TABLE T-22
CHRONIC TOXICITY CRITERIA

Chemical	Dermal Absorption from Soil, ABSd	Permeability Constants, Kp (cm/hr)	Cancer Slope Factor, CSF $(mg/kg\text{-}day)^{-1}$				Chronic Noncancer Reference Dose, RfD (mg/kg-day)			
			Oral	Source	Inhalation	Source	Oral	Source	Inhalation	Source
Cyanides										
Total Cyanide	0.01	3.9E-04	NC	1	NC	1	2.0E-02	2 l	8.6E-04	2 l
Dioxins										
Total TEQ	0.03	8.1E-01	1.3E+05	1	1.3E+05	1	NA		NA	
Herbicides										
2,4,5-TP (Silvex)	0.05	1.6E-02	NC	1	NC	1	8.0E-03	2	8.0E-03	2 b
2,4-Dichlorophenoxybutyric acid (2,4-DB)	0.05	2.1E-02	NC	1	NC	1	8.0E-03	2	8.0E-03	2 b
2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	0.05	1.6E-02	NC	1	NC	1	1.0E-03	2	1.0E-03	2 b
Dalapon	0.05	2.9E-03	NC	1	NC	1	3.0E-02	2	3.0E-02	2 b
Dichlorprop	0.05	1.1E-02	NC	1	NC	1	1.0E-02	4	NA	
MCPA	0.05	2.1E-02	NC	1	NC	1	5.0E-04	2	5.0E-04	2 b
MCPP	0.05	1.2E-02	NC	1	NC	1	1.0E-03	2	1.0E-03	2 b
Metals										
Antimony	0.01	1.0E-03	NC	1	NC	1	4.0E-04	2	NA	
Arsenic	0.03	1.0E-03	9.5E+00	1	1.2E+01	1	3.0E-04	2	8.6E-06	1 a
Barium	0.01	1.0E-03	NC	1	NC	1	2.0E-01	2	1.4E-04	3 h
Beryllium	0.01	1.0E-03	NC	1	8.4E+00	1	2.0E-03	2	2.0E-06	1 a
Cadmium	0.001	1.0E-03	NC	1	1.5E+01	1	5.0E-04 = water 1.0E-03 = soil	i	5.7E-06	1 a
Chromium	0.01	1.0E-03	NC	1	4.2E+01	2	1.5E+00	2 c	NA	
Cobalt	0.01	4.0E-04	NC	1	NC	1	2.0E-02	3	5.7E-06	3
Copper	0.01	1.0E-03	NC	1	NC	1	4.0E-02	3 h	NA	
Lead	0.01	1.0E-04	NA	d	NA	d	NA	d	NA	d
Manganese	0.01	1.0E-03	NC	1	NC	1	1.4E-01	2	1.4E-05	2 a
Mercury	0.10	2.4E-01	NC	1	NC	1	NA		2.6E-05	1 a
Molybdenum	0.01	1.0E-03	NC	1	NC	1	5.0E-03	2	NA	
Nickel	0.04	2.0E-04	NC	1	9.1E-01	1	2.0E-02	2	1.4E-05	1 a
Selenium	0.01	1.0E-03	NC	1	NC	1	5.0E-03	2	5.7E-03	1 a
Silver	0.01	6.0E-04	NC	1	NC	1	5.0E-03	2	NA	
Thallium	0.01	1.0E-03	NC	1	NC	1	8.0E-05	2	NA	
Tin	0.01	1.0E-03	NC	1	NC	1	6.0E-01	3 h	NA	
Vanadium	0.01	1.0E-03	NC	1	NC	1	1.0E-03	3 n	NA	
Zinc	0.01	6.0E-04	NC	1	NC	1	3.0E-01	2	NA	
PAHs										
2-Methylnaphthalene	0.13	9.2E-02	NC	1	NC	1	4.0E-03	2	4.0E-03	2 b
Acenaphthene	0.13	8.6E-02	NC	1	NC	1	6.0E-02	2	6.0E-02	2 b
Acenaphthylene	0.13	9.1E-02	NC	1	NC	1	6.0E-02	2 q	6.0E-02	2 b,q
Anthracene	0.13	1.4E-01	NC	1	NC	1	3.0E-01	2	3.0E-01	2 b
Benzo(a)anthracene	0.13	4.7E-01	1.2E+00	1	3.9E-01	1	3.0E-02	2 g	3.0E-02	2 b,g
Benzo(a)pyrene	0.13	7.0E-01	1.2E+01	1	3.9E+00	1	3.0E-02	2 g	3.0E-02	2 b,g
Benzo(b)fluoranthene	0.13	7.0E-01	1.2E+00	1	3.9E-01	1	3.0E-02	2 g	3.0E-02	2 b,g
Benzo(g,h,i)perylene	0.13	1.1E+00	NC	1	NC	1	3.0E-02	2 g	3.0E-02	2 b,g
Benzo(k)fluoranthene	0.13	6.9E-01	1.2E+00	1	3.9E-01	1	3.0E-02	2 g	3.0E-02	2 b,g
Chrysene	0.13	4.7E-01	1.2E-01	1	3.9E-02	1	3.0E-02	2 g	3.0E-02	2 b,g
Dibenzo(a,h)anthracene	0.13	1.5E+00	4.1E+00	1	4.1E+00	1	3.0E-02	2 g	3.0E-02	2 b,g
Fluoranthene	0.13	2.2E-01	NC	1	NC	1	4.0E-02	2	4.0E-02	2 b
Fluorene	0.13	1.1E-01	NC	1	NC	1	4.0E-02	2	4.0E-02	2 b
Indeno(1,2,3-c,d)pyrene	0.13	1.0E+00	1.2E+00	1	3.9E-01	1	3.0E-02	2 g	3.0E-02	2 b,g
Naphthalene	0.13	4.7E-02	NC	1	1.2E-01	1	2.0E-02	2	8.6E-04	2 a
Phenanthrene	0.13	1.4E-01	NC	1	NC	1	3.0E-01	2 i	3.0E-01	2 b,i
Pyrene	0.13	2.0E-01	NC	1	NC	1	3.0E-02	2	3.0E-02	2 b
PCBs										
Aroclor 1260	0.14	3.0E+00	2.0E+00	3	2.0E+00	1	2.0E-05	2	2.0E-05	2 b
PCB Congeners										
PCB TEQ	0.14	3.0E+00	1.3E+05	1	1.3E+05	1	NA		NA	

