



## INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

## Dose-Response Table

### Cancer and Hazard Threshold Concentrations – Chronic\* \*Exposure Greater Than 14 Days

#### Air Toxics Program, Office of Air Quality

This document contains:

- Dose-Response Table, Cancer and Hazard Threshold Concentrations – Chronic\* – \*Exposure Greater Than 14 Days,
- Sources from which numbers are derived,
- Air Toxics Program contact information for more information.

Dose-Response Table Cancer and Hazard Threshold Concentrations – Chronic* *Exposure Greater Than 14 Days					
Compound	CAS Number	Cancer Threshold Concentration at 1 In A Million Risk (ug/m3)	Source	Hazard Threshold Concentration (ug/m3)	Source
1,1,1,2-tetrachloroethane	630-20-6	1.4E-01	IRIS		
1,1,1,2-Tetrafluoroethane	811-97-2			80000.00	IRIS
1,1,2,2-tetrachloroethane	79-34-5	1.7E-02	IRIS		
1,1,2-Trichloroethane	79-00-5	6.3E-02	IRIS	400.00	CARB
1,1-Dichloroethylene	75-35-4	2.9E-03	HEAST	200.00	IRIS
1,1-Difluoroethane	75-37-6			40000.00	IRIS
1,1-Dimethyl hydrazine	57-14-7	7.6E-03	OPP-CAN		
1,2,4,5-Tetrachlorobenzene	95-94-3				
1,2,4-Trichlorobenzene	120-82-1	1.0E+00	CARB	200.00	HEAST
1,2,4-Trimethylbenzene	95-63-6			6.00	RSL
1,2-Dibromo-3-chloropropane	96-12-8	5.0E-04	CARB	0.20	IRIS
1,2-Diphenylhydrazine	122-66-7	4.5E-03	IRIS		
1,2-Epoxybutane	106-88-7			20.00	IRIS
1,2-Propylenimine	75-55-8	1.4E-03	CARB		
1,2-trans-dichloroethylene	156-60-5			800.00	ATSDR
1,3,5-Trimethylbenzene	108-67-8			6.00	RSL
1,3-Butadiene	106-99-0	3.3E-02	IRIS	2.00	IRIS
1,3-Dichlorobenzene	541-73-1			105.00	RSL
1,3-trans dichloropropene	10061-02-6	2.7E-02	HWIR	0.02	HWIR
1,3-Dichloropropene	542-75-6	2.5E-01	IRIS	20.00	IRIS
1,3-Dinitrobenzene	99-65-0			0.35	RSL
1,3-Propane sultone	1120-71-4	1.4E-03	CARB		
1,4-Dichlorobenzene	106-46-7	9.1E-02	HEAST	800.00	IRIS
1,4-Dioxane	123-91-1	2.0E-01	IRIS	30.00	IRIS
1-Chloro-1,1-difluoroethane	75-68-3			5000.00	IRIS
2,2,4-Trimethylpentane	540-84-1				
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	3.0E-08	CARB	0.00	CARB

