

## 8. REGULATIONS AND ADVISORIES

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

ATSDR has derived an intermediate-duration inhalation MRL of 0.01 mg/m<sup>3</sup> for diazinon based on a NOAEL of 1.57 mg/m<sup>3</sup> for inhibition of erythrocyte acetylcholinesterase (RBC AChE) in rabbits (Hartman 1990). The NOAEL of 1.57 mg/m<sup>3</sup> was adjusted from intermittent exposure (4 hours/day, 5 days/week) to a continuous exposure scenario (duration-adjusted NOAEL = 0.28 mg/m<sup>3</sup>). A NOAEL<sub>HEC</sub> (human equivalent concentration) of 0.44 mg diazinon/m<sup>3</sup> was derived from the duration-adjusted NOAEL using EPA (1994b) methodology (see Appendix A for details). The NOAEL<sub>HEC</sub> of 0.44 mg/m<sup>3</sup> was divided by an uncertainty factor of 30 (3 for extrapolation from animals to humans using dosimetric adjustment and 10 for human variability).

ATSDR has derived an acute-duration oral MRL of 0.006 mg/kg/day for diazinon based on a NOAEL of 0.6 mg/kg/day and a LOAEL of 1.2 mg/kg/day for >20% RBC AChE inhibition in rats (Davies and Holub 1980a). The NOAEL of 0.6 mg/kg/day was divided by an uncertainty factor of 100 (10 for extrapolation from animals to humans and 10 for human variability).

ATSDR has derived an intermediate-duration oral MRL of 0.002 mg/kg/day for diazinon based on the results of benchmark dose (BMD) analysis of RBC AChE inhibition in female rats exposed to diazinon in the diet (Davies and Holub 1980a). The resulting BMDL<sub>20</sub> of 0.2238 mg/kg/day was divided by an uncertainty factor of 100 (10 for extrapolation from animals to humans and 10 for human variability). See Appendix A for details regarding BMD analysis.

ATSDR has derived a chronic-duration oral MRL of 0.0007 mg/kg/day for diazinon based on a NOAEL of 0.065 mg/kg/day and a LOAEL of 5.5 mg/kg/day for >20% RBC AChE inhibition in male and female rats (Kirchner et al. 1991). The NOAEL of 0.065 mg/kg/day was divided by an uncertainty factor of 100 (10 for extrapolation from animals to humans and 10 for human variability).

EPA (IRIS 2008) does not list an oral reference dose (RfD) or an inhalation reference concentration (RfC) for diazinon.

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

Agency	Description	Information	Reference
<u>INTERNATIONAL</u>			
Guidelines:			
IARC	Carcinogenicity classification	No data	IARC 2007
WHO	Air quality guidelines	No data	WHO 2000
	Drinking water quality guidelines	Excluded from guideline value derivation <sup>a</sup>	WHO 2004
<u>NATIONAL</u>			
Regulations and Guidelines:			
a. Air			
ACGIH	TLV (8-hour TWA) <sup>b,c</sup>	0.01 mg/m <sup>3</sup>	ACGIH 2007
EPA	AEGL	No data	EPA 2006a
	Hazardous air pollutant	No data	EPA 2006c 42 USC 7412
NIOSH	REL (10-hour TWA) <sup>d</sup>	0.1 mg/m <sup>3</sup>	NIOSH 2005
	IDLH	No data	
OSHA	PEL (8-hour TWA) for general industry	No data	OSHA 2005 29 CFR 1910.1000
b. Water			
EPA	Designated as hazardous substances in accordance with Section 311(b)(2)(A) of the Clean Water Act	Yes	EPA 2006b 40 CFR 116.4
	Drinking water standards and health advisories		EPA 2006k
	1-day health advisory for a 10-kg child	0.02 mg/L	
	10-day health advisory for a 10-kg child	0.02 mg/L	
	DWEL	0.007 mg/L	
	Lifetime	0.001 mg/L	
	National primary drinking water standards; monitoring requirements for unregulated contaminants		EPA 2006d 40 CFR 141.40
	Minimum reporting level	0.5 µg/L	
	Reportable quantities of hazardous substances designated pursuant to Section 311 of the Clean Water Act	1 pound	EPA 2006f 40 CFR 117.3
	Water quality criteria for non-priority pollutants		EPA 2006e
Freshwater			
CMC and CCC	0.17 µg/L		
Saltwater			