TABLE T-22
CHRONIC TOXICITY CRITERIA

Chemical	Dermal Absorption from Soil, ABSd	Permeability Constants, Kp (cm/hr)	Cancer Slope Factor, CSF (mg/kg-day)$^{-1}$				Chronic Noncancer Reference Dose, RfD (mg/kg-day)			
			Oral	Source	Inhalation	Source	Oral	Source	Inhalation	Source
Pesticides										
4,4'-DDD	0.05	1.8E-01	2.4E-01	1	2.4E-01	1	NA		NA	
4,4'-DDE	0.05	1.6E-01	3.4E-01	1	3.4E-01	1	NA		NA	
4,4'-DDT	0.05	2.7E-01	3.4E-01	1	3.4E-01	1	5.0E-04	2	5.0E-04	2 b
Aldrin	0.05	1.4E-03	1.7E+01	1	1.7E+01	1	3.0E-05	2	3.0E-05	2 b
alpha-BHC	0.05	2.1E-02	6.3E+00	2	6.3E+00	2	5.0E-04	3	5.0E-04	3 b
Chlordane, alpha	0.04	3.8E-02	1.3E+00	1	1.2E+00	1	5.0E-04	2	2.0E-04	2 a
Chlordane, gamma	0.04	1.1E-01	1.3E+00	1	1.2E+00	1	5.0E-04	2	2.0E-04	2 a
delta-BHC	0.05	2.1E-02	1.5E+00	1	1.5E+00	1	2.0E-04	3 n	2.0E-04	3 b,n
Dieldrin	0.05	1.2E-02	1.6E+01	1	1.6E+01	1	5.0E-05	2	5.0E-05	2 b
Endosulfan I	0.05	2.3E-02	NC	1	NC	1	6.0E-03	2	6.0E-03	2 b
Endosulfan II	0.05	2.3E-02	NC	1	NC	1	6.0E-03	2	6.0E-03	2 b
Endosulfan sulfate	0.05	6.5E-02	NC	1	NC	1	6.0E-03	2	6.0E-03	2 b
Endrin	0.05	1.2E-02	NC	1	NC	1	3.0E-04	2	3.0E-04	2 b
Heptachlor	0.05	8.6E-03	4.1E+00	1	4.1E+00	1	5.0E-04	2	5.0E-04	2 b
Heptachlor epoxide	0.05	2.1E-02	9.1E+00	2	9.1E+00	2	1.3E-05	2	1.3E-05	2 b
Hexachlorobenzene	0.05	1.3E-01	1.8E+00	1	1.8E+00	1	8.0E-04	2	8.0E-04	2 b
Kepone	0.05	5.0E-03	8.0E+00	3	8.0E+00	3 b	2.0E-04	3	2.0E-04	3 b
Methoxychlor	0.05	4.3E-02	NC	1	NC	1	5.0E-03	2	5.0E-03	2 b
Mirex	0.05	1.1E-01	1.8E+01	1	1.8E+01	1	2.0E-04	2	2.0E-04	2 b
SVOCs										
Benzoic acid	0.1	7.3E-03	NC	1	NC	1	4.0E+00	2	4.0E+00	2 b
Bis(2-chloroethyl)ether	0.1	1.8E-03	2.5E+00	1	2.5E+00	1	NA		NA	
Bis(2-ethylhexyl)phthalate	0.1	2.5E-02	3.0E-03	1	8.4E-03	1	2.0E-02	2	2.0E-02	2 b
Diethylphthalate	0.1	3.9E-03	NC	1	NC	1	8.0E-01	2	8.0E-01	2 b
Di-n-butylphthalate	0.1	6.0E-02	NC	3	NC	3	1.0E-01	2	1.0E-01	2
