

7. REGULATIONS AND GUIDELINES

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Pertinent international and national regulations, advisories, and guidelines regarding copper and copper compounds 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	No data	WHO 2010
Water & Food			
EPA	Drinking water standards and health advisories		EPA 2018
	MCLG	1.3 mg/L	
	MCL or TT	TT ^a	
	National primary drinking water regulations		EPA 2009a
	Treatment Technique Action Level	1.3 mg/L	
	Public Health Goal	1.3 mg/L	
	National secondary drinking water regulations ^b	1.0 mg/L	EPA 2018
	RfD	Not evaluated	EPA 2018
	Groundwater monitoring		EPA 2010
	PQL	0.05 mg/L	
	Clean Water Act – Designation of copper sulfate as a hazardous substance		EPA 2019 40CFR117.3
	RQ	10 lbs.	
	RQ (ammoniated)	100 lbs.	
	National Recommended Water Quality Human Health Criteria		EPA 2002
	Consumption of water and organisms	1300 µg/L	
	Consumption of organism only	No data	
	National Recommended Aquatic Life Criteria		EPA 2007
	Saltwater CMC (acute)	4.8 µg/L	
	Saltwater CCC (chronic)	3.1 µg/L	
	Freshwater CMC	No data	
	Freshwater CCC	No data	
WHO	Drinking water quality guidelines		WHO 2017
	Contaminants from pipes and fittings	2 mg/L (2000 µg/L)	
DOT	Marine pollutant – copper metal powder and copper sulfate, anhydrous, hydrates		DOT 2000 49CFR172.101

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Agency	Description	Information	Reference
FDA	Allowable level of copper in bottled water	1.0 mg/L	FDA 2019c 21CFR165.110
	Color additives exempt from certification-copper powder for use in externally applied drugs	not less than 95%	FDA 2019b 21CFR73.1647
	Direct food substance affirmed as generally recognized as safe when used as a nutrient supplement or as a processing aid Copper sulfate Copper gluconate		FDA 2019a 21CFR184
Cancer			
HHS	Carcinogenicity classification	No data	NTP 2016
EPA	Carcinogenicity classification Copper – Oral exposure Copper – Inhalation exposure	D ^c D	IRIS 1988
IARC	Carcinogenicity classification Copper 8-hydroxyquinoline	Group 3 ^d	IARC 2020
Occupational			
ACGIH	TLV (8-hour TWA) Copper (dust and mists, as Cu) Copper fume (as Cu)	1 mg/m ³ 0.2 mg/m ³	ACGIH 2018
OSHA	PEL (8-hour TWA for general industry) Copper dusts and mists Copper fume	1 mg/m ³ 0.1 mg/m ³	OSHA 2020a 29CFR1910.1000
	PEL (8-hour TWA for construction industry) Copper dusts and mists Copper fume	1 mg/m ³ 0.1 mg/m ³	OSHA 2020c 29 CFR 1926.55
	PEL (8-hour TWA for shipyard industry) Copper dusts and mists Copper fume	1 mg/m ³ 0.1 mg/m ³	OSHA 2020b 29 CFR 1915.1000
NIOSH	REL (up to 10-hour TWA) Copper (dust and mists, as Cu) Copper fume (as Cu) IDLH Dusts and mists	1 mg/m ³ 0.1 mg/m ³ 100 mg Cu/m ³	NIOSH 2014a; 2014b
Emergency Criteria			
AIHA	ERPGs	No data	AIHA 2016
EPA	AEGLs	No data	AEGLs 2018
DOE	PACs-air Copper PAC-1 PAC-2 PAC-3 Copper sulfate PAC-1 PAC-2 PAC-3 Copper (II) chloride PAC-1 PAC-2 PAC-3	 3 mg/m ³ 33 mg/m ³ 200 mg/m ³ 7.5 mg/m ³ 9.9 mg/m ³ 59 mg/m ³ 6.3 mg/m ³ 69 mg/m ³ 420 mg/m ³	DOE 2018