2,4 Dimethylphenol	105-67-9			70.00	RSL
2,4,5-Trichlorophenol	95-95-4			350.00	RSL
2,4,6-Trichlorophenol	88-06-2	3.2E-01	IRIS	0.35	RSL
2,4-D, salts and ethers	94-75-7				
2,4-Dinitrophenol	51-28-5			7.00	RSL
2,4-Dinitrotoluene	121-14-2	1.1E-02	CARB	7.00	CARB
2,4-Toluene diamine	95-80-7	9.1E-04	CARB		
2,4-Toluene diisocyanate	584-84-9	9.1E-02	CARB	0.07	IRIS
2,6-Dinitrotoluene	606-20-2	5.3E-06	RSL	3.50	RSL
2-Acetylaminofluorene	53-96-3	7.7E-04	CARB		
2-Aminoanthraquinone	117-79-3	1.1E-01	CARB		
2-chloroacetophenone	532-27-4			0.03	IRIS
2-Chloronaphthalene	91-58-7			280.00	RSL
2-Ethoxyethanol	110-80-5			200.00	IRIS
2-Methoxyethanol	109-86-4			20.00	IRIS
2-Methylnaphthalene	91-57-6			70.00	RSL
2-Methylphenol	95-48-7			175.00	RSL
2-Naphthylamine	91-59-8	2.7E-05	Conv. Oral		
2-Nitroaniline	88-74-4			2.00	HEAST
2-Nitropropane	79-46-9	1.8E-01	OAQPS	20.00	IRIS
3,3'-Dichlorobenzidine	91-94-1	2.9E-03	CARB		
3,3-Dimethoxybenzidine	119-90-4	7.7E-03	CARB		
3,4-Dimethyl phenol	95-65-8			3.50	RSL
3-Methylcholanthrene	56-49-5	1.6E-04	CARB		
4,4-Methylenedianiline	101-77-9	2.2E-03	CARB	20.00	CARB
4,4-Methylene bis(2-chloroaniline)	101-14-4	2.3E-03	CARB		
4,6-Dinitro-o-cresol, and salts	534-52-1			0.48	TRI
4-aminobiphenyl	92-67-1	1.7E-04	CARB		
4-methylphenol	106-44-5			4.00	CARB
4-Nitrobiphenyl	92-93-3				
4-Nitrophenol	100-02-7			28.00	RSL
7,12-Dimethylbenz[a]anthracene	57-97-6	1.4E-05	CARB		
Acenaphthene	83-32-9			210.00	RSL
Acenaphthylene	208-96-8			35.00	Michigan
Acetaldehyde	75-07-0	4.5E-01	IRIS	9.00	IRIS
Acetamide	60-35-5	5.0E-02	CARB		
Acetone	67-64-1			31000.00	ATSDR
Acetonitrile	75-05-8			60.00	IRIS
Acetophenone	98-86-2				
Acetylene	74-86-2				
Acrolein	107-02-8			0.02	IRIS
Acrylamide	79-06-1	1.0E-02	IRIS	6.00	CARB
Acrylic Acid	79-10-7			1.00	IRIS
Acrylonitrile	107-13-1	1.5E-02	IRIS	2.00	IRIS
Aldrin	309-00-2	2.0E-04	IRIS		
Allyl Chloride	107-05-1	1.7E-01	CARB	1.00	IRIS
alpha-Hexachlorocyclohexane	319-84-6	5.6E-04	IRIS	20.00	CARB
Ammonia	7664-41-7			100.00	IRIS
Aniline	62-53-3	6.3E-01	CARB	1.00	IRIS
Anthracene	120-12-7			1050.00	RSL
Antimony Compounds	7440-36-0			0.20	TRI
Antimony Trioxide	1309-64-4			0.20	IRIS
Aramite	140-57-8	1.4E-01	IRIS		
Arsenic compounds	0	2.3E-04	IRIS	0.03	CARB
Arsine	7784-42-1			0.05	IRIS
Asbestos	1332-21-4	4.3E-06	IRIS		
Azobenzene	103-33-3	3.2E-02	IRIS		

