

7. REGULATIONS AND ADVISORIES

IARC (1987) determined that the available epidemiological data on chlordane were inadequate to evaluate human cancer risk, and that there was limited evidence from experimental animals of its carcinogenicity.

WHO (1984) classified technical chlordane as moderately hazardous,

The WHO/FAO (1978) has issued practical advice in a Data Sheet on Pesticides, No. 36 (Chlordane), dealing with labeling, safe-handling, transport, storage, disposal, decontamination, training and medical supervision of workers, first aid, and medical treatment.

On March 6, 1978, registrations for all uses of chlordane on food crops were canceled (EPA 1978). Exempt were (1) certain registrations for uses on nonfood plants, which were instead phased out over the next 5 years, and (2) the continued use through subsurface ground insertion for termite control. In 1987, a negotiated agreement covering the termiticide products of the primary chlordane manufacturer voluntarily canceled all but certain unaffected uses and imposed limitations on the continued sale, distribution, and use of the canceled products (EPA 1987b). On April 14, 1988, the EPA moved to cancel the registrations of other producers' termiticide products containing chlordane and to forbid the sale or commercial use of those products (EPA 1988c). These actions did not address the use of any remaining containers of products that had been canceled earlier, such as those that were involved in the March 6, 1978, decision.

Chlordane is regulated by the Clean Water Act Effluent Guidelines for the following industrial point sources: electroplating, steam electric production, asbestos production, timber products processing, metal finishing, paving and roofing, paint formulating, ink formulating, gum and wood processing, pesticide production, and carbon black production (EPA 1988a). For many of these industrial sources (asbestos production, timber products processing, paving and roofing, paint formulating, ink formulating, gum and wood processing, and carbon black production) the discharge limits have been set at zero.

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An MRL for intermediate-duration inhalation exposure of 0.0002 mg/m^3 was derived based on the NOAEL of 0.1 mg/m^3 for hepatic effects in rats in the 90-day intermittent exposure study by Khasawinah et al. (1989) and Velsicol Chemical Co. (1984). The LOAEL was 1.0 mg/m^3 , at which rats had hepatocellular hypertrophy and increased cytochrome P-450 content.

An MRL for chronic-duration inhalation exposure of 0.00002 mg/m^3 was also derived from the 90-day study by Khasawinah et al. (1989). An additional uncertainty factor of 10 was used to extrapolate from intermediate- to chronic-duration.

An MRL for acute-duration oral exposure of 0.001 mg/kg/day was derived based on a LOAEL of 1 mg/kg/day for developmental effects (depressed conditioned avoidance response acquisition, increased exploratory activity in open field test, and increased seizure threshold) in the offspring of mice exposed to chlordane during the last trimester (Al-Hachim and Al-Baker 1973).

An MRL for intermediate-duration oral exposure of 0.0006 mg/kg/day was derived based on a NOAEL of 0.055 mg/kg/day for hepatic effects in female rats exposed to chlordane in the diet for 30 months. Hepatocellular hypertrophy was observed in the rats exposed to 0.273 mg/kg/day (Khasawinah and Grutsch 1989a; Velsicol Chemical Co. 1983a).

An MRL for chronic-duration oral exposure of 0.0006 mg/kg/day was derived based on a NOAEL of 0.055 mg/kg/day for hepatic effects in rats in a 30-month dietary study by Khasawinah and Grutsch (1989a) and Velsicol Chemical Co. (1983a). The LOAEL was 0.273 mg/kg/day at which hepatocellular hypertrophy was found in female rats.

The EPA (IRIS 1992) derived an oral RfD of $0.00006 \text{ mg/kg/day}$ from the rat NOAEL for regional liver hypertrophy of 0.06 mg/kg/day in the 30-month feeding study by Khasawinah and Grutsch (1989a) and Velsicol Chemical Co. (1983a).

National and state regulations and guidelines applicable to chlordane are summarized in Table 7-1.