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Agency	Description	Information	Reference
	Other		
DOT	RQ for hazardous substances other than radionuclides		DOT 2000 49CFR172.101
	Copper ^e	5,000 lb (2270 kg)	
	Copper chloride ^f	10 lb (4.54 kg)	
	Cupric sulfate	10 lb (4.54 kg)	
	Quantity limitations for hazardous materials		
	Copper based pesticides, liquid, flammable, toxic, flash point less than 23 degrees C (UN2776, packing group I)		
	Passenger aircraft/rail	Forbidden	
	Cargo aircraft only	30 L	
	Copper based pesticides, liquid, flammable, toxic, flash point less than 23 degrees C (UN2776, packing group II)		
	Passenger aircraft/rail	1 L	
	Cargo aircraft only	60 L	
	Copper based pesticides, liquid, toxic (UN3010, packing group I)		
	Passenger aircraft/rail	1 L	
	Cargo aircraft only	30 L	
	Copper based pesticides, liquid, toxic (UN3010, packing group II)		
	Passenger aircraft/rail	5 L	
	Cargo aircraft only	60L	
	Copper based pesticides, liquid, toxic (UN3010, packing group III)		
	Passenger aircraft/rail	60 L	
	Cargo aircraft only	220L	
	Copper based pesticides, liquid, toxic, flammable, flash point not less than 23 degrees C (UN3009, packing group I)		
	Passenger aircraft/rail	1 L	
	Cargo aircraft only	30 L	
	Copper based pesticides, liquid, toxic, flammable, flash point not less than 23 degrees C (UN3009, packing group II)		
	Passenger aircraft/rail	5 L	
	Cargo aircraft only	60 L	
	Copper based pesticides, liquid, toxic, flammable, flash point not less than 23 degrees C (UN3009, packing group III)		
	Passenger aircraft/rail	60 L	
	Cargo aircraft only	220 L	
	Copper based pesticides, solid, toxic (UN2775, packing group I)		
	Passenger aircraft/rail	5 kg	
	Cargo aircraft only	50 kg	
	Copper based pesticides, solid, toxic (UN2775, packing group II)		
	Passenger aircraft/rail	25 kg	
	Cargo aircraft only	100 kg	

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Agency	Description	Information	Reference
	Copper based pesticides, solid, toxic (UN2775, packing group III)		
	Passenger aircraft/rail	100 kg	
	Cargo aircraft only	200 kg	
	Copper chloride (UN2802, packing group III)		
	Passenger aircraft/rail	25 kg	
	Cargo aircraft only	100 kg	
FDA	Color additives exempt from certification – copper powder for use in cosmetics		FDA 2019a 21 CFR 73.2647

^aThe MCL is the TT, which is a required process intended to reduce the level of a contaminant in drinking water; the action level for copper is 1.3 mg/L. If more than 10 percent of tap water samples exceed the action level, water systems must take additional steps.

^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. There are no human data, inadequate animal data from assays of copper compounds, and equivocal mutagenicity data.

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

^eThe RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 micrometers (0.004 inches)

^fIndicates that the name was added by PHMSA because (1) the name is a synonym for a specific hazardous substance and (2) the name appears in the Hazardous Materials Table as a proper shipping name.

ACGIH = American Conference of Governmental Industrial Hygienists; AEGL = acute exposure guideline levels; AIHA = American Industrial Hygiene Association; CCC = Criterion Continuous Concentration; CFR = Code of Federal Regulations; CMC = Continuous Maximum Concentration; HHS = Department of Health and Human Services; DOE = Department of Energy; DOT = Department of Transportation; EPA = Environmental Protection Agency; ERPG = emergency response planning guidelines; FDA = Food and Drug Administration; GRAS = Generally Recognized As Safe; IARC = International Agency for Research on Cancer; IDLH = Immediately Dangerous to Life of Health; IRIS = Integrated Risk Information System; MCL = maximum contaminant level; MCLG = maximum contaminant level goal; 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; PQL = possible quantitation limit; REL = recommended exposure limit; RfC = inhalation reference concentration; RfD = oral reference dose; RQ = reportable quantity; TLV = threshold limit values; TT = treatment technique; TWA = time-weighted average; WHO = World Health Organization