

8. REGULATIONS, ADVISORIES, AND GUIDELINES

MRLs are substance specific estimates, which are intended to serve as screening levels, are used by ATSDR health assessors and other responders to identify contaminants and potential health effects that may be of concern at hazardous waste sites.

ATSDR has derived an intermediate-duration oral MRL of 0.1 mg/kg/day for 1,2,4-trichlorobenzene based on an increased incidence of centrilobular hepatocyte hypertrophy in male rats administered 1,2,4-trichlorobenzene in the diet for 13 weeks (CMA 1989). The MRL was derived using BMD modeling of incidence data for hepatocyte hypertrophy in male rats. The predicted dose associated with a 10% extra risk (BMD_{10}) for hepatocyte hypertrophy was 33.09 mg/kg/day; the lower 95% confidence limit on this dose ($BMDL_{10}$) was 14.35 mg/kg/day. An uncertainty factor of 100 was used (10 for animal to human extrapolation and 10 for human variability).

ATSDR has derived a chronic-duration oral MRL of 0.1 mg/kg/day for 1,2,4-trichlorobenzene based on an increased incidence of hepatocellular hypertrophy in male rats administered 1,2,4-trichlorobenzene in the diet for 104 weeks (Moore 1994a). The MRL was derived using BMD modeling of incidence data for hepatocellular hypertrophy in male rats. The predicted dose associated with a 10% extra risk (BMD_{10}) for hepatocellular hypertrophy was 23.25 mg/kg/day; the lower 95% confidence limit on this dose ($BMDL_{10}$) was 13.33 mg/kg/day. An uncertainty factor of 100 was used (10 for animal to human extrapolation and 10 for human variability).

EPA (IRIS 2010) has established an oral reference dose (RfD) for 1,2,4-trichlorobenzene of 0.01 mg/kg/day based on a NOAEL of 14.8 mg/kg/day for increased adrenal weights in rats exposed to 1,2,4-trichlorobenzene in drinking water (Robinson et al. 1981). The uncertainty factor used in this assessment was 1,000 (10 for extrapolation from laboratory studies, 10 for the protection of sensitive human subpopulations, and 10 to account for a lack of chronic studies). EPA's assessment was conducted in 1991.

EPA has not derived an inhalation reference concentration (RfC) for trichlorobenzenes.

The international and national regulations, advisories, and guidelines regarding trichlorobenzenes in air, water, and other media are summarized in Table 8-1.

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Table 8-1. Regulations, Advisories, and Guidelines Applicable to Trichlorobenzenes

Agency	Description	Information	Reference
<u>INTERNATIONAL</u>			
Guidelines:			
IARC	Carcinogenicity classification	No	IARC 2009
WHO	Air quality guidelines	No	WHO 2000
	Drinking water quality guidelines	No ^a	WHO 2006
<u>NATIONAL</u>			
Regulations and Guidelines:			
a. Air			
ACGIH	TLV (8-hour TWA)	No	ACGIH 2009
	STEL (15-minute TWA) 1,2,4-Trichlorobenzene TLV-basis (critical effect)	5 ppm ^b Eye and upper respiratory tract irritation	
AIHA	ERPGs	No	AIHA 2010
EPA	AEGLs	No	EPA 2010c
	Hazardous air pollutant		EPA 2006b 42 USC 7412
	1,2,4-Trichlorobenzene	Yes	
	Regulated toxic substances and threshold quantities for accidental release prevention	No	EPA 2009j 40 CFR 68.130
NIOSH	Second AEGL chemical priority list		EPA 2010d
	1,2,4-Trichlorobenzene	Yes ^c	
	REL (10-hour TWA) 1,2,4-Trichlorobenzene Target organs	5 ppm (40 mg/m ³) ^b Eyes, skin, respiratory system, liver, reproductive system	NIOSH 2005
OSHA	Category of pesticide	Group III ^d	NIOSH 1992
	PEL (8-hour TWA) for general industry	No	OSHA 2009 29 CFR 1910.1000, Table Z-1