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TABLE 7-1. Regulations and Guidelines Applicable to Chlordane

Agency	Description	Information	Reference
<u>INTERNATIONAL</u>			
FAO/WHO	Residue tolerances for sum of alpha and gamma isomers and oxychlordane in food	0.02-0.5 mg/kg	FAO/WHO 1973
FAO/WHO	ADI	0-0.001 mg/kg/bw	FAO/WHO 1978
WHO	Guidelines for drinking water	0.3 µg/L	WHO 1984
IARC	Cancer classification	Group 3 ^a	IARC 1987
<u>NATIONAL</u>			
Regulations:			
a. Air:			
OSHA	PEL TWA (8-hour workday) (skin desig.)	0.5 mg/m ³	OSHA 1989 (29 CFR 1910.1000)
b. Other:			
EPA	Limit in waste combustion residue	0.3 µg/kg	EPA 1991 40 CFR 266 56 FR 7228 (02/21/91)
EPA OERR	Reportable quantity (released to the environment)	1 pound	EPA 1987c (40 CFR 117.3) (08/14/89)
	Threshold planning quantity	1,000 pounds	EPA 1987d (40 CFR 300, 355)
Guidelines:			
a. Air:			
NIOSH	REL, TWA	Ca; 0.5 mg/m ³ (skin)	NIOSH 1992
ACGIH	TLV-TWA (8-hour workday) (skin desig.)	0.5 mg/m ³ (skin)	ACGIH 1991
NRC	Interim guideline for military housing	5 µg/m ³	NRC 1982
EPA	Unit risk (inhalation)	3.7x10 ⁻⁴ /µg/m ³	IRIS 1992
b. Water			
EPA ODW	HA		IRIS 1992
	1-Day (10 kg child)	0.06 mg/L	
	10-Day (10 kg child)	0.06 mg/L	
	Longer-Term (10 kg child)	0.5 µg/L	
	Longer-Term (70 kg adult)	2 µg/L	
	DWEL	2 µg/L	
	Lifetime HA	None	
EPA ODW	MCLG	0 mg/L	IRIS 1992
	MCL	0.002 mg/L	56 FR 3526 (01/30/91)
EPA OWRS	Ambient water quality criteria for the following lifetime increased cancer risk levels:		IRIS 1992 45 FR 79327 (05/01/91)
	with ingestion of water, fish, and shellfish		
	10 ⁻⁵	5.8 ng/L	
	10 ⁻⁶	0.58 ng/L	
	10 ⁻⁷	0.058 ng/L	
	with ingestion of fish and shellfish only		
	10 ⁻⁵	5.9 ng/L	
	10 ⁻⁶	0.59 ng/L	
	10 ⁻⁷	0.059 ng/L	
EPA	Cancer unit risk (drinking water)	3.7x10 ⁻⁵ µg/L	IRIS 1992

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TABLE 7-1. Regulations and Guidelines Applicable to Chlordane (continued)

Agency	Description	Information	Reference
c. Food FDA	Maximum levels for residues of chlordane (including <i>cis</i> - and <i>trans</i> -chlordane; <i>cis</i> - and <i>trans</i> -nonochlor, oxychlordane; alpha, beta, and gamma chlordene, and chlordene): in fruits and vegetables in rendered animal fat and edible portion of fish	0.1 ppm 0.3 ppm	FDA 1989b
d. Other			
EPA	q ₁ * (oral)	1.3 (mg/kg/day) ⁻¹	IRIS 1992
EPA	q ₁ * (inhalation)	1.3 (mg/kg/day) ⁻¹	IRIS 1992
EPA	RfD (oral)	6x10 ⁻⁵ mg/kg/day	IRIS 1992
EPA	Group (Cancer Ranking)	B2 ^a	IRIS 1992
EPA	Designated as a hazardous waste	No. UO36	EPA 1982b
FDA	Action level for fish	0.3 ppm	FDA 1990
FDA	Action level for other foods	0.1-0.3 ppm	FDA 1990

