

8. REGULATIONS AND ADVISORIES

The international, national, and state regulations and advisories regarding DDT, DDE, and DDD in air, water, and other media are summarized in Table 8-1.

ATSDR has derived an acute-duration oral MRL of 5×10^{-4} mg/kg/day for DDT based on effects on perinatal development of the nervous system in neonatal mice with behavioral neurotoxicity manifested in the adult animals (Eriksson et al. 1990a, 1990b, 1992, 1993; Johansson et al. 1995, 1996; Talts et al. 1998). An intermediate-duration oral MRL of 5×10^{-4} mg/kg/day was derived based on hepatic histologic changes in rats (Laug et al. 1950). A chronic oral MRL was not derived because the most sensitive noncancer effects were observed at doses higher than doses for the most sensitive acute- and intermediate-duration effects. EPA derived an oral reference dose (RfD) of 5×10^{-4} mg/kg/day for DDT based on liver lesions in rats (Laug et al. 1950); an uncertainty factor of 100 was used (IRIS 2001a).

EPA assigned DDT, DDE, and DDD a weight-of-evidence classification of B2, probable human carcinogens (IRIS 2001a, 2001b, 2001c). An oral slope factor of $0.34 \text{ (mg/kg/day)}^{-1}$ was derived for DDT based on increased incidence of liver tumors in rats and mice in several studies (Cabral et al. 1982b; Rossi et al. 1977; Terracini et al. 1973; Thorpe and Walker 1973; Tomatis and Turusov 1975; Turusov et al. 1973). Based on the oral data, EPA (IRIS 2001c) derived an inhalation unit risk of $9.7 \times 10^{-5} \text{ (}\mu\text{g/m}^3\text{)}^{-1}$ for DDT. EPA (IRIS 2001c) derived an oral slope factor of $0.34 \text{ (mg/kg/day)}^{-1}$ for DDE based on observed lesions as neoplastic liver nodules or hepatocellular tumors in mice and hamster studies (NCI 1978; Rossi et al. 1983; Tomatis et al. 1974). An oral slope factor of $0.24 \text{ (mg/kg/day)}^{-1}$ was derived for DDD based on increased incidence of liver tumors in male mice (Tomatis et al. 1974b).

IARC has assigned a weight-of-evidence classification of 2B to DDT, possibly carcinogenic to humans (IARC 2002). The Department of Health and Human Services (DHHS) has determined that DDT may reasonably be anticipated to be a human carcinogen (NTP 2002).

The use of DDT and DDD in the United States was canceled in 1972. Exceptions include use by Public Health Service officials and other health officials for control of vector-borne disease, use by the U.S. Department of Agriculture or military for health quarantine, and use in drugs for controlling body lice (EPA 1972).

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Table 8-1. Regulations and Guidelines Applicable to DDT/DDE/DDD

Agency	Description	Information	References
<u>INTERNATIONAL</u>			
Guidelines:			
IARC	Carcinogenicity classification—DDT	Group 2B ^a	IARC 2002
WHO	Acceptable daily intake—DDT	0.02 mg/kg-bw	WHO 2002
	Drinking water guideline—DDT and metabolites	2 µg/L	WHO 2002
<u>NATIONAL</u>			
Regulations and guidelines:			
a. Air			
ACGIH	TLV–TWA (8-hour)—DDT	1 mg/m ³	ACGIH 2001
NIOSH	REL (10-hour TWA)—DDT ^{b,c} IDLH—DDT	0.5 mg/m ³ 500 mg/m ³	NIOSH 2002
OSHA	PEL (8-hour TWA) for general industry—DDT ^c	1 mg/m ³	OSHA 2001b 29CFR1910.1000
	PEL (8-hour TWA) for construction industry—DDT ^c	1 mg/m ³	OSHA 2001c 29CFR1926.55
	PEL (8-hour TWA) for shipyard industry—DDT ^c	1 mg/m ³	OSHA 2001a 29CFR1915.1000
USC	Hazardous air pollutant—DDE		USC 2001 42 USC 7412
b. Water			
EPA	Designated as a hazardous substance in accordance with Section 311(b)(2)(A) of the Clean Water Act—DDT and DDD		EPA 2001e 40CFR116.4
	Effluent guidelines and standards; designated as a toxic pollutant pursuant to Section 307(a)(1) of the Clean Water Act—DDT and metabolites		EPA 2002e 40CFR401.15
	Reportable quantities for hazardous substances designated pursuant to Section 311 of the Clean Water Act—DDT and DDE	1 pound	EPA 2002b 40CFR117.3