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Agency	Description	Information	Reference
	CMC and CCC	0.82 µg/L	
<b>NATIONAL (cont.)</b>			
DOT	Marine pollutant	Yes	DOT 2005 49 CFR 172.101, Appendix B
<b>c. Food</b>			
FDA	Bottled drinking water	No data	FDA 2005a
EPA	Tolerances for residues (see 40 CFR 180.153 for a complete listing of tolerances for residues on raw agricultural commodities)	Range: 0.1–40 ppm	EPA 2006i 40 CFR 180.153
USDA	Domestic quarantine notices; authorized insecticide	Fire ants and containerized nonbearing blueberries and fruit and nut plants	USDA 2006 7 CFR 301.81-10
<b>d. Other</b>			
ACGIH	Carcinogenicity classification Biological exposure indices (for acetylcholinesterase inhibiting pesticides) Cholinesterase activity in red blood cells (sampling time is discretionary)	A4 <sup>e</sup>  70% of individual's baseline	ACGIH 2007
EPA	Carcinogenicity classification RfC RfD Superfund, emergency planning, and community right-to-know Designated CERCLA hazardous substance Reportable quantity Effective date of toxic chemical release reporting	Group E <sup>f</sup> No data No data  Yes 1 pound 01/01/95	EPA 2006k IRIS 2008  EPA 2006g 40 CFR 302.4  EPA 2006h 40 CFR 372.65

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

Agency	Description	Information	Reference
<b>NATIONAL</b> ( <i>cont.</i> )			
NTP	Carcinogenicity classification	No data	NTP 2004

<sup>a</sup>Excluded from guideline value derivation because it is unlikely to occur in drinking water.

<sup>b</sup>Inhalable fraction and vapor

<sup>c</sup>Skin notation: 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, liquids, or solids.

<sup>d</sup>Skin designation: indicates the potential for dermal absorption; skin exposure should be prevented as necessary through the use of good work practices, gloves, coveralls, goggles, and other appropriate equipment.

<sup>e</sup>A4: not classifiable as a human carcinogen

<sup>f</sup>Group E: evidence of noncarcinogenicity for humans

ACGIH = American Conference of Governmental Industrial Hygienists; AEGL = Acute Exposure Guideline Level; CCC = Criterion Continuous Concentration; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; CMC = Criteria Maximum Concentration; DOT = Department of Transportation; DWEL = drinking water equivalent level; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; FR = Federal Register; IARC = International Agency for Research on Cancer; IDLH = immediately dangerous to life or health; IRIS = Integrated Risk Information System; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = permissible exposure limit; REL = recommended exposure limit; RfC = inhalation reference concentration; RfD = oral reference dose; TLV = threshold limit values; TWA = time-weighted average; USC = United States Code; USDA = United States Department of Agriculture; WHO = World Health Organization

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The International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP) have not classified diazinon for human carcinogenicity (IARC 2007; NTP 2004). The 2006 edition of the EPA Drinking Water Standards and Health Advisories includes a Group E (evidence of noncarcinogenicity for humans) designation for diazinon (EPA 2006k). The American Conference of Governmental Industrial Hygienists (ACGIH) has assigned diazinon to carcinogenicity category A4 (not classifiable as a human carcinogen) (ACGIH 2007).

OSHA has not required employers of workers who are occupationally exposed to diazinon to institute engineering controls and work practices to reduce and maintain employee exposure at or below permissible exposure limits (PELs) (OSHA 2005). The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an 8-hour Threshold Limit Value-Time-Weighted Average (TLV-TWA) of 0.01 mg/m<sup>3</sup> for diazinon (ACGIH 2007). NIOSH has recommended a 10-hour (TWA) Recommended Exposure Limit (REL) of 0.1 mg/m<sup>3</sup> for diazinon (NIOSH 2005).

EPA regulates diazinon under the Clean Water Act (CWA) and the Clean Air Act (CAA) and has designated it as a hazardous substance and a hazardous air pollutant (HAP) (EPA 2006b, 2006c). Diazinon 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 2006h). Diazinon has been assigned a reportable quantity (RQ) limit of 1 pound (EPA 2006g). The RQ represents the amount of a designated hazardous substance which, when released to the environment, must be reported to the appropriate authority.

EPA recommends a criterion continuous concentration (CCC) and a criteria maximum concentration (CMC) of 0.17 µg/L for fresh water and 0.82 µg/L for salt water (EPA 2006e). The CCC is an estimate of the highest concentration of diazinon in freshwater/saltwater to which aquatic organisms can be exposed indefinitely without resulting in an unacceptable effect; the CMC is the highest concentration in freshwater/saltwater to which aquatic organisms can be exposed for a brief period without resulting in an unacceptable effect.

Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), tolerances for residues on raw agricultural commodities for diazinon range from 0.1 to 40 ppm (EPA 2006i); see 40 CFR 180.153 for a complete listing of tolerances for residues and the corresponding raw agricultural commodities.