7. REGULATIONS AND ADVISORIES

The international, national, and state regulations and guidelines regarding heptachlor and heptachlor epoxide in air, water, and other media are summarized in Tables 7-1 and 7-2, respectively.

ATSDR has not derived an MRL for heptachlor or heptachlor epoxide. EPA (IRIS 1990) has derived an oral reference dose (RfD) for heptachlor of 5.00×10^{-4} mg/kg/day with an uncertainty factor of 300, based on liver weight increases in male rats in a 2-year feeding study (Witherup et al. 1955). EPA (IRIS 1990) assigned heptachlor epoxide an RfD of 1.30×10^{-5} mg/kg/day with an uncertainty factor of 1,000, based on increased liver-to-body-weight ratios in male and female dogs in a 60-week feeding study (University of Cincinnati 1958). No inhalation reference concentration (RfC) data exist for either chemical.

Heptachlor 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" (EPA 1987e, 1988e).

Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), all uses of heptachlor and heptachlor epoxide were canceled in 1978, except for use in subsurface control of subterranean termites and for dipping of roots and tops of nonfood plants (EPA 1985c; FDA 1989c).

FDA has established an action level of 0.3 ppm for chlorinated hydrocarbons found in the fat of the following food-producing animals: adult cattle, calves, swine, sheep, goats, and poultry (HSDB 1990). In 1989, EPA recommended a replacement action level of 0.2 ppm for heptachlor and heptachlor epoxide (EPA 1989b).

On August 25, 1989, FDA established new and revised action levels for unavoidable residues of the canceled pesticide heptachlor and its metabolite heptachlor epoxide in food and feed. The action levels were recommended by EPA following revocation of previous tolerances in raw agricultural commodities. The action levels now in effect for residues of heptachlor and heptachlor epoxide, either individually or in combination, are as follows: 0.01 ppm for processed animal feed, artichokes, asparagus, brassica, bulb vegetables, cereal grains, citrus fruits, eggs, figs, fruiting vegetables, grass forage, fodder, hay, leafy vegetables, legume vegetables, m,ilk (fat basis), nongrass animal feeds, peanuts, pome fruits, root and tuber vegetables, salsify tops, small fruits and berries, stone fruits, and sugarcane; 0.02 ppm for cottonseed, cucurbit vegetables, pineapple, and rabbit (fat basis); and 0.3 ppm for fish (edible portion) (FDA 1989a).

Effluent guidelines have been established for heptachlor and heptachlor epoxide under the Clean Water Act for the following industrial point-source categories (EPA 1988a): electroplating, steam electric, asbestos, timber products processing, metal finishing, paving and roofing, paint and ink formulating, gum and wood, pesticides, and carbon black.

TABLE 7-1. Regulations and Guidelines Applicable to Heptachlor

Agency	Description	Information	References
INTERNATIONAL			
IARC	Carcinogenic classification	Group 3[a]	IARC 1979
WHO	ADI in food	0.5 μg/kg/day	WHO 1984
WHO	Drinking Water Guidance Level based on a carcinogenic end point	0.1 μg/L	WHO 1984
NATIONAL			
Regulations:			
a. Air:			
OSHA	PEL TWA (skin)	0.5 mg/m^3	OSHA 1989b (29 CFR 1910.1000); OSHA 1989a
b. Water:			
EPA ODW	RMCL in drinking water (proposed)	0.4 μg/L	EPA 1989b (40 CFR 141, 142, 143); EPA 1989a
EPA OWRS	Priority Pollutants Regulated in Subcategory 1-Organic Pesticide Chemicals Manufacturing	Yes	EPA 1978c (40 CFR 455); EPA 1985d
	Pesticides regulated by NSPS, PSES, and PSNS when formulated and packaged	Yes	EPA 1978c (40 CFR 455); EPA 1985d
	Priority Pollutants Regulated in Pesticide Active Ingredient Manufacturing Wastewater	Yes	EPA 1978c (40 CFR 455); EPA 1985d
	Priority Pollutant Effluent Limitations for BAT, NSPS, PSES, and PSNS:		EPA 1978c (40 CFR 455); EPA 1985d
	Maximum for any 1 day	0.090 mg/L	
	Monthly average shall not exceed	0.032 mg/L	
c. Food:			
FDA	Action level for edible fish and shellfish	0.3 ppm	FDA 1989a, 1989b
	Action level for raw food crops	0.01 ppm	FDA 1989b
	Recommended action level for fat from meat	0.2 ppm	FDA 1989b
d. Other:			
EPA OERR	Reportable quantity	1 pound	EPA 1985a (40 CFR 302); EPA 1985b
EPA OSW	Designation as a hazardous substance under Section 311(b)(2)(A) of the Federal Water Pollution Control Act	Yes	EPA 1978a (40 CFR 116.4); EPA 1978b
	Designated as a Toxic Pollutant under Section 307(a)(1) of the Federal Water Pollution Control Act	Yes	EPA 1979a (40 CFR 401.15); EPA 1979b
	Listing as a hazardous waste: discarded commercial chemical products off-specification species, container residues, and spill residues thereof	Yes	EPA 1980b (40 CFR 261.33); EPA 1980c

