

## 8. REGULATIONS AND ADVISORIES

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

ATSDR has derived an acute oral MRL of  $8 \times 10^{-3}$  mg/kg/day on the basis of developmental neurotoxic effects in rats. This MRL is based on a LOAEL of 2.5 mg/kg/day for hyperactivity in rat offspring whose mothers were exposed to hexachlorobenzene for 4 days prior to mating (Goldey and Taylor 1992).

An intermediate oral MRL of  $1 \times 10^{-4}$  mg/kg/day, based on reproductive effects in monkeys (Babineau et al. 1991; Bourque et al. 1995; Jarrell et al. 1993) has also been derived for hexachlorobenzene by ATSDR. This MRL is based on degenerative changes in the ovaries of female monkeys exposed to hexachlorobenzene doses of  $0.01$  mg/kg/day for 90 days.

ATSDR has also derived a chronic oral MRL of  $5 \times 10^{-5}$  mg/kg/day, based on a LOAEL of 0.016 mg/kg/day for peribiliary lymphocytosis and fibrosis of the liver in adult  $F_1$  generation male rats fed hexachlorobenzene for 130 weeks in a 2-generation study by Arnold et al. (1985).

The EPA oral reference dose for hexachlorobenzene (IRIS 2002) is  $8 \times 10^{-4}$  mg/kg/day based on liver effects in the Arnold et al. (1985) rat study. No reference concentration exists for the compound. These EPA assessments are currently undergoing re-evaluation.

EPA has classified hexachlorobenzene in weight-of-evidence Group B2 as a probable human carcinogen (IRIS 2001). EPA derived an oral slope factor of 1.6 per (mg/kg)/day and an inhalation unit risk of  $4.6 \times 10^{-4}$  per ( $\mu\text{g}/\text{m}^3$ ) based on hepatocellular carcinoma in rats exposed orally. This EPA assessment is currently being re-evaluated. IARC classifies the chemical as 2B, possibly carcinogenic to humans (IARC 2001). The National Toxicology Program (2001) concluded that hexachlorobenzene is reasonably anticipated to be a human carcinogen.

Hexachlorobenzene is on the list of chemicals appearing in "The Emergency Planning and Community Right-to-Know Act of 1986" (EPCRA) (EPA 2001a). Section 313 of Title III of EPCRA requires owners and operators of certain facilities that manufacture, import, process, or otherwise use the chemicals on this list to report annually their release of those chemicals to any environmental media.

## 8. REGULATIONS AND ADVISORIES

Although no Occupational Safety and Health Administration standards exist for hexachlorobenzene, the American Conference of Governmental Industrial Hygienists has set a threshold limit value (8-hour time weighted average) of 0.002 mg/m<sup>3</sup> (ACGIH 2001), based on a route-to-route extrapolation from an oral study in Rhesus monkeys (Rozman et al. 1978).

Hexachlorobenzene is regulated by the Clean Water Effluent Guidelines as stated in Title 40, Section 400–475, of the Code of Federal Regulations. For each point source category, hexachlorobenzene may be regulated as one of a group of chemicals that are controlled as Total Toxic Organics, or may have a specific Regulatory Limitation, or may have a Zero Discharge Limitation. The point source categories for which hexachlorobenzene is controlled as a Total Toxic Organic are electroplating (EPA 2001b), metal finishing (EPA 2001c), and coil coating. The point source categories for which hexachlorobenzene has a specific Regulatory Limitation include primary rare earth metals (EPA 2001d) and organic chemicals, plastics, and synthetic fibers (EPA 2001e).

The Resource Conservation and Recovery Act (RCRA) identifies hexachlorobenzene as a hazardous waste in two ways: (1) when it exceeds a toxicity characteristic leaching procedure test concentration of 0.13 mg/L (EPA 2000p), and (2) when discarded as a commercial product, off-spec species, container residue, or spill residue (EPA 2001i).

