

7. REGULATIONS AND GUIDELINES

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

Table 7-1. Regulations and Guidelines Applicable to Cobalt

Agency	Description	Information	Reference
Air			
EPA	Subchronic p-RfC Chronic p-RfC	0.00002 mg/m ³ 0.000006 mg/m ³	EPA 2008
WHO	Air quality guidelines	No data	WHO 2010
USC	HAP		USC 2011 42 USC 7412
	Cobalt compounds	Included in the Clean Air Acts list of HAPs to be regulated by EPA	
Water & Food			
EPA	Drinking water standards National primary drinking water regulations Subchronic p-RfD Chronic p-RfD	No data No data 0.003 mg/kg-day 0.0003 mg/kg-day	EPA 2018 EPA 2009 EPA 2008
WHO	Drinking water quality guidelines	No data	WHO 2017
FDA	Substances Added to Food (EAFUS) Cobalt sulfate (as catalyst)	Permitted as boiler water additive in preparation of food for human consumption	FDA 2020b 21CFR173.310
	Cobaltous salts and its derivatives	Prohibited from use in human food	FDA 2020a 21CFR189.120
Cancer			
HHS	Carcinogenicity classification Cobalt and cobalt compounds that release cobalt ions in vivo	Reasonably anticipated to be human carcinogens	NTP 2016
EPA	Carcinogenicity classification	No data	EPA 2000
IARC	Carcinogenicity classification Cobalt sulfate and other soluble cobalt(II) salts Cobalt and cobalt compounds Cobalt metal without tungsten carbide	Group 2B ^a Group 2B Group 2B	IARC 2020

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Agency	Description	Information	Reference
	Cobalt metal with tungsten carbide	Group 2A ^b	
Occupational			
OSHA	PEL (8-hour TWA) for general industry Cobalt metal, dust, and fume (as Co)	0.1 mg/m ³	OSHA 2020a 29CFR1910.1000
	PEL (8-hour TWA) for construction industry Cobalt metal, dust, and fume (as Co)	0.1 mg/m ³	OSHA 2020a 29CFR1926.55
	PEL (8-hour TWA) for shipyard industry Cobalt metal, dust, and fume (as Co)	0.1 mg/m ³	OSHA 2020b 29CFR1915.1000
NIOSH	REL (TWA) Cobalt metal dust and fume (as Co)	0.05 mg/m ³	NIOSH 2019
Emergency Criteria			
AIHA	ERPGs Cobalt hydrocarbonyl ^c		AIHA 2016
	ERPG-1	Insufficient data	
	ERPG-2	0.9 mg/m ³	
	ERPG-3	3 mg/m ³	
NIOSH	IDLH Cobalt metal dust and fume (as Co)	20 mg/m ³	NIOSH 2014
EPA	AEGLS-air	No data	AEGLs 2018
DOE	PACs-air		DOE 2018
	Cobalt		
	PAC-1	0.18 mg/m ³	
	PAC-2	2 mg/m ³	
	PAC-3	20 mg/m ³	
	Cobalt acetate tetrahydrate		
	PAC-1	2.1 mg/m ³	
	PAC-2	23 mg/m ³	
	PAC-3	140 mg/m ³	
	Cobalt carbonyl		
	PAC-1	0.3 mg/m ³	
	PAC-2	3.3 mg/m ³	
	PAC-3	20 mg/m ³	
	Cobalt chloride		
	PAC-1	0.13 mg/m ³	
	PAC-2	18 mg/m ³	
	PAC-3	83 mg/m ³	
	Cobalt hydrocarbonyl		
	PAC-1	0.3 mg/m ³	
	PAC-2	0.9 mg/m ³	
	PAC-3	3 mg/m ³	
	Cobalt hydroxide		
	PAC-1	0.095 mg/m ³	
	PAC-2	1.1 mg/m ³	
	PAC-3	6.3 mg/m ³	
	Cobalt nitrate hexahydrate		
	PAC-1	0.3 mg/m ³	
	PAC-2	23 mg/m ³	
	PAC-3	140 mg/m ³	
	Cobalt nitrate		
	PAC-1	0.19 mg/m ³	
	PAC-2	14 mg/m ³	

7. REGULATIONS AND GUIDELINES

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	PAC-3	86 mg/m ³	
	Cobalt nitrite		
	PAC-1	0.15 mg/m ³	
	PAC-2	1.7 mg/m ³	
	PAC-3	10 mg/m ³	
	Cobalt oxide		
	PAC-1	0.082 mg/m ³	
	PAC-2	4.5 mg/m ³	
	PAC-3	27 mg/m ³	
	Cobalt sulfate		
	PAC-1	0.16 mg/m ³	
	PAC-2	14 mg/m ³	
	PAC-3	84 mg/m ³	
	Cobalt sulfate heptahydrate		
	PAC-1	0.29 mg/m ³	
	PAC-2	19 mg/m ³	
	PAC-3	120 mg/m ³	
	Cobalt tetraphenylporphine		
	PAC-1	120 mg/m ³	
	PAC-2	1,300 mg/m ³	
	PAC-3	7,900 mg/m ³	
	Cobalt(II) chloride hexahydrate		
	PAC-1	0.24 mg/m ³	
	PAC-2	25 mg/m ³	
	PAC-3	150 mg/m ³	
	Cobalt(II) oxide		
	PAC-1	0.076 mg/m ³	
	PAC-2	4.2 mg/m ³	
	PAC-3	25 mg/m ³	
	Cobalt(II) perchlorate, hexahydrate		
	PAC-1	0.37 mg/m ³	
	PAC-2	5.8 mg/m ³	
	PAC-3	35 mg/m ³	
	Cobalt(II) sulfate hydrate		
	PAC-1	0.18 mg/m ³	
	PAC-2	1.9 mg/m ³	
	PAC-3	12 mg/m ³	
	Cobalt, ((2,2'-(1,2-ethanediy)bis(nitrilomethylidene))bis(6-fluorophenolato))(2-)-N,N',O,O')-; (Fluomine)		
	PAC-1	0.27 mg/m ³	
	PAC-2	3 mg/m ³	
	PAC-3	5.7 mg/m ³	
	Cobaltous bromide		
	PAC-1	0.22 mg/m ³	
	PAC-2	13 mg/m ³	
	PAC-3	80 mg/m ³	
	Cobaltous carbonate		
	PAC-1	0.12 mg/m ³	
	PAC-2	210 mg/m ³	
	PAC-3	1,200 mg/m ³	

7. REGULATIONS AND GUIDELINES

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Agency	Description	Information	Reference
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^aGroup 2B: Possibly carcinogenic to humans.

^bGroup 2A: Probably carcinogenic to humans.

^cValues are given as cobalt.

AEGL = acute exposure guideline levels; AIHA = American Industrial Hygiene Association; CFR = Code of Federal Regulations; DOE = Department of Energy; DWEL = drinking water equivalent level; EAFUS = Everything Added to Food in the United States; EPA = Environmental Protection Agency; ERPG = emergency response planning guidelines; FDA = Food and Drug Administration; HAP = hazardous air pollutant; HHS = Department of Health and Human Services; IARC = International Agency for Research on Cancer; 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; p-RfC = provisional inhalation reference concentration; p-RfD = provisional oral reference dose; REL = recommended exposure limit; TLV = threshold limit values; TWA = time-weighted average; USC = United States Code; WHO = World Health Organization