TABLE 7-1 (Continued)

Agency	Description	Information	References
NATIONAL (Cont.)			
	Listing as a hazardous constituent	Yes	EPA 1988b (40 CFR 261, Appendix VIII); EPA 1988c
	Groundwater Monitoring Requirement	Yes	EPA 1987a (40 CFR 264, Appendix IX); EPA 1987c
EPA OTS	Toxic Chemical Release Reporting; Community Right-to-Know	Yes	EPA 1988d (40 CFR 372); EPA 1987d
Guidelines:			
a. Air:			
ACGIH	TLV TWA (skin)	0.5 mg/m^3	ACGIH 1992
	Carcinogen Category (proposed)	A2[b]	ACGIH 1992
	Excursion Limit Recommendation	Yes	ACGIH 1990
EPA	RfC (Inhalation)	No data	IRIS 1990
NIOSH	REL TWA (Ca, skin)	0.5 mg/m^3	*NIOSH 1992*
b. Water:			
EPA ODW	MCLG (proposed)	0.00	EPA 1989b (40 CFR 141, 142); EPA 1989a
EPA OWRS	Health Advisories		EPA 1990a
	1-day (recommended)(child)	0.010 mg/L	
	10-day (child)	0.010 mg/L	
	Longer-term (child)	0.005 mg/L	
	Longer-term (recommended)(adult)	0.0175 mg/L	IRIS 1990
	Lifetime	None[c]	
	DWEL	0.0175 mg/L	
	Ambient Water Quality Criteria for Protection of Human Health[d]		EPA 1980d
	Ingesting water and organisms:		
	10^{-5}	2.78 ng/L	
	10^{-6}	0.28 ng/L	
	10^{-7}	0.028 ng/L	
	Ingesting organisms only:		
	10^{-5}	2.85 ng/L	
	10^{-6}	0.29 ng/L	
	10^{-7}	0.029 ng/L	
	Water Quality Standards for Protection of Aquatic Life		EPA 1980d
	Concentration should never exceed:		
	Saltwater	0.053 µg/L	
	Freshwater	0.52 µg/L	
	24-hour average:		
	Saltwater	0.0036 µg/L	
	Freshwater	0.0038 µg/L	

TABLE 7-1 (Continued)

