

7. REGULATIONS AND ADVISORIES

The international, national, and state regulations and guidelines regarding tetrachloroethylene in air, water, and other media are summarized in Table 7- 1.

Tetrachloroethylene 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 1987d).

As a result of the Eleventh Circuit Court of Appeals decision (AFL-CIO versus OSHA), OSHA’s permissible exposure level for tetrachloroethylene, which was lowered to 25 ppm in 1989, was returned to 100 ppm (OSHA 1993). Based on human exposure data, Stewart et al. (1981) concluded that a TLV of 100 ppm contained no safety factor for individuals more susceptible to the subjective and neurological symptoms of tetrachloroethylene. Based on human data, the ACGIH (ACGIH 1995) TLV-TWA is 25 ppm. The geometric mean exposure of dry cleaning machine operators was 22 ppm (Ludwig et al. 1983), a value close to the ACGIH TLV-TWA.

ATSDR has derived an acute inhalation MRL of 0.2 ppm with an uncertainty factor of 10, based on increased pattern reversal visual-evoked potential latencies, and deficits for vigilance and eye-hand coordination observed in humans exposed 4 hours/day for 4 days at 50 ppm but not at 10 ppm (Altmann et al. 1992). A chronic-duration inhalation MRL of 0.04 ppm with an uncertainty factor of 100 was derived based on increased reaction times in workers exposed to tetrachloroethylene in dry cleaning shops at an average concentration of 15 ppm for about 10 years (Ferroni et al. 1992). An acute oral MRL of 0.05 mg/kg/day with an uncertainty factor of 100 was derived based on hyperactivity observed in 60-day-old mice that were treated with tetrachloroethylene for 7 days beginning at 10 days of age (Fredriksson et al. 1993). Additional inhalation and oral MRLs were not derived.

EPA (IRIS 1996) has derived an oral reference dose (RfD) for tetrachloroethylene of 0.01 mg/kg/day with an uncertainty factor of 1,000, based on hepatotoxicity in mice (Buben and O’Flaherty 1985). An inhalation reference concentration (RfC) for tetrachloroethylene has not been derived (IRIS 1996).

7. REGULATIONS AND ADVISORIES

TABLE 7-1. Regulations and Guidelines Applicable to Tetrachloroethylene

Agency	Description	Information	References
<u>INTERNATIONAL</u>			
IARC	Carcinogenic classification	Group 2A ^a	IARC 1995
WHO	Drinking Water Guideline	40 µg/L	WHO 1993
<u>NATIONAL</u>			
Regulations:			
a. Air:			
OSHA	PEL TWA	100 ppm	OSHA 1993 (CFR 1910.1000)
	Acceptable ceiling 5 minutes in any 3 hours	200 ppm 300 ppm	
EPA OAQPS	Listing as a Hazardous Air Pollutant under Section 112 of the Clean Air Act	Yes	EPA 1996g (FR 59:12427)
b. Water:			
EPA ODW	MCL in drinking water Regulated under SDWA of 1986	0.005 mg/L	EPA 1996c EPA 1996c
		Yes	
EPA OWRS	Priority Pollutants Regulated in Sub-Part A-Organic Pesticide Chemicals Manufacturing	Yes	EPA 1996j (FR 58:50689)
	Priority Pollutant Effluent Limitations	Yes	
c. Food:			
FDA	Indirect food additive for use only as a component of adhesives	Yes	FDA 1977
d. Other:			
EPA OERR	Reportable quantity: CERCLA Statutory RQ	100 pounds	EPA 1996f (FR 60:35991)
EPA OSW	Designated as a Toxic Pollutant under Section 307(a)(1) of the Federal Water Pollution Control Act	Yes	EPA 1996k (FR 58:45035)
	Designated as a Hazardous Substance under Section 101(14) of CERCLA	Yes	