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Agency	Description	Information	Reference
NATIONAL (cont.)			
DOE	TEELs		
	TEEL-0 ^e		
	1,2,3-Trichlorobenzene	5 mg/m ³	DOE 2010a
	1,2,4-Trichlorobenzene	0.25 ppm (1.5 mg/m ³)	DOE 2010b
	PAC-1 ^f		
	1,2,3-Trichlorobenzene	15 mg/m ³	
	1,2,4-Trichlorobenzene	0.75 ppm (5 mg/m ³)	
	PAC-2 ^g		
	1,2,3-Trichlorobenzene	25 mg/m ³	
	1,2,4-Trichlorobenzene	5 ppm (35 mg/m ³)	
	PAC-3 ^h		
	1,2,3-Trichlorobenzene	500 mg/m ³	
	1,2,4-Trichlorobenzene	40 ppm (300 mg/m ³)	
b. Water			
EPA	Designated as hazardous substances in accordance with Section 311(b)(2)(A) of the Clean Water Act	No	EPA 2009c 40 CFR 116.4
EPA	Drinking water contaminant candidate list	No	EPA 1998a 63 FR 10274
	Drinking water standards and health advisories		EPA 2009d
	1-Day health advisory for a 10-kg child		
	1,2,4-Trichlorobenzene	0.1 mg/L	
	1,3,5-Trichlorobenzene	0.6 mg/L	
	10-Day health advisory for a 10-kg child		
	1,2,4-Trichlorobenzene	0.1 mg/L	
	1,3,5-Trichlorobenzene	0.6 mg/L	
	DWEL		
	1,2,4-Trichlorobenzene	0.35 mg/L	
	1,3,5-Trichlorobenzene	0.2 mg/L	
	Lifetime		
	1,2,4-Trichlorobenzene	0.07 mg/L	
	1,3,5-Trichlorobenzene	0.04 mg/L	
	10 ⁻⁴ Cancer risk	No	
	Master Testing List	Yes ⁱ	EPA 1996a

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Agency	Description	Information	Reference
NATIONAL (cont.)			
EPA	National primary drinking water standards (1,2,4-trichlorobenzene)		EPA 2009e
	MCL	0.07 mg/L	
	Potential health effects from long-term exposure above the MCL	Changes in adrenal glands	
	Common sources of 1,2,4-Trichlorobenzene in drinking water	Discharge from textile finishing factories	
	Public health goal	0.07 mg/L	
	National recommended water quality criteria (1,2,4-trichlorobenzene)	Yes	EPA 2006a
	Human health for the consumption of		
	Water + organism	35 µg/L	
	Organism only	70 µg/L	
	Reportable quantities of hazardous substances designated pursuant to Section 311 of the Clean Water Act	No	EPA 2009i 40 CFR 117.3
	Groundwater monitoring list	Yes	EPA 2009a 40 CFR 264, Appendix IX
c. Food			
FDA	Bottled drinking water		FDA 2010a 21 CFR 165.110
	1,2,4-Trichlorobenzene	0.07 mg/L	
	EAFUS	No	FDA 2010b
d. Other			
ACGIH	Carcinogenicity classification	No	ACGIH 2009
EPA	Carcinogenicity classification		IRIS 2010
	1,2,4-trichlorobenzene	D ^j	
	RfC	No	
	RfD		
	1,2,4-Trichlorobenzene	0.01 mg/kg/day	
	Superfund, emergency planning, and community right-to-know		
	Designated CERCLA hazardous substance (1,2,4-trichlorobenzene)	Yes ^k	EPA 2009g 40 CFR 302.4
	Reportable quantity	100 pounds	
	Effective date of toxic chemical release reporting		EPA 2009i 40 CFR 372.65
	1,2,4-Trichlorobenzene	1/1/1987	

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Agency	Description	Information	Reference
<u>NATIONAL</u> (cont.)			
	Extremely hazardous substances and its threshold planning quantity	No	EPA 2009h 40 CFR 355, Appendix A
EPA	TSCA chemical lists and reporting periods	No	EPA 2009b 40 CFR 712.30
	TSCA health and safety data reporting Effective date		EPA 2009m 40 CFR 716.120
	1,2,3-Trichlorobenzene	10/04/1982	
	1,2,4-Trichlorobenzene	10/04/1982	
	1,3,5-Trichlorobenzene	10/04/1982	
	Sunset date		
	1,2,3-Trichlorobenzene	10/04/1992	
	1,2,4-Trichlorobenzene	10/04/1992	
	1,3,5-Trichlorobenzene	10/04/1992	
	RCRA waste minimization PBT priority chemical list (1,2,4-trichlorobenzene)	Yes	EPA 1998b 63 FR 60332
EPA	Standards of performance for equipment leaks of VOC in the synthetic organic chemicals manufacturing industry		EPA 2009f 40 CFR 60 Subpart VV
	Trichlorobenzenes	Yes	
	Organic hazardous air pollutant		EPA 2009k 40 CFR 63, Table 2 to Subpart F
	1,2,4-Trichlorobenzene	Yes	