Agency	Description	Information	References
NATIONAL (Cont.)			
c. Food:			
NAS	ADI	0-0.0005 mg/kg	HSDB 1990
d. Other:			
EPA	RfD (oral)	5.00×10^{-4} mg/kg/day	IRIS 1990
	Carcinogen classification	$B2^{e}$	IRIS 1990
	Unit risk (air)	1.3×10^{-3} $(\mu g/m^3)^{-1}$	IRIS 1990
	Unit risk (water)	1.3×10^{-4} $(\mu g/L)^{-1}$	IRIS 1990
	q_1^* (oral)	4.5 mg/kg/day	IRIS 1990
STATE			
Regulations and Guidelines:			
a. Air:			
	Acceptable Ambient Air Concentrations		NATICH 1991
California-Montana	NA	0.00	
Connecticut	(8-hour)	2.50 $\mu g/m^3$	
Florida-Tampa	(8-hour)	0.005 mg/m^3	
Florida-Fort Lauderdale	(8-hour)	0.005 mg/m^3	
Kansas	(Annual)	1.19 $\mu g/m^3$	
Kansas-Kansas City	(Annual)	0.001 $\mu g/m^3$	
Massachusetts	(24-hour)	0.140 $\mu g/m^3$	
Massachusetts	(Annual)	0.001 $\mu g/m^3$	
Maryland	NA	0.00	
North Dakota	(8-hour)	0.005 mg/m^3	
Nevada	(8-hour)	0.012 mg/m^3	
New York	(1 year)	1.70 $\mu g/m^3$	
Pennsylvania-Philadelphia	(1 year)	0.18 $\mu g/m^3$	
Pennsylvania-Philadelphia	(Annual)	0.18 $\mu g/m^3$	
South Carolina	(24-hour)	2.50 $\mu g/m^3$	
Texas	(30 minutes)	5.00 $\mu g/m^3$	
Texas	(Annual)	0.50 $\mu g/m^3$	
Virginia	(24-hour)	8.30 $\mu g/m^3$	
Kentucky	Significant Emission Levels of Toxic Air Pollutants	1.276×10^{-4} pounds/hour	NREPC 1986 (401 KAR 63.022)
Wisconsin	Hazardous Air Contaminants with Acceptable Ambient Concentrations:		CELDS 1990a
	Emission points <25 ft	0.0408 pounds/hour	
	Emission points ≥25 ft	0.1704 pounds/hour	

TABLE 7-1 (Continued)

Agency	Description	Information	References
STATE (Cont.)			
b. Water:			
	Drinking water quality guidelines and standards		FSTRAC 1988
Arizona		0.50 µg/L	
California		0.02 µg/L	
Illinois		0.1 µg/L	
Kansas		0.104 µg/L	
Maine		0.23 µg/L	
Minnesota		0.1 µg/L	
Alabama	Toxic Pollutant Criteria for Aquatic Life:		CELDS 1990b
	Freshwater		
	Acute	0.52 µg/L	
	Chronic	0.0038 µg/L	
	Marine		
	Acute	0.053 µg/L	
	Chronic	0.0036 µg/L	
Arkansas	Surface Water Quality Standards		CELDS 1990a
	Chronic (24-hour average)	0.0038 µg/L	
	Acute	0.52 µg/L	
California	Applied Action Levels for drinking water	0.02 ppb	EPA 1987f
California	Toxic materials limitations objectives for protection of human health (30-day average)	0.72 ng/L	CELDS 1990b
Florida	Class I surface water for use as potable water; shall not exceed	0.001 µg/L	CELDS 1990a
Florida	Class II water criteria	0.001 µg/L	CELDS 1990a
Florida	Unregulated contaminant subject to community water systems monitoring	Yes	CELDS 1990a
Illinois	MCL in drinking water	0.0001 mg/L	CELDS 1990a
Illinois	Public and food processing water supply standards	0.0001 mg/L	IEPA 1988

TABLE 7-1 (Continued)

Agency	Description	Information	References
STATE (Cont.)			
Indiana	Water Quality Criteria		CELDS 1990b
	Acute aquatic (maximum) continuous criterion concentration for human health (4-day average):	0.26 mg/L	
	Outside mixing zone	0.0028 mg/L	
	Point of water intake	0.0028 mg/L	
Nevada	Water Quality Criteria for Agricultural Water Uses		CELDS 1990a
	Irrigation	<0.0001 mg/L	
	Watering of livestock	<0.00052 mg/L	
Nevada	Water Quality Criteria for Aquatic Use		CELDS 1990a
	Acute	<0.00052 mg/L	
	Chronic (24-hour average)	<0.0000038 mg/L	
	Propagation of wildlife	<0.0001 mg/L	
	Municipal or domestic water supply	<0.0001 mg/L	
New York	Allowable concentration limits for Class GA waters	Not detectable	CELDS 1990a
New York	Effluent standards: MACs into saturated or unsaturated zones	Not detectable	CELDS 1990a
North Carolina	Water quality standards for salt and fresh water	0.004 µg/L	CELDS 1990a
North Dakota	Water Quality Standards for Class I streams		CELDS 1990a
	Chronic	0.004 µg/L	
	Acute	0.52 µg/L	
Ohio	Permissible concentration in		CELDS 1990a
	Public water supply	0.00028 µg/L	
	Aquatic life habitats	0.001 µg/L	
Oklahoma	Pesticide criteria in the water column for the protection of fish and wildlife propagation	0.50 mg/L	CELDS 1990a
Oklahoma	Pesticide alert levels in fish tissues	0.3 mg/kg	CELDS 1990a

