

CHAPTER 7. REGULATIONS AND GUIDELINES

Pertinent international and national regulations, advisories, and guidelines regarding copper 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 copper.

Table 7-1. Regulations and Guidelines Applicable to Copper and Copper Sulfate

Agency	Description	Information	Reference
Air			
EPA	RfC	Not evaluated	IRIS 1988
WHO	Air quality guidelines	Not listed	WHO 2010
Water & Food			
EPA	Drinking water standards and health advisories	No health advisories listed	EPA 2018b
	National primary drinking water regulations Copper TT action level ^a	1.3 mg/L	EPA 2022d
	National secondary drinking water regulations ^b Copper secondary MCL	1.0 mg/L	EPA 2009a
	RfD	Not evaluated	IRIS 1988
WHO	Drinking water quality guidelines Copper guideline value	2 mg/L (2,000 µg/L)	WHO 2022
FDA	Allowable level of copper in bottled water	1.0 mg/L	FDA 2022
	Direct food substances affirmed as generally recognized as safe when used as a nutrient supplement or as a processing aid Copper sulfate Copper gluconate	GRAS GRAS	FDA 2019a , FDA 2019b
Cancer			
HHS	Carcinogenicity classification	No data	NTP 2021
EPA	Carcinogenicity classification Copper	D ^c	IRIS 1988
IARC	Carcinogenicity classification Copper 8-hydroxyquinoline	Group 3 ^d	IARC 1987

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Agency	Description	Information	Reference
Occupational			
OSHA	PEL (8-hour TWA for general industry, construction and shipyards)		OSHA 2020a , 2020b , 2020c
	Copper dusts and mists	1 mg/m ³	
	Copper fume	0.1 mg/m ³	
NIOSH	REL (up to 10-hour TWA)		NIOSH 2019a , 2019b
	Copper (dust and mists, as Cu)	1 mg/m ³	
	Copper fume (as Cu)	0.1 mg/m ³	
	IDLH		
	Copper (dust and mists, as Cu)	100 mg Cu/m ³	
Emergency Criteria			
EPA	AEGLs	No data	EPA 2018c
DOE	PACs-air		DOE 2018
	Copper		
	PAC-1 ^e	3 mg/m ³	
	PAC-2 ^e	33 mg/m ³	
	PAC-3 ^e	200 mg/m ³	
	Copper sulfate		
	PAC-1 ^e	7.5 mg/m ³	
	PAC-2 ^e	9.9 mg/m ³	
	PAC-3 ^e	59 mg/m ³	
	Copper (II) chloride		
	PAC-1 ^e	6.3 mg/m ³	
PAC-2 ^e	69 mg/m ³		
PAC-3 ^e	420 mg/m ³		

^aA treatment technique (TT) is a required process, triggered by exceedance of the action level, which is intended to reduce the level of a contaminant in drinking water. The copper action level is exceeded if the 90th percentile concentration of copper is >1.3 mg/L.

^bNational secondary drinking water regulations are contaminants tested on voluntary basis. The levels indicated may cause water to appear cloudy or colored, or to taste or smell, however, it is safe to drink.

^cD: not classified.

^dGroup 3: Not classifiable as to its carcinogenicity to humans.

^eDefinitions of PAC terminology are available from DOE (2023).

AEGL = acute exposure guideline levels; DOE = Department of Energy; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; GRAS = generally recognized as safe; HHS = Department of Health and Human Services; IARC = International Agency for Research on Cancer; IDLH = Immediately Dangerous to Life of Health; IRIS = Integrated Risk Information System; MCL = maximum contaminant level; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PAC = protective action criteria; 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