CHAPTER 7. REGULATIONS AND GUIDELINES

Pertinent international and national regulations, advisories, and guidelines regarding lead in air, water, and other media are summarized in Table 7-1. This table is not an exhaustive list, and current regulations should be verified by the appropriate regulatory agency.

ATSDR develops MRLs, which are substance-specific guidelines intended to serve as screening levels by ATSDR health assessors and other responders to identify contaminants and potential health effects that may be of concern at hazardous waste sites. See Section 1.3 and Appendix A for detailed information on the MRLs for Pb. As discussed in Appendix A, no MRLs were derived for Pb.

Table 7-1. Regulations and Guidelines Applicable to Lead (Pb)

Agency	Description	Information	Reference
		Air	
EPA	RfC	Not evaluated	IRIS 2002, 2004
EPA	NAAQS	0.15 µg/m^3 [a]	EPA 2019b
WHO	Air quality guidelines	Not listed	WHO 2010
		Water & Food	
EPA	Drinking water standards and health advisories	No data	EPA 2018c
	National primary drinking water regulations for inorganic lead		EPA 2009
	MCL or TT	TT[b]	
	Action level	0.015 mg/L	
	Public health goal	zero	
	Lead and copper rule proposal		EPA 2019a
	Trigger level (proposed)	10 µg/L[c]	
	RfD		
	Tetraethyl lead	1x10^{-7} mg/kg/day	IRIS 2002
WHO	Drinking water quality guidelines		WHO 2017
	Provisional guideline value, lead	0.01 mg/L (10 µg/L)[d]	
FDA	Substances Added to Food[e]	Not listed	FDA 2019a
	Allowable level of lead in bottled water	0.005 mg/L	FDA 2019b

Table 7-1. Regulations and Guidelines Applicable to Lead (Pb)

Agency	Description	Information	Reference
	Cancer		
HHS	Carcinogenicity classification		NTP 2016
	Lead and lead compounds	Reasonably anticipated to be human carcinogens	
EPA	Carcinogenicity classification		IRIS 2004
	Lead and compounds (inorganic)	B2[f]	
IARC	Carcinogenicity classification		
	Lead	Group 2B[g]	IARC 1987, 2019
	Lead compounds, inorganic	Group 2A[h]	IARC 2006, 2019
	Lead compounds, organic	Group 3[i]	IARC 2006, 2019
	Occupational		
OSHA	PEL (8-hour TWA) for general industry		
	Lead (elemental, inorganic and organic soaps)	50 µg/m^3	OSHA 2019a
	Tetraethyl lead and tetramethyl lead	0.075 mg/m^3 [j]	OSHA 2019b
	PEL (8-hour TWA) for construction and shipyards		
	Lead (elemental, inorganic and organic soaps)	50 µg/m^3	OSHA 2019c, 2019a
	Tetraethyl lead	0.1 mg/m^3 [j]	OSHA 2019d, 2019e
	Tetramethyl lead	0.15 mg/m^3 [j]	OSHA 2019d, 2019f
	Action level (8-hour TWA) for general industry, construction		
	Lead (elemental, inorganic and organic soaps)	30 µg/m^3	OSHA 2019a, 2019c
	Medical removal protection for general industry		OSHA 2019a
	Temporary removal blood lead level	≥60 µg/100 g	
	Return to work blood lead level	<40 µg/100 g	
	Medical removal protection for construction and shipyards		OSHA 2019c
	Temporary removal blood lead level	≥50 µg/dL	
	Return to work blood lead level	<40 µg/dL	
NIOSH	REL (8-hour TWA)		
	Lead and compounds (as Pb)	0.05 mg/m^3	NIOSH 2019a
	Tetraethyl lead (as Pb) and tetramethyl lead (as Pb)	0.075 mg/m^3 [j]	NIOSH 2019b, 2019c
	IDLH		
	Lead and compounds (as Pb)	100 mg/m^3	NIOSH 2019a
	Tetraethyl lead (as Pb) and tetramethyl lead (as Pb)	40 mg/m^3	NIOSH 2019b, 2019c

Table 7-1. Regulations and Guidelines Applicable to Lead (Pb)

Agency	Description	Information	Reference
	Emergency Criteria		
EPA	AEGLs-air	No data	EPA 2018c
DOE	PACs-air[k]		DOE 2018a
	Lead		
	PAC-1	0.15 mg/m^3	
	PAC-2	120 mg/m^3	
	PAC-3	700 mg/m^3	
	Tetraethyl lead		
	PAC-1	0.3 mg/m^3	
	PAC-2	4 mg/m^3	
	PAC-3	40 mg/m^3	
	Tetramethyl lead		
	PAC-1	0.45 mg/m^3	
	PAC-2	4 mg/m^3	
	PAC-3	40 mg/m^3	
	Lead acetate		
	PAC-1	5 mg/m^3	
	PAC-2	55 mg/m^3	
	PAC-3	330 mg/m^3	
	Lead carbonate		
	PAC-1	0.19 mg/m^3	
	PAC-2	24 mg/m^3	
	PAC-3	900 mg/m^3	
	Lead dioxide and lead sulfide		
	PAC-1	0.17 mg/m^3	
	PAC-2	140 mg/m^3	
	PAC-3	810 mg/m^3	
	Lead tetroxide		
	PAC-1	0.17 mg/m^3	
	PAC-2	130 mg/m^3	
	PAC-3	770 mg/m^3	
	Lead sulfide		
	PAC-1	0.17 mg/m^3	
	PAC-2	140 mg/m^3	
	PAC-3	810 mg/m^3	
	Lead oxide		
	PAC-1	0.16 mg/m^3	
	PAC-2	130 mg/m^3	
	PAC-3	750 mg/m^3	