TABLE 7-1 (Continued)

Agency	Description	Information	References
STATE (Cont.)			
Puerto Rico	Maximum Allowable Concentration	0.001 µg/L	CELDS 1990a
Virginia	Chronic criteria for protection of aquatic life		CELDS 1990a
	Freshwater	0.0038 µg/L	
	Saltwater	0.0036 µg/L	
Virginia	Groundwater Monitoring Parameter	Yes	CELDS 1990b
Virginia	Statewide groundwater standard	0.001 µg/L	CELDS 1990a
Washington, DC	Water Quality Standards		CELDS 1990a
	Class C waters protected for aquatic life, waterfowl, shore birds, and water-oriented wildlife	0.0038 mg/L	
	Class D waters protected for use as a raw water source for public water supply	0.0003 mg/L[f]	
Wisconsin	Human Cancer Criteria		DNR 1987
	Public water supply:		
	Warm water sport fish communities	1.4 ng/L	
	Cold water communities	0.41 ng/L	
	Great Lakes communities	0.42 ng/L	
	Non-Water Supply:		
	Warm water sport fish communities	1.4 ng/L	
	Cold water communities	0.42 ng/L	
	Warm water forage and limited forage fish communities and limited aquatic life	16,000 ng/L	
c. Food:			
Illinois	FDA Action Levels	0.3 ppm	IEPA 1988
d. Other:			
	Permitted use of heptachlor banned		CELDS 1990a
Minnesota		Yes	
New York		Yes	
	Sale and use of heptachlor is prohibited		CELDS 1990a
New Hampshire		Yes	
New Jersey		Yes	
South Carolina		Yes	

TABLE 7-1 (Continued)

Agency	Description	Information	References
STATE (Cont.)			
	Designated as a restricted pesticide		CELDS 1990a
Alabama		Yes	
Hawaii		Yes	
New Mexico		Yes	
Florida	Persistant pesticides may not be applied in a broadcast manner	Yes	CELDS 1990a
Connecticut	Heptachlor used only to control subterranean termites	Yes	CELDS 1990a
Kentucky	Defined as a hazardous waste	Yes	NREPC 1988 (401 KAR 31:040)
Maine	Heptachlor is a limited use insecticide	Yes	CELDS 1990a
Michigan	Restricted use pesticide; may not be distributed without a license	Yes	CELDS 1990a
Ohio	Heptachlor banned except for use in subterranean termite control	Yes	CELDS 1990a
Wisconsin	Defined as "limited use pesticide," permit required for use	Yes	WAC 1988
Wisconsin	Designated as a toxic pollutant	Yes	CELDS 1990a

[a]Group 3: not classifiable as to human carcinogenicity
[b]Suspected human carcinogen
[c]Heptachlor has not been assigned a lifetime health advisory because of its carcinogenic potential.
[d]Because of its carcinogenic potential, the EPA-recommended concentration for heptachlor in ambient water is zero. However, because attainment of this level may not be possible, levels that correspond to upper-bound incremental lifetime cancer risks of 10^{-5}, 10^{-6}, and 10^{-7} are estimated.
[e]Group B2: possible human carcinogen
[f]A risk factor of 10^{-6} is associated with the criterion. The preferred level is zero.