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Table 8-1. Regulations and Guidelines Applicable to DDT/DDE/DDD (continued)

Agency	Description	Information	References	
NATIONAL (cont.)				
EPA	Groundwater monitoring	Suggested method	EPA 2001a 40CFR264, Appendix IX	
	DDT and DDD	8080		
		8270		
	DDE	8080		
		8270		
	Human health consumption of: DDT/DDE			EPA 1999a
	Water and organism	5.9x10 ⁻⁴ µg/L ^{d,e}		
	Organism only	5.9x10 ⁻⁴ µg/L ^{d,e}		
	DDD			
	Water and organism	8.3x10 ⁻⁴ µg/L ^{d,e}		
Organism only	8.4x10 ⁻⁴ µg/L ^{d,e}			
Toxic pollutant effluent standard; ambient water criterion in navigable waters—DDT/DDE/DDD	0.001 µg/L	EPA 2002i 40CFR129.101		
Toxic pollutant effluent standard; toxic pollutant subject to regulations under provisions of this subpart—DDT/DDE/DDD		EPA 2002d 40CFR129.4(b)		
c. Food				
FDA	Action levels (ppm)—DDT/DDE/DDD		FDA 2002a	
	Fat of meat (cattle, goats, hogs, horses, sheep), fish	5		
	Carrots	3		
	Manufactured dairy products	1.25		
	Beans (cocoa, whole raw), peppermint oil, potatoes, soya bean oil (crude), spearmint oil, sweet potatoes	1.0		
	Artichokes, asparagus, barley grain (food, feed), broccoli, Brussels' sprouts, cabbage, cauliflower, celery, collards, eggs, endives (escarole), hay, kale, kohlrabi, lettuce, maize grain (food, feed)	0.5		

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Table 8-1. Regulations and Guidelines Applicable to DDT/DDE/DDD (continued)

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
FDA (cont.)	Action levels (ppm)— DDT/DDE/DDD Milo sorghum grain (food, feed), mushrooms, mustard greens, oat grain (food, feed), peppermint hay, rice grain (food, feed), rye grain (food, feed), spearmint hay, spinach, Swiss chard, tomato pomace (dried, for use in dog and cat food), wheat grain (food, feed)	0.5	FDA 2002a
	Apricots, avocados, beans, beans (dried), beets (roots, tops), cherries, guavas, mangoes, nectarines, okra, onions (dry bulb), papayas, parsnips (roots, tops), peaches, peanuts, peas, pineapples, plums (fresh prunes), radishes (roots, tops), rutabagas (roots, tops), soya beans (dry), turnips (roots, tops)	0.2	
	Apples, blackberries, blueberries (huckleberries), boysenberries, citrus fruit, maize (fresh sweet plus cob with husk removed), cottonseed, cranberries, cucumbers, currants, dewberries, eggplant, gooseberries, hops (fresh), loganberries, melons, pears, peppers, pumpkins, quinces, raspberries, squash, squash (summer), strawberries, youngberries	0.1	
	Grapes, hops (dried), tomatoes, lettuces	0.05	

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Table 8-1. Regulations and Guidelines Applicable to DDT/DDE/DDD (continued)

Agency	Description	Information	References
NATIONAL (cont.)			
FDA	Drug products containing certain active ingredients offered over-the-counter for certain uses; as there are inadequate data to establish general recognition of the safety and effectiveness of these ingredients for their specified uses	Pediculicide (lice) drug products	FDA 2002b 21CFR310.545 (a)(25)
USDA	Labeling treated seed; commonly accepted abbreviated chemical names—DDT		USDA 2001 7CFR201.31a(b)
d. Other			
ACGIH	Carcinogenicity classification—DDT	A3 ^f	ACGIH 2001
EPA	DDT Carcinogenicity classification Inhalation unit risk Oral slope factor RfD	B2 ^g 9.7x10 ⁻⁵ (µg/m ³) ⁻¹ 0.34 (mg/kg/day) ⁻¹ 5x10 ⁻⁴ mg/kg/day	IRIS 2001c
	DDE Carcinogenicity classification Inhalation unit risk Oral slope factor RfD	B2 ^g No data 0.34 (mg/kg/day) ⁻¹ No data	IRIS 2001b
	DDD Carcinogenicity classification Inhalation unit risk Oral slope factor RfD	B2 ^g No data 0.24 (mg/kg/day) ⁻¹ No data	IRIS 2001a
	Criteria for municipal solid waste landfills; listed as a hazardous constituent	Suggested method	EPA 2002g 40CFR258, Appendix II
	DDT and DDD	8080 8270	0.1 10
	DDE	8080 8270	0.05 10
	Health based limits for exclusion of waste-derived residues; concentration limit for residues—DDT	1x10 ⁻³ mg/kg	EPA 2001b 40CFR266, Appendix VII