Benzene	71-43-2	1.3E-01	IRIS	30.00	IRIS
Benidine	92-87-5	1.5E-05	IRIS	10.00	CARB
Benzo[a]anthracene	56-55-3	9.1E-03	CARB		
Benzo[a]pyrene	50-32-8	9.1E-04	CARB		
Benzo[b]fluoranthene	205-99-2	9.1E-03	CARB		
Benzo[e]pyrene	192-97-2				
Benzo[g,h,i]perylene	191-24-2	1.1E-04	IDEM		
Benzo[k]fluoranthene	207-08-9	9.1E-03	CARB		
Benzofuran	271-89-6	5.6E-02	CARB		
Benzonitrile	100-47-0				
Benzotrichloride	98-07-7	2.7E-04	IRIS		
Benzyl Chloride	100-44-7	2.1E-02	IRIS	10.15	RSL
Beryllium compounds	0	4.2E-04	IRIS	20.00	IRIS
beta-Hexachlorocyclohexane	319-85-7	1.9E-03	IRIS	2.00	CARB
beta-Propiolactone	57-57-8	2.5E-04	CARB		
Biphenyl	92-52-4			0.42	RSL
bis(2-Chloroethyl)ether	111-44-4	3.0E-03	IRIS		
bis(2-Ethylhexyl)phthalate	117-81-7	4.2E-01	CARB	10.00	CARB
bis(chloromethyl)ether	542-88-1	1.6E-05	IRIS		
Bromoform	75-25-2	9.1E-01	IRIS		
Bromomethane	74-83-9			5.00	IRIS
Butyl benzyl phthalate	85-68-7			700.00	RSL
Cadmium compounds	7440-43-9	5.6E-04	IRIS	0.02	CARB
Calcium cyanamide	156-62-7				
Caprolactum	105-60-2			2.30	RSL
Captan	133-06-2	1.5E+00	CARB		
Carbaryl	63-25-2	4.0E+00	OPP-CAN		
Carbazole	86-74-8	1.8E-01	RSL		
Carbon disulfide	75-15-0			700.00	IRIS
Carbon tetrachloride	56-23-5	1.7E-01	IRIS	100.00	IRIS
Carbonyl Sulfide	463-58-1			12.00	TRI
Catechol	120-80-9	3.8E-01	TRI		
Chlordane	12789-03-6	1.0E-02	IRIS	0.70	IRIS
Chlorine	7782-50-5			0.15	ATSDR
Chlorine Dioxide	10049-04-4			0.20	IRIS
Chlorobenzene	108-90-7			1000.00	CARB
Chlorobenzilate	510-15-6	1.3E-02	HEAST		
Chlorodibromomethane	124-48-1	4.2E-01	IRIS		
Chlorodifluoromethane	75-45-6			5000.00	IRIS
Chloroform	67-66-3	4.3E-02	IRIS	98.00	IRIS
Chloromethane	74-87-3	5.6E-01	SCDM	90.00	IRIS
Chloromethyl methyl ether	107-30-2	1.4E-03	CARB		
Chloroprene	126-99-8	3.3E-03	IRIS	20.00	IRIS
Chromium (VI) compounds	18540-29-9	8.3E-05	IRIS	0.10	IRIS
Chrysene	218-01-9	9.1E-02	CARB		
Cis-1,3-dichloropropene	10061-01-5	2.7E-02	HWIR	200.00	HWIR
Cobalt	7440-48-4			0.10	ATSDR
Coke oven emissions	8007-45-2	1.6E-03	IRIS		
Creosols/Cresylic Acid	1319-77-3			600.00	CARB
Crotonaldehyde	4170-30-3	1.8E-03	TRI		
Cumene	98-82-8			400.00	IRIS
Cyanide Compounds	57-12-5			3.00	TRI
Cyclohexane	110-82-7			6000.00	IRIS
DDE	72-55-9	1.0E-02	CARB		
Dibenz[a,h]anthracene	53-70-3	8.3E-04	CARB		
Dibenzofuran	132-64-9			7.00	RSL
Dichlorobenzene	25321-22-6	1.5E-01	TRI	200.00	TRI

Dichlorobromomethane	75-27-4	5.6E-02	IRIS		
Dichlorvos	62-73-7	1.2E-02	CARB	0.50	IRIS
Dieldrin	60-57-1	2.2E-04	IRIS		
Diesel emissions				5.00	EPA ORD
Diethanolamine	111-42-2			3.00	CARB
Diethyl phthalate	84-66-2			2800.00	RSL
Diethyl Sulfate	64-67-5	2.9E-03	TRI		
Dimethyl carbamoyl chloride	79-44-7	2.7E-04	CARB		
Dimethyl formamide	68-12-2			30.00	IRIS
Dimethyl phthalate	131-11-3			35000.00	RSL
Dimethyl sulfate	77-78-1				
Di-n-butyl phthalate	84-74-2			350.00	RSL
Di-n-octyl phthalate	117-84-0			70.00	RSL
Epichlorohydrin	106-89-8	8.3E-01	IRIS	1.00	IRIS
Ethane	74-84-0				
Ethanol	64-17-5			2200.00	ACGIH
Ethyl acrylate	140-88-5	7.1E-02	HEAST	48.00	CARB
Ethyl Carbamate	51-79-6	3.4E-03	CARB		
Chloroethane	75-00-3	7.5E+00	CARB	10000.00	IRIS
Ethyl methanesulfonate	62-50-0	1.2E-05	HWIR		
Ethylbenzene	100-41-4	4.0E-01		1000.00	IRIS
Ethylene dibromide	106-93-4	1.7E-03	IRIS	9.00	IRIS
Ethylene dichloride	107-06-2	3.8E-02	IRIS	2400.00	IRIS
Ethylene glycol	107-21-1			400.00	CARB
Ethylene glycol monobutyl ether	111-76-2			1300.00	IRIS
Ethylene imine	151-56-4	5.3E-05	CARB		
Ethylene oxide	75-21-8	1.1E-02	CARB	30.00	CARB
Ethylene thiourea	96-45-7	7.7E-02	CARB	3.00	CARB
Ethylidene dichloride	75-34-3	6.3E-01	CARB	500.00	HEAST
Fluoranthene	206-44-0			140.00	RSL
Fluorene	86-73-7			140.00	RSL
Fluoride	16984-48-8			13.00	CARB
Formaldehyde	50-00-0	7.7E-02	IRIS	9.80	ATSDR
Freon 11	75-69-4			700.00	HEAST
Freon 113	76-13-1			30000.00	HEAST
Freon 12	75-71-8			200.00	HEAST
Glycol Ethers	0			20.00	TRI
Heptachlor	76-44-8	7.7E-04	IRIS		
Heptachlor epoxide	1024-57-3	3.8E-04	IRIS		
Heptane	142-82-5			1900.00	ACGIH
Hexachlorobenzene	118-74-1	2.2E-03	IRIS	3.00	RSL
Hexachlorobutadiene	87-68-3	4.5E-02	IRIS	90.00	CARB
Hexachlorocyclopentadiene	77-47-4			0.20	IRIS
Hexachlorodibenzo-p-dioxon	57653-85-7	7.7E-07	IRIS		
Hexachloroethane	67-72-1	2.5E-01	IRIS	30.00	IRIS
Hexamethylene-1,6-diisocyanate	822-06-0			0.01	IRIS
Hexamethylphosphoramide	680-31-9				
Hydrazine	302-01-2	2.0E-04	IRIS	0.20	CARB
Hydrochloric Acid	7647-01-0			20.00	IRIS
Hydrofluoric acid	7664-39-3			14.00	IRIS
Hydrogen Cyanide	74-90-8			0.80	IRIS
Hydrogen Sulfide	6/4/7783			2.00	IRIS
Hydroquinone	123-31-9	6.3E-02	TRI		
Indeno[1,2,3-cd]pyrene	193-39-5	9.1E-03	CARB		
Isobutyraldehyde	78-84-2			35.00	TRI
Isophorone	78-59-1	3.7E+00	IRIS	2000.00	CARB
Isopropanol	67-63-0			7000.00	CARB