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Agency	Description	Information	Reference
NATIONAL (<i>cont.</i>)			
NTP	Carcinogenicity classification	No	NTP 2005

^aGuideline value not established because total trichlorobenzenes occur in drinking water at concentrations below those at which toxic effects may occur, and health-based value would exceed lowest reported odor threshold (WHO 2006).

^bCeiling: the concentration should not be exceeded during any part of the working exposure.

^cTrichlorobenzenes are included on the list of 371 priority chemicals that are acutely toxic and represent the selection of chemicals for AEGL development by the NAC/AEGL committee during the next several years.

^dGroup III pesticides pose minimal risk of adverse acute effects even at relatively high doses.

^eTEEL-0 is the threshold concentration below which most people will experience no adverse health effects.

^fPAC-1 is the airborne concentration (expressed as ppm or mg/m³) of a substance above which it is predicted that the general population, including susceptible individuals, could experience discomfort, irritation, or certain asymptomatic, nonsensory effects. However, these effects are not disabling and are transient and reversible upon cessation of exposure.

^gPAC-2 is the airborne concentration (expressed as ppm or mg/m³) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting, adverse health effects or an impaired ability to escape.

^hPAC-3 is the airborne concentration (expressed as ppm or mg/m³) of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

ⁱ1,2,4-Trichlorobenzene was originally recommended to the MTL by the TSCA Interagency Testing Committee in 1990 and was removed in 1994 because the TSCA Section 4 Final Rule-Making testing program was completed.

1,2,4-Trichlorobenzene was again recommended to the MTL in 1995 by the Organization for Economic Cooperation and Development (OECD) and by the U.S. EPA Office of Air and Radiation (OAR). The OECD chemical testing program is currently underway by a voluntary testing agreement and the testing needs include SIDS screening data for health effects, environmental effects, and environmental fate and exposure. The OAR chemical testing action development is currently underway and the testing needs for health effects include acute toxicity, neurotoxicity, developmental toxicity and immunotoxicity.

^jD: not classifiable as to human carcinogenicity based on a dermal exposure study in mice that was found inadequate for drawing conclusions as to carcinogenicity in humans.

^kDesignated CERCLA hazardous substance pursuant to Section 311(b)(2) of the Clean Water Act and Section 112 of the Clean Air Act.

ACGIH = American Conference of Governmental Industrial Hygienists; AEGL = acute exposure guideline levels; AIHA = American Industrial Hygiene Association; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; DOE = Department of Energy; DWEL = drinking water equivalent level; EAFUS = Everything Added to Food in the United States; EPA = Environmental Protection Agency; ERPG = emergency response planning guidelines; FDA = Food and Drug Administration; IARC = International Agency for Research on Cancer; IRIS = Integrated Risk Information System; MCL = maximum contaminant level; MCLG = maximum contaminant level goal; MTL = Master Testing List; NAC = National Advisory Committee; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PAC = protective action criteria; PBT = persistent, bioaccumulative, and toxic; PEL = permissible exposure limit; RCRA = Resource Conservation and Recovery Act; REL = recommended exposure limit; RfC = inhalation reference concentration; RfD = oral reference dose; SIDS = Screening Information Data Sets; STEL = short-term exposure limit; TEEL = temporary emergency exposure limits; TLV = threshold limit values; TSCA = Toxic Substances Control Act; TWA = time-weighted average; USC = United States Code; VOC = volatile organic compound; VTA = Voluntary Testing Agreement; WHO = World Health Organization

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EPA has designated 1,2,4-trichlorobenzene as a hazardous air pollutant (HAP) under the Clean Air Act (CAA) (EPA 2006b). 1,2,4-Trichlorobenzene is on the list of chemicals appearing in "Toxic Chemicals Subject to Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986" and has been assigned a reportable quantity (RQ) limit of 100 pounds (EPA 2009g). The RQ represents the amount of a designated hazardous substance which, when released to the environment, must be reported to the appropriate authority.