7. REGULATIONS AND ADVISORIES

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

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
	When used as a spent solvent, listed as a Hazardous Waste from nonspecific sources	Yes	EPA 1996l (FR 60:33913)
	Listing as a Hazardous Waste: Column bottoms or heavy ends from the combined production of tetrachloroethylene and trichloroethylene	Yes	EPA 1996e (FR 60:7848)
	Listing as a Hazardous Waste: Discarded commercial chemical products off-specification species, container residues, and spill residues	Yes	EPA 1996b (FR 60:19165)
	Groundwater Monitoring Requirement	Yes	EPA 1996d (FR 60:56952)
EPA OTS	Toxic Chemical Release Reporting; Community Right-to-Know	Yes	EPA 1996h (FR 60:49803)
Guidelines:			
a. Air:			
ACGIH	TLV TWA STEL Carcinogenicity	25 ppm 100 ppm A3 ^b	ACGIH 1995
EPA	RfC (Inhalation)	No data	IRIS 1996
NIOSH			
	Limit of quantitation	0.4 ppm	NIOSH 1994b
	Potential occupational carcinogen	Yes	NIOSH 1994c
	IDLH (Immediately Dangerous to Life or Health)	150 ppm	NIOSH 1994a
b. Water:			
EPA ODW	Health Advisories:		EPA 1996c
	1 day (child)	2 mg/L	
	10 day (child)	2 mg/L	
	Longer term (child)	1 mg/L	

7. REGULATIONS AND ADVISORIES

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

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
EPA	Longer term (adult)	5 mg/L	EPA 1996c
	Lifetime (adult)	none ^c	
	Drinking Water Equivalent Level	0.5 mg/L	
	Ambient water quality criteria for protection of human health		
	Ingesting water and organisms	0.8 µg/L	
	Ingesting organisms only	8.85 µg/L	
NAS	SNARL		NAS 1980
	24 hour	172 mg/L	
c. Other: EPA	7 day	24.5 mg/L	NAS 1980
	RfD	1.00×10 ⁻² mg/kg/day (u.f. 1,000)	IRIS 1996
DHHS	End point	Hepatotoxicity	IRIS 1996
	Carcinogenic classification	Reasonably anticipated to be a carcinogen	DHHS 1994
<u>STATE</u>			
Regulations and Guidelines:			
a. Air:	Acceptable Ambient Air Concentration		NATICH 1994
Arizona	(1 hour)	11,000 µg/m ³	
Arizona	(24 hours)	770 µg/m ³	
Arizona	(1 year)	2.1 µg/m ³	
California		0	
Connecticut	(8 hours)	1,700 µg/m ³	
Florida	(8 hours)	3,350 µg/m ³	
Florida	(24 hours)	804 µg/m ³	
Indiana	(8 hours)	1,670 µg/m ³	
Kansas	(1 year)	1.02 µg/m ³	
Kansas		1.72 µg/m ³	
Louisiana	(1 year)	105 µg/m ³	
Maine	(1 year)	0.01 µg/m ³	
Maryland		0	
Massachusetts	(24 hours)	922 µg/m ³	
Massachusetts	(1 year)	0.02 µg/m ³	
Michigan	(1 year)	1.70 µg/m ³	