STATE

Regulations and Guidelines:

a: Air:	Acceptable ambient air concentration		
Arizona		17 µg/m ³ (1 hr avg)	NATICH 1992
Arizona		1.1 µg/m ³ (24 hr avg)	NATICH 1992
Arizona		0.0029 µg/m ³ (annual avg)	NATICH 1992
Connecticut		2.5 µg/m ³ (8 hr avg)	NATICH 1992
Florida, Tampa		5 µg/m ³ (8 hr avg)	NATICH 1992
Florida, Ft. Lauderdale		5 µg/m ³ (8 hr avg)	NATICH 1992
Florida, Pinellas Co.		5 µg/m ³ (8 hr avg)	NATICH 1992
Florida, Pinellas Co.		1.2 µg/m ³ (24 hr avg)	NATICH 1992
Florida, Pinellas Co.		0.0027 µg/m ³ (annual avg)	NATICH 1992
Kansas		0.0027 µg/m ³ (annual avg)	NATICH 1992
Kansas, Kansas City		0.0027 µg/m ³ (annual avg)	NATICH 1992
Massachusetts		0.14 µg/m ³ (8 hr avg)	NATICH 1992
Massachusetts		0.03 µg/m ³ (annual avg)	NATICH 1992
Maryland		0	NATICH 1992
North Dakota		5 µg/m ³ (8 hr avg)	NATICH 1992
Nevada		12 µg/m ³ (8 hr avg)	NATICH 1992
New York		1.7 µg/m ³ (annual avg)	NATICH 1992
Oklahoma		5 µg/m ³ (24 hr avg)	NATICH 1992
Pennsylvania, Philadelphia		0.35 µg/m ³ (annual avg)	NATICH 1992
South Carolina		2.5 µg/m ³ (24 hr avg)	NATICH 1992
Texas		5 µg/m ³ (30 min avg)	NATICH 1992
Texas		0.5 µg/m ³ (annual avg)	NATICH 1992
Virginia		8.3 µg/m ³ (24 hr avg)	NATICH 1992
b: Water:			
Arizona	Acceptable drinking water concentration	0.022 µg/L	FSTRAC 1990
California	Acceptable drinking water concentration	0.55 µg/L	FSTRAC 1988
California	Maximum contaminant level for community water	0.1 µg/L	CELDS 1992
District of Columbia	Standard for raw water source for public water supply systems	0.0005 µg/L	CELDS 1992
Florida	Community water systems shall monitor for this substance at least every 36 months	Yes	CELDS 1992

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TABLE 7-1. Regulations and Guidelines Applicable to Chlordane (continued)