Table 7-1. Regulations and Guidelines Applicable to Lead (Pb)

Agency	Description	Information	Reference
	Lead sulfate		
	PAC-1	0.22 mg/m^3	
	PAC-2	170 mg/m^3	
	PAC-3	1,000 mg/m^3	
	Lead phosphate		
	PAC-1	0.2 mg/m^3	
	PAC-2	150 mg/m^3	
	PAC-3	910 mg/m^3	
	Lead chloride		
	PAC-1	0.2 mg/m^3	
	PAC-2	160 mg/m^3	
	PAC-3	940 mg/m^3	
	Lead chromate		
	PAC-1	0.036 mg/m^3	
	PAC-2	16 mg/m^3	
	PAC-3	97 mg/m^3	
	Lead bromide		
	PAC-1	0.27 mg/m^3	
	PAC-2	200 mg/m^3	
	PAC-3	1,200 mg/m^3	
	Lead nitrate		
	PAC-1	0.24 mg/m^3	
	PAC-2	180 mg/m^3	
	PAC-3	1,100 mg/m^3	
	Lead iodide		
	PAC-1	0.33 mg/m^3	
	PAC-2	270 mg/m^3	
	PAC-3	1,600 mg/m^3	
	Lead fluoroborate		
	PAC-1	0.28 mg/m^3	
	PAC-2	220 mg/m^3	
	PAC-3	1,300 mg/m^3	
Miscellaneous Federal Guidance			
CDC	PbB reference value	5 µg/dL	CDC 2012d, 2012e
EPA	Dust-lead hazard standards		EPA 2019c
	Floors	10 µg/ft^2	
	Window sills	100 µg/ft^2	

Table 7-1. Regulations and Guidelines Applicable to Lead (Pb)

Agency	Description	Information	Reference
EPA	Soil screening level	400 ppm	EPA 1994e, 1998; 2016d
HUD	Dust lead hazard action levels		HUD 2017
	Floors	≥10 µg/ft^2	
	Window sills	≥100 µg/ft^2	
	Dust lead clearance action levels		
	Interior floors	<10 µg/ft^2	
	Porch floors	<40 µg/ft^2	
	Window sills	<100 µg/ft^2	
	Window troughs	<100 µg/ft^2	

[a]Not-to-exceed air Pb concentration of 0.15 µg/m^3 in total suspended solids for a 3-month rolling average, evaluated over a 3-year period (i.e., the 3-month rolling average cannot exceed 0.15 µg/m^3 over a 3-year period).
[b]If >10% of tap water samples exceed the action level, a water system must take additional steps to control the corrosiveness of its water.
[c]Exceedance would trigger additional planning, monitoring, and treatment requirements, which vary depending on the characteristics of the water system.
[d]The guideline value is designated as provisional on the basis of treatment performance and analytical achievability because it is extremely difficult to achieve a lower concentration by central conditioning, such as phosphate dosing.
[e]The Substances Added to Food inventory replaces EAFUS and contains the following types of ingredients: food and color additives listed in FDA regulations, flavoring substances evaluated by FEMA or JECFA, GRAS substances listed in FDA regulations, substances approved for specific uses in food prior to September 6, 1958, substances that are listed in FDA regulations as prohibited in food, delisted color additives, and some substances "no longer FEMA GRAS."
[f]Group B2: probable human carcinogen.
[g]Group 2B: possibly carcinogenic to humans.
[h]Group 2A: probably carcinogenic to humans.
[i]Group 3: not classifiable as to carcinogenicity to humans.
[j]Skin designation.
[k]Definitions of PAC terminology are available from U.S. Department of Energy (DOE 2018b).

AEGL = acute exposure guideline levels; CDC = Centers for Disease Control and Prevention; DOE = Department of Energy; EAFUS = Everything Added to Food in the United States; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; FEMA = Flavor and Extract Manufacturers Association of the United States; GRAS = generally recognized as safe; HHS = Department of Health and Human Services; HUD = Housing and Urban Development; IARC = International Agency for Research on Cancer; IDLH = immediately dangerous to life or health concentration; IRIS = Integrated Risk Information System; JECFA = Joint FAO/WHO Expert Committee on Food Additives; MCL = maximum contaminant level; NAAQS = National Ambient Air Quality Standard; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PAC = Protective Action Criteria; PbB = blood lead concentration; PEL = permissible exposure limit; REL = recommended exposure limit; RfC = inhalation reference concentration; RfD = oral reference dose; TT = treatment technique; TWA = time-weighted average; WHO = World Health Organization