ACGIH = American Conference of Governmental Industrial Hygienists; ADI = Acceptable Daily Intake; BAT = Best Available Technology; Ca = agent recommended by NIOSH to be treated as a potential occupational carcinogen; DWEL = Drinking Water Equivalent Level; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; IARC = International Agency for Research on Cancer; IDLH = Immediately Dangerous to Life or Health Level; MAC = Maximum Allowable Concentration; MCL = Maximum Contaminant Level; MCLG = Maximum Contaminant Level Goal; NA = Not applicable; NAS = National Academy of Sciences; NIOSH = National Institute for Occupational Safety and Health; NSPS = New Source Performance Standards; ODW = Office of Drinking Water; OERR = Office of Emergency and Remedial Response; OSHA = Occupational Safety and Health Administration; OSW = Office of Solid Wastes; OTS = Office of Toxic Substances; OWRS = Office of Water Regulations and Standards; PEL = Permissible Exposure Limit; PSES = Pretreatment Standards for Existing Sources; PSNS = Pretreatment Standards for New Sources; RfC = Reference Concentration; RfD = Reference Dose; RMCL = Recommended Maximum Contaminant Level; TLV = Threshold Limit Value; TWA = Time-Weighted Average; WHO = World Health Organization

TABLE 7-2. Regulations and Guidelines Applicable to Heptachlor Epoxide

Agency	Description	Information	References
INTERNATIONAL			
IARC	Carcinogenic classification	Group 3[a]	IARC 1979
WHO	ADI in food	0.5 µg/kg/day	WHO 1984
WHO	Drinking Water Guidance Level based on a carcinogenic end point	0.1 µg/L	WHO 1984
NATIONAL			
Regulations:			
a. Air:			
OSHA	PEL TWA (skin)	None	OSHA 1989b (29 CFR 1910.1000); OSHA 1989a
b. Water:			
EPA ODW	RMCL in drinking water (proposed)	0.2 µg/L	EPA 1989b (40 CFR 141, 142, 143); EPA 1989a
EPA OWRS	Excluded from Subcategory 1-Organic Pesticide Chemicals Manufacturing Regulations	Yes	EPA 1978c (40 CFR 455); EPA 1985d
	Pesticides regulated by NSPS, PSES, and PSNS when formulated and packaged	Yes	EPA 1978c (40 CFR 455); EPA 1985d
c. Other:			
EPA	RfD (oral)	1.30×10^{-5} mg/kg/day	IRIS 1990
EPA OERR	Reportable quantity (CERCLA Statuatory RQ)	1 pound	EPA 1985a (40 CFR 302); EPA 1985b
EPA OSW	Designated as a toxic pollutant under Section 307(a)(1) of the Federal Water Pollution Control Act	Yes	EPA 1979a (40 CFR 401.15); EPA 1979b
	Listing as a hazardous constituent	Yes	EPA 1988b (40 CFR 261, Appendix VIII); EPA 1988c
	Groundwater Monitoring Requirement	Yes	EPA 1987a (40 CFR 264, Appendix IX); EPA 1987c
Guidelines:			
a. Air:			
ACGIH	TLV TWA	None	ACGIH 1990
	Proposed	0.05 mg/m^3	
	Carcinogen category (proposed)	A2[b]	ACGIH 1990
EPA	RfC (inhalation)	None	IRIS 1990
NIOSH	IDLH	None	NIOSH 1985

TABLE 7-2 (Continued)