7. REGULATIONS AND ADVISORIES

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

Agency	Description	Information	References
<u>STATE</u> (cont.)			
North Dakota	(8 hours)	3.39 mg/m ³	
North Carolina	(1 year)	0.19 mg/m ³	
North Dakota	(1 hour)	13.7 mg/m ³	
Nevada	(8 hours)	7.98 mg/m ³	
New York	(1 year)	1,120 µg/m ³	
Pennsylvania-Philadelphia	(1 year)	8,040 µg/m ³	
Pennsylvania-Philadelphia	(1 year)	1,200 ppb	
Rhode Island	(1 year)	0.05 µg/m ³	
South Carolina	(24 hours)	3,350 µg/m ³	
South Dakota	(8 hours)	3,350 µg/m ³	
Texas	(30 minutes)	340 µg/m ³	
Texas	(1 year)	34 µg/m ³	
Vermont	(1 year)	0.41 µg/m ³	
Virginia	(24 hours)	5,700 µg/m ³	
Washington	(1 year)	1.10 µg/m ³	
Wisconsin	(24 hours)	8,040 µg/m ³	
Wisconsin	Hazardous Air Contaminants with Acceptable Ambient Concentrations:		WAC 1988
	Emission points <25 feet	27.900 pounds/ hour	
	Emission points ≥25 feet	117.168 pounds/ hour	
b. Water:	Drinking water quality guidelines and standards		FSTRAC 1990
Alabama			
Arizona		0.67 µg/L	
California		5 µg/L	
Connecticut		5 µg/L	
Florida		3 µg/L	
Kansas		5 µg/L	
Maine		5 µg/L	
Minnesota		6.6 µg/L	
New Hampshire		1.0 µg/L	
New Jersey		1.0 µg/L	
Oklahoma		5 µg/L	CELDS 1994
Rhode Island		0.7 µg/L	
Utah		5 µg/L	CELDS 1994
Vermont		7 µg/L	
Wisconsin		5 µg/L	

7. REGULATIONS AND ADVISORIES

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

Agency	Description	Information	References
<u>STATE</u> (cont.)			
	Drinking Water Supply Standards		
Indiana		8 µg/L	CELDS 1994
Kentucky		0.8 µg/L	
Louisiana		0.65 µg/L	
Missouri		0.8 µg/L	
West Virginia		0.8 µg/L	
Wisconsin		0.7 µg/L	
	Ground Water Standards		
New Mexico		0.02 µg/L	CELDS 1994
North Carolina		0.7 µg/L	

^aGroup 2A: probably carcinogenic to humans

^bA3 ACGIH group - Animal carcinogen: The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that are not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

^cLifetime health advisory is recommended only if tetrachloroethylene is classified in group C. If tetrachloroethylene is classified in group B2, no lifetime health advisory is recommended.

ACGIH = American Conference of Governmental Industrial Hygienists; BAT = Best Available Technology; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; DHHS = Department of Health and Human Services; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; IARC = International Agency for Research on Cancer; MCL = Maximum Contaminant Level; NAS = National Academy of Sciences; NIOSH = National Institute for Occupational Safety and Health; NSPS = New Source Performance Standards; OAQPS = Office of Air Quality Planning 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; RfC = Reference Concentration; RfD = Reference Dose; RQ = Reportable Quantity; SDWA = Safe Drinking Water Act; SNARL = Suggested No-Adverse-Response Level; STEL = Short Term Exposure Limit; TLV = Threshold Limit Value; TWA = Time-Weighted Average; u.f. = uncertainty factor; WHO = World Health Organization

7. REGULATIONS AND ADVISORIES

In 1987, EPA's Science Advisory Board, Office of Research and Development, placed tetrachloroethylene on a continuum between B2 (probable human carcinogen; based on sufficient evidence in animals and inadequate or no evidence in humans) and C (possible human carcinogen) (EPA 1991b). In 1991, EPA's Office of Health and Environmental Assessment, a component of the Office of Research and Development, asked the Science Advisory Board to reevaluate the animal cancer data and related new ancillary information. The conclusion of the Science Advisory Board was that EPA's assessment of tetrachloroethylene done in 1987 remains appropriate. Therefore, the position taken by EPA's Science Advisory Board in 1987 regarding the carcinogenicity classification for tetrachloroethylene, which was reiterated in 1991, has not changed since 1987. This assessment is based on "increased liver tumors in male and female mice, kidney tumors in male rats, and, possibly, mononuclear cell leukemia in male and female rats" (EPA 1991b). The Science Advisory Board concluded that tetrachloroethylene "is an example of a chemical for which there is no compelling evidence of human cancer risk, but for which reductions in unnecessary human exposure might well be prudent." In response to the on-going evaluation, the q_1^* for tetrachloroethylene and the associated unit risk for oral and inhalation exposure have been withdrawn.