## 8. REGULATIONS AND ADVISORIES

**Table 8-1. Regulations and Guidelines Applicable to Hexachlorobenzene**

Agency	Description	Information	Reference
<u>INTERNATIONAL</u>			
Guidelines:			
IARC	Carcinogenicity classification	Group 2B <sup>a</sup>	IARC 2001
WHO	Drinking water guideline	1 µg/L	WHO 1996
	Total daily intake in humans		WHO 1997
	Non-cancer effects	0.17 µg/kg b.w./day	
	Neoplastic effects	0.16 µg/kg b.w./day	
<u>NATIONAL</u>			
Regulations and Guidelines:			
a. Air			
ACGIH	TLV (8-hour TWA)	0.002 mg/m <sup>3</sup>	ACGIH 2001
NIOSH	REL	No data	
OSHA	PEL	No data	
USC	Listed as a hazardous air pollutant		USC 2001 42 USC 7412
b. Water			
EPA	Drinking water standard	0.001 ppm	EPA 2001m 40CFR141.32(e)(68)
	MCL	0.001 mg/L	EPA 2001k 40CFR141.61(c)
	MCLG	Zero	EPA 2001l 40CFR141.50(a)(22)
	Effluent guidelines and standards—electroplating point source category	Total toxic organics	EPA 2001b 40CFR413.02
	Effluent guidelines and standards—metal finishing point source category	Total toxic organics	EPA 2001c 40CFR433.11
	Effluent guidelines and standards—nonferrous metals manufacturing point source category	New source performance standards for the primary rare earth metals subcategory	EPA 2001d 40CFR421.274
	Effluent guidelines and standards—organic chemicals, plastics, and synthetic fibers		EPA 2001e 40CFR414

## 8. REGULATIONS AND ADVISORIES

**Table 8-1. Regulations and Guidelines Applicable to Hexachlorobenzene  
(continued)**

Agency	Description	Information	Reference
<u>NATIONAL</u> (cont.)			
EPA	Groundwater monitoring Suggested methods 8120 8270	<u>PQL</u> 0.5 µg/L 10 µg/L	EPA 2001f 40CFR264, Appendix IX
	Land disposal restrictions; universal treatment standards Waste water Non-waste water	0.055 mg/L <sup>2</sup> 10 mg/kg <sup>3</sup>	EPA 2001j 40CFR268.48(a)
c. Food			
USDA	Labeling of treated seed with commonly accepted chemical (generic) name of substance		USDA 2001 7CFR201.31a(b)
d. Other			
ACGIH	Carcinogenicity classification	A3 <sup>b</sup>	ACGIH 2001
EPA	Carcinogenicity classification Oral slope factor Inhalation unit risk RfD RfC	B2 <sup>c</sup> 1.6 per (mg/kg)/day 4.6x10 <sup>-4</sup> per (µg/m <sup>3</sup> ) 8x10 <sup>-4</sup> mg/kg/day No data	IRIS 2001
	Health-based limits for exclusion of waste-derived residues— concentration limits for residues	2x10 <sup>-4</sup> mg/kg	EPA 2001h 40CFR266, Appendix VII
	Identification and listing of hexachlorobenzene as a hazardous waste—hazardous waste number	U127	EPA 2001i 40CFR261.33(f)
	Maximum concentration of contaminants for the toxicity characteristic—regulatory level	0.13 mg/L	EPA 2001p 40CFR261.24

## 8. REGULATIONS AND ADVISORIES

**Table 8-1. Regulations and Guidelines Applicable to Hexachlorobenzene  
(continued)**

Agency	Description	Information	Reference
<u>NATIONAL</u> (cont.)			
EPA	Reportable quantity regarded as a CERCLA hazardous substance under Section 307(a) of the Clean Water Act, Section 112 of the Clean Air Act, and Section 3001 of RCRA	10 pounds	EPA 2001a 40CFR302.4
	Hazardous waste management Unit risk Risk specific dose	4.9x10 <sup>-4</sup> µg/m <sup>3</sup> 2.0x10 <sup>-2</sup> µg/m <sup>3</sup>	EPA 2001g 40CFR266, Appendix V
	Toxic chemical release reporting; community right-to-know—alternate reporting threshold for PBT compounds	10 pounds	EPA 2001o 40CFR372.27
	Toxic chemical release reporting; community right-to-know—effective date of reporting	01/01/87	EPA 2001n 40CFR372.65
NTP	Carcinogenicity classification	Reasonably anticipated to be a human carcinogen	NTP 2001
<u>STATE</u>			
a. Air			
Idaho	Acceptable ambient concentration for a carcinogen Emissions level	2x10 <sup>-3</sup> µg/m <sup>3</sup> 1.3x10 <sup>-5</sup> pounds/hour	ID Dept. of Health and Welfare 1999
Washington	Acceptable source impact levels (at 10 <sup>-6</sup> risk), annual average	0.0022 µg/m <sup>3</sup>	WA Dept. of Ecology 1998
Wisconsin	Hazardous air contaminants without acceptable ambient concentrations requiring application of best available control technology	25 pounds/year <sup>2</sup>	WI Dept. of Natural Resources 1997
b. Water			
Alaska	MCL	0.001 mg/L	AK Dept. of Environ. Conservation 1999
Arizona	Drinking water guideline	0.02 ug/L	HSDB 2001