N-Nitrosodimethylamine	0.1	2.7E-04	5.1E+01	2	4.9E+01	2	8.0E-06	3	8.0E-06	3 b
N-Nitrosodiethylamine	0.1	1.0E-03	3.6E+01	1	3.6E+01	1	NA		NA	
N-Nitrosodipropylamine	0.1	2.3E-03	7.0E+00	1	7.0E+00	1	NA		NA	
N-Nitrosomethylethylamine	0.1	5.9E-04	2.2E+01	1	2.2E+01	1	--	--	--	--
N-Nitrosopyrrolidine	0.1	6.1E-04	2.1E+00	1	2.1E+00	1	NA		NA	
VOCs										
1,1,1-Trichloroethane	0.1	1.3E-02	NC	1	NC	1	2.8E-01	3 n	2.9E-01	1 a
1,1,2-Trichloroethane	0.1	6.4E-03	7.2E-02	1	5.7E-02	1	4.0E-03	2	4.0E-03	2 b
1,1-Dichloroethane	0.1	6.7E-03	5.7E-03	1	5.7E-03	1	1.0E-01	3 h	1.4E-01	3 h
1,1-Dichloroethylene	0.1	1.2E-02	NC	1	NC	1	5.0E-02	2	2.0E-02	1 a
1,2,4-Trimethylbenzene	0.1	8.6E-02	NC	1	NC	1	5.0E-02	3	1.7E-03	3
1,2-Dibromoethane	0.1	2.8E-03	3.6E+00	1	2.5E-01	1	9.0E-03	2	2.3E-04	1 a
1,2-Dichloroethene	0.1	7.7E-03	NC	1	NC	1	2.0E-02	2	2.0E-02	2 b
1,2-Dichloropropane	0.1	7.8E-03	3.6E-02	1	3.6E-02	1	1.1E-03	2 a,b	1.1E-03	2 a
1,3,5-Trimethylbenzene	0.1	6.2E-02	NC	1	NC	1	5.0E-02	3	1.7E-03	3
1,3-Butadiene	0.1	1.6E-02	3.4E+00	1	6.0E-01	1	5.7E-04	2 a,b	5.7E-04	2 a
1,4-Dichlorobenzene	0.1	4.2E-02	5.4E-03	1	4.0E-02	1	3.0E-02	3 n	2.3E-01	2 a
1,4-Dioxane	0.1	3.3E-04	2.7E-02	1	2.7E-02	1	NA		8.6E-01	1 a
2-Hexanone	0.1	4.5E-03	NC	1	NC	1	8.0E-02	3 h,p	8.6E-01	2 a,p
4-Ethyltoluene	0.1	7.9E-02	NC	1	NC	1	2.0E-01	2 j	2.9E-02	2 j
Acetone	0.1	5.1E-04	NC	1	NC	1	9.0E-01	2	9.0E-01	2 b
Acetonitrile	0.1	1.0E-03	NC	1	NC	1	1.7E-02	2 a,b	1.7E-02	2 a
Acrolein	0.1	6.5E-04	NC	1	NC	1	5.0E-04	2	5.7E-06	2 a
Benzene	0.1	1.5E-02	1.0E-01	1	1.0E-01	1	4.0E-03	2	8.6E-03	2 a
Bromomethane	0.1	2.8E-03	NC	1	NC	1	1.4E-03	2	1.4E-03	2 a
Carbon disulfide	0.1	1.7E-02	NC	1	NC	1	1.0E-01	2	2.0E-01	2 a
Carbon tetrachloride	0.1	1.6E-02	1.5E-01	1	1.5E-01	1	7.0E-04	2	1.1E-02	1 a
Chloroethane	0.1	6.1E-03	2.9E-03	3 n	2.9E-03	3 n,b	4.0E-01	3 n	2.9E+00	2 a

