that has been more thoroughly studied. The critical effects and target organs are assumed to be the same for the extrapolated pathway as for the studied pathway.

Critical Effects Categories and Target Organs

	Critical Effect Category	Target Organs
1.	Systemic	Liver, Kidneys, Urinary Tract
2.	Circulatory	Arteries, Veins, Heart, and Blood
3.	Gastrointestinal	Buccal Cavity, Esophagus, Stomach, Intestines, and Gall Bladder
4.	Musculoskeletal	Muscles, Bone, and Connective Tissues
5.	Respiratory	Lungs, Trachea, and Nasal Passageway
6.	Immunological	Lymph and Tissue Fluid, Spleen, and Lymph Nodes
7.	Neurological	Brain, Spinal Cord, Neurons, and Neuroglia
8.	Reproductive/Endocrine	Testes, Ovaries, Thyroid, Adrenal, Pituitary, Pancreas, and Parathyroid
9.	Developmental	Teratology, Growth Retardation, Structural Malformations, and Abnormal Development
10.	Dermal/Ocular	Skin and Eyes

The primary critical effect and target organ for each chemical was obtained using the following sources (in order of preference):

1. IRIS (EPA 2000)
2. HEAST (EPA 1997)
3. ATSDR Toxicological Profiles
4. NCEA Issue Papers (EPA 1993 – 2003)
5. Hazardous Substance Databank (http://toxnet.nlm.nih.gov)
6. Open Literature

Exceptions include the following critical effects and target organs:

- Some compounds have an RfD based on the No Observed Adverse Effects Level (NOAEL), and information on toxic effects at higher doses was not available. In these cases, the critical effect of a surrogate compound (similar in structure and type) was used.
- Some compounds have an RfD established with the NOAEL and some toxic effects information. The toxic effects information was used to establish the critical effect.
- Some compounds have experimentally derived oral and inhalation reference doses. Critical effects from both routes have been listed. These compounds should be considered as additive in both categories (if both exposure pathways have receptors).
- Some compounds did not have an easily identified target organ within the critical effects category. These compounds were classified within a category as “nonspecific.”

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EPA, 2002	Supplemental Guidance for Developing Soil Screening Levels For Superfund Sites, OSWER 9355.4-24
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	Exposure Factors EPA, 1989 Exposure Factors Handbook, EPA/600/8-89/043
HEAST	Health Effects Assessment Summary Tables, FY 97 Update EPA-54–R-97-036
HSDB	Hazardous Substances Data Bank. (See NLM.)
IDEM, VRP	Voluntary Remediation Program, Resource Guide, OER, IDEM October 1995.
IRIS	Integrated Risk Information System, EPA http://www.epa.gov/iris
NCEA	National Center for Exposure Assessment, http://www.epa.gov/ncea
NLM	National Library of Medicine (NLM) Toxicology Information Network (TOXNET), 2003: Hazardous Substances Databank (HSDB): http://toxnet.nlm.nih.gov/
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