Isosafrole	120-58-1				
Lead compounds	0	8.3E-02	CARB	0.15	CARB
Lindane	58-89-9	3.2E-03	CARB	0.30	CARB
Maleic anhydride	108-31-6			0.70	CARB
Manganese compounds	0			0.30	ATSDR
m-Creosol	108-93-4				
Mercury compounds	0			0.09	CARB
Mercury, elemental	7439-97-6			0.30	IRIS
Methanol	67-56-1			20000.00	IRIS
Methyl chloroform	71-55-6			5000.00	CARB
Methyl ethyl ketone (MEK)	78-93-3			5000.00	IRIS
Methyl hydrazine	60-34-4	4.5E-03	CARB		
Methyl iodide	74-88-4	1.2E-03	TRI		
Methyl isobutyl ketone	108-10-1			3000.00	RSL
Methyl Isocyanate	624-83-9			1.00	CARB
Methyl methacrylate	80-62-6			700.00	IRIS
Methyl methanesulfonate	66-27-3	3.6E-02	CARB		
Methyl tert butyl ether	1634-04-4	3.8E+00	CARB	3000.00	IRIS
Methylene chloride	75-09-2	1.0E+02	IRIS	600.00	IRIS
Methylene diphenyl diisocyanate	101-68-8			0.60	IRIS
M-Xylene	108-38-3			200.00	CARB
N,N-Diethyl aniline	121-69-7				
Naphthalene	91-20-3	2.9E-02	CARB	3.00	IRIS
n-Hexane	110-54-3			700.00	IRIS
Nickel compounds	0	4.2E-03	IRIS	0.20	ATSDR
Nickel subsulfide	12035-72-2	2.1E-03	IRIS		
Nitrobenzene	98-95-3	2.5E-02		9.00	CARB
N-Nitrosodiethylamine	55-18-5	2.3E-05	IRIS		
N-Nitrosodimethylamine	62-75-9	7.1E-05	IRIS		
N-Nitroso-di-N-butylamide	924-16-3	6.3E-04	IRIS		
N-Nitroso-methylethylamine	10595-95-6	1.6E-04	CARB		
N-Nitrosomorpholine	59-89-2	5.3E-04	CARB		
N-Nitroso-N-methylurea	684-93-5	2.9E-05	CARB		
N-Nitrosopyrrolidine	930-55-2	1.6E-03	IRIS		
o-Anisidine	90-04-0	2.5E-02	CARB	0.20	TRI
o-Toluidine	95-53-4	2.0E-02	CARB		
o-Xylene	95-47-6			200.00	CARB
p,p-Dichlorodiphenyltrichloroethane	50-29-3	1.0E-02	IRIS		
Parathion	56-38-2				
Pentachloronitrobenzene	82-68-8	1.4E-02	HEAST		
Pentachlorophenol	87-86-5	2.0E-01	CARB	100.00	CARB
Perchloroethylene	127-18-4	3.8E+00	IRIS	40.00	IRIS
Phenanthrene	85-01-8			10.50	IDEM(R)
Phenol	108-95-2			200.00	CARB
Phosgene	75-44-5			0.30	CARB
Phosphine	7803-51-2			0.30	IRIS
Phosphoric Acid	7664-38-2			10.00	IRIS
Phosphorous	7723-14-0			0.07	CARB
Phthalic anhydride	85-44-9			20.00	CARB
Polychlorinated biphenyl compounds (PCBs)	1336-36-3	1.0E-02	IRIS	0.07	RSL
Polycyclic Organic Matter	0	2.9E-03	EPA		
Propene	68551-10-0			300.00	CARB
Propionaldehyde	123-38-6			8.00	IRIS
Propoxur	114-26-1	9.1E-01	OPP-CAN		
Propylene	115-07-1			3000.00	CARB
Propylene dichloride	78-87-5	5.3E-02	HEAST	4.00	IRIS