TABLE T-22
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Chemical	Dermal Absorption from Soil, ABSd	Permeability Constants, Kp (cm/hr)	Cancer Slope Factor, CSF $(mg/kg\text{-}day)^{-1}$				Chronic Noncancer Reference Dose, RfD (mg/kg-day)			
			Oral	Source	Inhalation	Source	Oral	Source	Inhalation	Source
Chloroform	0.1	6.8E-03	3.1E-02	1	1.9E-02	1	1.0E-02	2	1.4E-02	3 n
Chloromethane	0.1	3.3E-03	NC	1	NC	1	2.6E-02	2 a,b	2.6E-02	2 a
cis-1,2-Dichloroethene	0.1	1.1E-02	NC	1	NC	1	1.0E-02	3	1.0E-02	3 b
Cyclohexane	0.1	1.2E-01	NC	1	NC	1	1.7E+00	2 a,b	1.7E+00	2 a
Diisopropyl ether	0.1	4.3E-03	NC	1	NC	1	NA		1.1E-01	3
Ethanol	0.1	3.2E-04	NC	1	NC	1	5.0E-01	2 e	1.1E+00	1 a,e
Ethylbenzene	0.1	4.9E-02	NC	1	NC	1	1.0E-01	2	2.9E-01	2 a
Freon 11 (Trichlorofluoromethane)	0.1	1.3E-02	NC	1	NC	1	3.0E-01	2	2.0E-01	3 h
Freon 113 (1,1,2-trichloro-1,2,2-trifluo	0.1	1.8E-02	NC	1	NC	1	3.0E+01	2	8.6E+00	3 h
Heptane	0.1	9.5E-01	NC	1	NC	1	1.1E+01	3 o	2.0E-01	1 a,o
Hexane	0.1	3.3E-01	NC	1	NC	1	1.1E+01	3	2.0E-01	1 a
Isopropanol	0.1	1.5E-03	NC	1	NC	1	5.0E-01	2 e	2.0E+00	1 a,e
Methyl ethyl ketone	0.1	9.6E-04	NC	1	NC	1	6.0E-01	2	1.4E+00	2 a
Methyl isobutyl ketone (MIBK)	0.1	2.7E-03	NC	1	NC	1	8.0E-02	3 h	8.6E-01	2 a
Methylcyclopentane	0.1	2.4E-01	NC	1	NC	1	8.6E-01	3 b,f	8.6E-01	3 f,h
Methylene chloride	0.1	3.5E-03	1.4E-02	1	3.5E-03	1	6.0E-02	2	1.1E-01	1 a
Propanal	0.1	1.2E-03	NC	1	NC	1	5.0E-01	2 e	2.0E+00	1 a,e
Styrene	0.1	3.7E-02	NC	1	NC	1	2.0E-01	2	2.6E-01	1 a
Tert-butyl alcohol (TBA)	0.1	1.7E-03	NC	1	NC	1	3.0E-01	2 k	3.0E-01	2 b,k
Tetrachloroethylene	0.1	3.3E-02	5.4E-01	1	2.1E-02	1	1.0E-02	2	1.0E-02	1 a
Tetrahydrofuran	0.1	1.2E-03	7.6E-03	3 n	6.8E-03	3 n	2.1E-01	3 n	8.6E-02	3 n
Toluene	0.1	3.1E-02	NC	1	NC	1	2.0E-01	2	8.6E-02	1 a
Total Xylenes	0.1	5.3E-02	NC	1	NC	1	2.0E-01	2	2.9E-02	2
Trichloroethylene	0.1	1.2E-02	1.3E-02	1	7.0E-03	1	3.0E-04	3 n	1.0E-02	3
Vinyl chloride	0.1	5.6E-03	2.7E-01	1	2.7E-01	1	3.0E-03	2	2.9E-02	2