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Table 8-1. Regulations and Guidelines Applicable to DDT/DDE/DDD (continued)

Agency	Description	Information	References
NATIONAL (cont.)			
EPA	Identification and listing of hazardous waste; hazardous waste number		EPA 2002f 40CFR261.33(f)
	DDT	U061	
	DDD	U060	
	Land disposal restrictions; universal treatment standards		EPA 2001c 40CFR268.48(a)
	Wastewater standard		
	DDT	0.023 mg/L ²	
	DDE	0.031 mg/L ²	
	DDD	0.0039 mg/L ²	
	Non-wastewater standard		
	DDT/DDE/DDD	0.087 mg/kg ³	
	Pesticide effluent limitation guidelines and standards—DDT/DDE/DDD		EPA 2002c 40CFR455.20(b)
Pesticide residue tolerances on agricultural commodities—DDT/DDD	Class of chlorinated organic pesticides	EPA 2001d 40CFR180.3(e)(4)	
Reportable quantity designated as a CERCLA hazardous substance under Sections 311(b)(4) and 307(a) of the Clean Water Act and Section 3001 of RCRA—DDT and DDD	1 pound	EPA 2002a 40CFR302.4	
Reportable quantity designated as a CERCLA hazardous substance under Section 307(a) of the Clean Water Act and Section 112 of the Clean Air Act—DDE	1 pound ^h	EPA 2002a 40CFR302.4	
Standards for the management of specific hazardous wastes		EPA 2002h 40CFR266, Appendix V	
Unit risk	9.7x10 ⁻⁵ (µg/m ³) ⁻¹		
Risk specific dose	1.0x10 ⁻¹ µg/m ³		
TSCA significant new use subject to reporting—DDT	Manufacture, import, or process 10,000 pounds or more per year per facility for any use	EPA 2002j 40CFR721.2287	
NTP	Reasonably anticipated to be a human carcinogen—DDT		NTP 2002

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Table 8-1. Regulations and Guidelines Applicable to DDT/DDE/DDD (continued)

Agency	Description	Information	References
<u>STATE</u>			
Regulations and guidelines:			
a. Air			
Hawaii	Hazardous air pollutant—DDE		BNA 2001
Idaho	DDT Unit risk factor Emissions level AACCC (annual average)	$9.7 \times 10^{-5} (\mu\text{g}/\text{m}^3)^{-1}$ 6.8×10^{-5} pounds/hour $1 \times 10^{-2} \mu\text{g}/\text{m}^3$	UATW 1999d
Illinois	Toxic air contaminant— DDT/DDE/DDD		BNA 2001
Kansas	Hazardous air pollutant—DDE		BNA 2001
Kentucky	Hazardous air pollutant—DDE		BNA 2001
Maryland	Toxic air pollutant—DDT		BNA 2001
Minnesota	Hazardous air pollutant threshold; <i>de minimis</i> level—DDE	0.01 tons/year	BNA 2001
Nebraska	Hazardous air pollutant—DDE		BNA 2001
New Hampshire	Regulated toxic air pollutant; occupational exposure level— DDT	1 mg/m ³	BNA 2001
New Mexico	Toxic air pollutant—DDT OEL Emissions	1.00 mg/m ³ 0.0667 pounds/hour	BNA 2001
Rhode Island	Hazardous air pollutant—DDE		BNA 2001
South Carolina	Toxic air emissions—DDE	High toxicity, may cause chronic effects that result in death or permanent injury after very short exposure to small quantities	BNA 2001
Vermont	Hazardous air contaminant—DDE		BNA 2001
Washington	Threshold for hazardous air pollutants—DDE	0.005 tons/year	BNA 2001