Propylene glycol monmethyl ether	107-98-2			2000.00	IRIS
Propylene oxide	75-56-9	2.7E-01	IRIS	30.00	IRIS
P-Xylene	106-42-3			200.00	CARB
Pyrene	129-00-0			105.00	RSL
Pyridine	110-86-1			3.50	RSL
Quinoline	91-22-5	1.2E-03	Conv. Oral		
Safrole	94-59-7	1.6E-02	CARB		
Selenium compounds	0			20.00	CARB
Styrene	100-42-5			1000.00	IRIS
Styrene oxide	96-09-3	2.2E-02	CARB	6.00	CARB
technical-Hexachlorocyclohexane	608-73-1	2.0E-03	IRIS		
Titanium Tetrachloride	7550-45-0			0.10	TRI
Toluene	108-88-3			5000.00	IRIS
Toxaphene	8001-35-2	3.1E-03	IRIS		
Trichloroethylene	79-01-6	2.4E-01	IRIS	2.00	IRIS
Triethylamine	121-44-8			7.00	IRIS
Trifluralin	1582-09-8	4.5E-01	IRIS		
Vinyl Acetate	108-05-4			200.00	IRIS
Vinyl bromide	593-60-2	3.1E-02	HEAST	3.00	IRIS
Vinyl chloride	75-01-4	1.1E-01	IRIS	100.00	IRIS
Xylenes	1330-20-7			100.00	IRIS

## Sources:

Sources from which the numbers are derived include:

- Integrated Risk Information System (IRIS): <http://www.epa.gov/iris>
- Agency for Toxic Substances and Disease Registry (ATSDR): <http://www.atsdr.cdc.gov/>
- Health Effects Assessment Summary Tables (HEAST): <http://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=2877&CFID=45448247&CFTOKEN=94409042>
- California Environmental Protection Agency Air Resource Board (CARB) [PDF]: <http://www.arb.ca.gov/toxics/healthval/contable.pdf>
- International Agency for Research on Cancer (IARC): <http://monographs.iarc.fr/>
- U.S. EPA Regional Screening Levels (RSL) – Generic Tables: <http://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2015>
- U. S. EPA Office of Pesticide Programs (OPP-CAN) [PDF]: [http://npic.orst.edu/chemicals\\_evaluated.pdf](http://npic.orst.edu/chemicals_evaluated.pdf)
- U. S. EPA Hazardous Waste Identification Rule (HWIR): <https://archive.epa.gov/epawaste/hazard/web/html/index-55.html>
- Michigan Air Toxics: <http://www.deq.state.mi.us/itslirs/>
- TRI Risk-Screening Environmental Indicators (TRI): <http://www.epa.gov/rsei/risk-screening-environmental-indicators-rsei-technical-appendices-version-234>
- Superfund Chemical Data Matrix (SCDM): <http://www.epa.gov/superfund/superfund-chemical-data-matrix-scdm>
- American Conference of Governmental Industrial Hygienists (ACGIH): <https://www.acgih.org/science/tlv-bei-guidelines/policies-procedures-presentations/tlv-bei-development/>

## Contact and More Information:

- For questions concerning the Air Toxics Program, please contact staff at (317) 233-5697 or (800) 451-6027.
- For questions concerning the dose-response table above, please contact Jeff Stoakes, at (317) 233-0429 or [jstoakes@idem.IN.gov](mailto:jstoakes@idem.IN.gov).
- Please visit IDEM's Air Toxics Program website at <https://www.in.gov/idem/toxic/>.