Notes

ABSd: dermal absorption factor (USEPA, 2004b); RfD: reference dose; RfC: reference concentration; REL: reference exposure level

a - Value converted from an RfC value (units: mg chemical/m^3 air), assuming a 20 m^3/day inhalation rate and a 70 kg body weight.

b - Route-to-route extrapolation.

c - Toxicity values for trivalent chromium.

d - Lead exposure is evaluated using Cal-EPA's LeadSpread model or the USEPA Adult Lead Method. See text.

e - Surrogate value - assumes toxicity for methanol.

f - Surrogate value - assumes toxicity for methylcyclohexane.

g - Surrogate value - assumes toxicity for pyrene.

h - Health Effects Assessment Summary Tables (HEAST, USEPA 1997b), from Region IX PRG table (USEPA, 2004a)

i - Surrogate value - assumes toxicity for anthracene.

j - Surrogate value - assumes toxicity for xylenes.

k - Surrogate value - assumes toxicity for isobutanol.

l - Surrogate value - assumes toxicity for hydrogen cyanide.

m - Surrogate value - assumes toxicity for benzaldehyde.

n - National Center for Environmental Assessment (NCEA) from Region IX PRG table (USEPA, 2004a)

o - Surrogate value - assumes toxicity for hexane.

p - Surrogate value - assumes toxicity for methyl isobutyl ketone.

q - Surrogate value - assumes toxicity for acenaphthene

Cancer Toxicity Value Reference Priority:

1. Cal-EPA OEHHA (2007), Toxicity Criteria Database http://www.oehha.ca.gov/risk/chemicalDB/index.asp
2. USEPA (2007) Integrated Risk Information System Database. URL: http://www.epa.gov/iriswebp/iris/subst/index.html
3. USEPA (2004a) Region IX Preliminary Remediation Goal (PRG) table
4. Texas Comission on Environmental Quality (TCEQ 2005), Texas Risk Reduction Program. www.tnrcc.state.tx.us/permitting/rrr.htm

Noncancer Toxicity Value Reference Priority:

The lower value between the REL-to-RfD (1) or the RfD (2) was used for the inhalation noncancer toxicity criteria:

1. Cal-EPA OEHHA (2007), Chronic RELs for Airborne Toxicants, http://www.oehha.org/air/chronic_rels/AllChrels.html
2. USEPA (2007) Integrated Risk Information System Database. URL: http://www.epa.gov/iriswebp/iris/subst/index.html