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Table 8-1. Regulations and Guidelines Applicable to DDT/DDE/DDD (continued)

Agency	Description	Information	References
<u>STATE (cont.)</u>			
b. Water			
Alabama	Aquatic life criteria—DDT		UATW 1999b
	Freshwater		
	Acute	1.1 µg/L	
	Chronic	0.001 µg/L	
	Marine		
	Acute	0.13 µg/L	
Arizona	Drinking water guideline—DDT	0.1 µg/L	HSDB 2001
	Chronic	0.001 µg/L	
Colorado	Human health based standards		UATW 1999a
	DDT/DDE		
	Water supply	0.1 µg/L	
	Water and fish	5.9×10^{-4} µg/L	
DDD	Water supply	No data	
	Water and fish	8.3×10^{-4} µg/L	
Florida	Drinking water guideline—DDT/DDD/DDE	0.1 µg/L	HSDB 2001
Hawaii	Water quality criteria—DDT and metabolite DDD		UATW 1999c
	Freshwater		
	Acute	1.1 µg/L	
	Chronic	0.001 µg/L	
	Saltwater		
	Acute	0.013 µg/L	
Chronic		0.001 µg/L	
	Fish consumption	8×10^{-6} µg/L	
Illinois	Drinking water standard—DDT	50 µg/L	HSDB 2001
Maine	Drinking water guideline—DDT	0.83 µg/L	HSDB 2001
Minnesota	Drinking water guideline—DDT/DDD/DDE	1 µg/L	HSDB 2001
New Hampshire	Drinking water guideline—DDT	0.1 µg/L	HSDB 2001
c. Food			
Oklahoma	Alert level in fish tissues	5.0 mg/kg	FSTRAC 1999
	Concern levels in fish tissue	2.5 mg/kg	
	Water column criteria to protect for the consumption of fish flesh	5.9×10^{-3} µg/L	

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Table 8-1. Regulations and Guidelines Applicable to DDT/DDE/DDD (continued)

Agency	Description	Information	References
STATE (cont.)			
Alabama	Fish and Wildlife Advisory for	Fish	EPA 1999b
Alaska	DDT/DDE/DDD	Fish	
Arizona		Fish and turtles	
California		Fish	
Georgia		Fish	
Massachusetts		Fish	
Michigan		Fish	
New York		Fish and waterfowl	
Oklahoma		Fish	
Oregon		Fish	
Texas		Fish	
Washington		Fish	
d. Other			
California	Chemicals known to the state to cause cancer— DDT/DDD/DDE		BNA 2001
Hawaii	Restricted use pesticide— DDT/DDE	All concentrations	BNA 2001

^aGroup 2B: possibly carcinogenic to humans

^bPotential occupational carcinogen

^cSkin designation: refers to the potential significant contribution to the overall exposure by the cutaneous route, including mucous membranes and the eyes, either by contact with vapors or, of probable greater significance, by direct skin contact with the substance

^dThis criterion has been revised to reflect The Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of April 8, 1998. The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case.

^eThis criterion is based on carcinogenicity of 10⁻⁶ risk. Alternate risk levels may be obtained by moving the decimal point (e.g., for a risk level of 10⁻⁵, move the decimal point in the recommended criterion one place to the right).

^fA3: confirmed animal carcinogen with unknown relevance to humans

^gB2; probable human carcinogen

^hThe 1-pound reportable quantity is a Section 102 CERCLA statutory reportable quantity

AACC = acceptable ambient concentrations for carcinogens; ACGIH = American Conference of Governmental Industrial Hygienists; BNA = Bureau of National Affairs; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; FSTRAC = Federal-State Toxicology and Risk Analysis Committee; HSDB = Hazardous Substances Data Bank; IARC = International Agency for Research on Cancer; IDLH = immediately dangerous to life and health; IRIS = Integrated Risk Information System; NIOSH = National Institute of Occupational Safety and Health; NTP = National Toxicology Program; OEL = occupational exposure limit; OSHA = Occupational Safety and Health Administration; PEL = permissible exposure limit; PQL = practical quantitation limits; RCRA = Resource Conservation Recovery Act; REL = recommended exposure limit; RfD = oral reference dose; TLV = threshold limit value; TSCA = Toxic Substances Control Act; TWA = time-weighted average; UATW = Unified Air Toxics Website; USC = United States Code; USDA = U.S. Department of Agriculture; WHO = World Health Organization