## 8. REGULATIONS AND ADVISORIES

**Table 8-1. Regulations and Guidelines Applicable to Hexachlorobenzene  
(continued)**

Agency	Description	Information	Reference
<i>STATE (cont.)</i>			
California	MCL	0.001 mg/L	CA Dept. of Health Services 2000
Colorado	Groundwater standard	1 µg/L	CO Dept. of Public Health and Environ. 1999
Hawaii	MCL applying to community and non-transient, non-community water systems	0.001 mg/L	HI Dept. of Health 1999a
Hawaii	Toxic pollutant standards <sup>e</sup>		HI Dept. of Health 1999b
	Freshwater		
	Acute	No standard	
	Chronic	No standard	
	Saltwater		
	Acute	No standard	
	Chronic	No standard	
	Fish consumption	2.4x10 <sup>-4</sup> µg/L	
Kansas	Water quality standards		KS Dept. of Health and Environ. 1999
	Aquatic life		
	Acute	6.0 mg/L	
	Chronic	3.7 mg/L	
	Public health		
	Food procurement	7.4x10 <sup>-4</sup> mg/L	
	Domestic water supply	1 mg/L	
Maine	Drinking water guideline	0.2 µg/L	HSDB 2001
Minnesota	Drinking water guideline	0.2 µg/L	HSDB 2001
New Jersey	Groundwater quality criteria PQL	0.02 µg/L 10 µg/L	NJ Dept. of Environ. Protection 1993
South Dakota	MCL for drinking water	0.001 mg/L	SD Dept. of Environ. Natural Resources 1998
c. Food	No data		
d. Other			
California	Proposition 65 chemical; known to the state to cause cancer and developmental toxicity	Any manufacturer, packager, or producer required to add specific warnings to products and shipments	BLR 2002

8. REGULATIONS AND ADVISORIES

**Table 8-1. Regulations and Guidelines Applicable to Hexachlorobenzene  
(continued)**

Agency	Description	Information	Reference
<i>STATE (cont.)</i>			
Florida	Toxic substance	A toxic substance is present in any mixture if it is 1% or more of the mixture	BLR 2002
Massachusetts	Hazardous substance	Carcinogen, teratogen, and extraordinary hazardous	BLR 2002
Minnesota	Hazardous substance	Potential hazard from absorption through skin contact	BLR 2002
New Jersey	Right to know hazardous substance; required to submit surveys listing the hazardous substances present at their facilities in quantities >500 pounds; and report their inventories of any chemical that requires a MSDS and is present on site in quantities >10,000 pounds		BLR 2002
New York	Hazardous substance—reportable quantities		BLR 2002
	Air	10 pounds	
	Land	1 pound	

<sup>a</sup>Group 2B: possibly carcinogenic to humans

<sup>b</sup>A3: confirmed animal carcinogen with unknown relevance to humans

<sup>c</sup>B2: probable human carcinogen

<sup>d</sup>Indicates value derived using an oral cancer potency factor as a surrogate.

ACGIH = American Conference of Governmental Industrial Hygienists; ATSDR = Agency for Toxic Substances and Disease Registry; BLR = Business & Legal Reports, Inc.; b.w. = body weight; CERCLA = Comprehensive Environmental Response Compensation and Liability Act; CFR = Code of Federal Regulations; EPA = Environmental Protection Agency; HSDB = Hazardous Substances Data Bank; IARC = International Agency for Research on Cancer; IRIS = Integrated Risk Information System; MCL = maximum contaminant level; MCLG = maximum contaminant level goal; MRLs = Minimal Risk Levels; MSDS = Material Safety Data Sheets; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = permissible exposure limit; PQL = practical quantitation limit; RCRA = Resource Conservation and Recovery Act; REL = recommended exposure limit; RfC = inhalation reference concentration; RfD = oral reference dose; TLV = threshold limit value; TWA = time-weighted average; USC = United States Code; USDA = United States Department of Agriculture; WHO = World Health Organization