Agency	Description	Information	References
NATIONAL (Cont.)			
b. Water:			
EPA ODW	MCLG	0.00	EPA 1989b (40 CFR 141, 142): EPA 1989a
EPA OWRS	Health Advisories		EPA 1990a
	1-day (recommended)(child)	0.010 mg/L	
	10-day (child)	None[c]	
	Longer-term (child)	0.00015 mg/L	IRIS 1990
	Longer-term (recommended)(adult)	0.0005 mg/L	IRIS 1990
	Lifetime	None[d]	
	DWEL	0.00044 mg/L	
	Ambient Water Quality Criteria for Protection of Human Health[d]		EPA 1980d
	Ingesting water and organisms:		
	10^{-5}	2.78 ng/L	
	10^{-6}	0.28 ng/L	
	10^{-7}	0.028 ng/L	
	Ingesting organisms only:		
	10^{-5}	2.85 ng/L	
	10^{-6}	0.29 ng/L	
	10^{-7}	0.029 ng/L	
	Water Quality Standards for Protection of Aquatic Life		EPA 1980d
	Concentration should never exceed:		
	Saltwater	0.053 µg/L	
	Freshwater	0.52 µg/L	
	24-hour average:		
	Saltwater	0.0036 g/L	
	Freshwater	0.0038 µg/L	
c. Food:			
FDA	Action level for edible fish and shellfish	0.3 ppm	FDA 1989a, 1989b
	Action level for raw food crops	0.01 ppm	FDA 1989b
	Recommended action level for fat from meat	0.2 ppm	FDA 1989b
NAS	ADI	0-0.0005 mg/kg	HSDB 1990
d. Other:			
EPA	RfD (oral)	1.30×10^{-5} mg/kg/day	IRIS 1990
	Carcinogen classification	B2[e]	IRIS 1990
	Unit risk (air)	2.6×10^{-3} $(\mu g/m^3)^{-1}$	IRIS 1990
	Unit risk (water)	2.6×10^{-4} $(\mu g/L)^{-1}$	IRIS 1990
	q_1^* (oral)	9.1 mg/kg/day	IRIS 1990
STATE			
Regulations and Guidelines:			
a. Air:			
Maryland	Acceptable Ambient Air Concentrations	0.00	NATICH 1991

TABLE 7-2 (Continued)

Agency	Description	Information	References
STATE (Cont.)			
b. Water:			
	Drinking water quality guidelines and standards		FSTRAC 1988
California		0.10 µg/L	
Illinois		0.1 µg/L	
Kansas		0.006 µg/L	
Minnesota		0.006 µg/L	
California	Applied Action Levels for drinking water	0.10 ppb	EPA 1987f
Illinois	MCL in drinking water	0.0001 mg/L	CELDS 1990a
Illinois	Public and food processing water supply standards	0.0001 mg/L	IEPA 1988
New York	Allowable concentration limits for Class GA waters	Not detectable	CELDS 1990a
New York	Effluent standards: MACs into saturated or unsaturated zones	Not detectable	CELDS 1989
North Carolina	Water quality standards for fresh water	0.004 mg/L	CELDS 1990b
Ohio	Permissible concentration in:		CELDS 1990a
	Public water supply	0.1 µg/L	
	Aquatic life habitats	Not available	
Virginia	Groundwater Monitoring Parameter	Yes	CELDS 1990b
Virginia	Statewide groundwater standard	0.001 µg/L	CELDS 1990a
c. Food:			
Illinois	FDA Action Levels	0.3 ppm	IEPA 1988
d. Other:			
Wisconsin	Designated as a toxic pollutant	Yes	CELDS 1990a

[a]Group 3: not classifiable as to human carcinogenicity
[b]Suspected human carcinogen
[c]No data are available from which to derive a 1- or 10-day Health Advisory for heptachlor epoxide.
[d]Heptachlor epoxide has not been assigned a lifetime health advisory because of its carcinogenic potential.
[e]Group B2: possible human Carcinogen

ACGIH = American Conference of Governmental Industrial Hygienists; ADI = Acceptable Daily Intake; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; DWEL = Drinking Water Equivalent Level; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; IARC = International Agency for Research on Cancer; IDLH = Immediately Dangerous to Life or Health Level; MAC = Maximum Allowable Concentration; MCL = Maximum Contaminant Level; MCLG = Maximum Contaminant Level Goal; NAS = National Academy of Sciences; NIOSH = National Institute for Occupational Safety and Health; NSPS = New Source Performance Standards; ODW = Office of Drinking Water; OERR = Office of Emergency and Remedial Response; OSHA = Occupational Safety and Health Administration; OSW = Office of Solid Wastes; OWRS = Office of Water Regulations and Standards; PEL = Permissible Exposure Limit; PSES = Pretreatment Standards for Existing Sources; PSNS = Pretreatment Standards for New Sources; RfC = Reference Concentration; RfD = Reference Dose; RMCL = Recommended Maximum Contaminant Level; RQ = Reportable Quantity; TLV = Threshold Limit Value; TWA = Time-Weighted Average; WHO = World Health Organization