Agency	Description	Information	Reference
Hawaii	Water quality standard for consumption of fish	0.000016 µg/L	CELDS 1992
Illinois	Maximum contaminant level for community water systems	3 µg/L	CELDS 1992
Illinois	Acceptable drinking water concentration	3 µg/L	FSTRAC 1988
Kansas	Acceptable drinking water concentration	0.27 µg/L	FSTRAC 1990
Maine	Acceptable drinking water concentration	0.27 µg/L	FSTRAC 1990
Massachusetts	Acceptable drinking water concentration	0.5 µg/L	FSTRAC 1990
Minnesota	Acceptable drinking water concentration	0.3 µg/L	FSTRAC 1990
Mississippi	Water quality criterion for human health, consumption of aquatic organisms	0.000575 µg/L	CELDS 1992
Mississippi	Water quality criterion for human health, consumption of aquatic organisms and water	0.000575 µg/L	CELDS 1992
Nebraska	Maximum contaminant level for groundwater	Pending	CELDS 1992
Nevada	Municipal, domestic, or industrial water supply standard	0 mg/L	CELDS 1992
New Hampshire	Acceptable drinking water concentration	2 µg/L	FSTRAC 1990
New Jersey	Surface water quality criterion	0.0043 µg/L	CELDS 1992
New Jersey	Acceptable drinking water concentration	0.5 µg/L	FSTRAC 1990
New York	Acceptable drinking water level	0.1 µg/L	CELDS 1992
New York	Effluent limit	0.1 µg/L	CELDS 1992
Ohio	Permissible concentration in public water supplies	0.00046 µg/L	CELDS 1992
Rhode Island	Acceptable drinking water concentration	0.03 µg/L	FSTRAC 1990
Vermont	Water quality criterion, Class A or B waters	0.46 ng/L	CELDS 1992
Vermont	Water quality criterion, Class C waters	0.48 ng/L	CELDS 1992
Virginia	Groundwater quality standard	0.01 µg/L	CELDS 1992
Wisconsin	The level in effluent above which a facility must file an annual effluent report	0.001 mg/L	CELDS 1992
Wisconsin	Human cancer criterion (risk = 10 ⁻⁵) for surface waters for public water supplies in warm water sport fish communities	4.3 ng/L	CELDS 1992
Wisconsin	Human cancer criterion (risk = 10 ⁻⁵) for surface waters for public water supplies in cold water communities	1.3 ng/L	CELDS 1992
Wisconsin	Human cancer criterion (risk = 10 ⁻⁵) for surface waters for public water supplies in Great Lakes communities	1.3 ng/L	CELDS 1992
Wisconsin	Human cancer criterion (risk = 10 ⁻⁵) for surface waters for nonpublic water supplies in warm water sport fish communities	4.4 ng/L	CELDS 1992
Wisconsin	Human cancer criterion (risk = 10 ⁻⁵) for surface waters for nonpublic water supplies in cold water communities	1.3 ng/L	CELDS 1992
Wisconsin	Human cancer criterion (risk = 10 ⁻⁵) for surface waters for nonpublic water supplies in warm water forage and limited forage fish communities and limited aquatic life	54 µg/L	CELDS 1992
c. Other:			
California	Designated a restricted material	Yes	CELDS 1992
California	Soluble threshold limit concentration for wastes	0.25 mg/L	CELDS 1992
California	Total threshold limit concentration for wastes	2.5 mg/kg (wet weight)	CELDS 1992
Hawaii	Designated a restricted use pesticide	Yes	CELDS 1992
Michigan	Designated a restricted use material	Yes	CELDS 1992
New Hampshire	Restricted use and sale	Yes	CELDS 1992
New Jersey	Prohibited sale, offer for sale, purchase or use	Yes	CELDS 1992
New Mexico	Designated a use-restricted pesticide	Yes	CELDS 1992
South Carolina	Use restricted	Yes	CELDS 1992

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TABLE 7-1. Regulations and Guidelines Applicable to Chlordane (continued)

Agency	Description	Information	Reference
Vermont	Sale or use restricted	Yes	CELDS 1992
Virginia	Sanitary landfill, construction, demolition, debris landfill, industrial waste landfill groundwater monitoring requirement	Yes	CELDS 1992
Wisconsin	Toxic pollutant, the discharge quantity of which is restricted	Yes	CELDS 1992
Wisconsin	Designated constituent of hazardous waste	Yes	CELDS 1992
Wisconsin	Designated a toxic waste subject to the "small quantity exclusion"	Yes	CELDS 1992

*Not classifiable as to carcinogenicity in humans.

^bProbable human carcinogen

ACGIH = American Conference of Governmental Industrial Hygienists; ADI = Acceptable Daily Intake; Ca = Potential Occupational Carcinogen; DWEL = Drinking Water Equivalent Level; EPA = Environmental Protection Agency; FAO = Food and Agriculture Organization; FDA = Food and Drug Administration; HA = Health Advisory; MCL = Maximum Contaminant Level; MCLG = Maximum Contaminant Level Goal; NIOSH = National Institute for Occupational Safety and Health; NRC = National Research Council; ODW = Office of Drinking Water; OERR = Office of Emergency and Remedial Response; OWRS = Office of Water Regulations and Standards; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Level; REL = Recommended Exposure Limit; RfD = Reference dose; TLV = Threshold Limit Value; TWA = Time-weighted Average; WHO = World Health Organization