CHAPTER 7. REGULATIONS AND GUIDELINES

Pertinent international and national regulations, advisories, and guidelines regarding perfluoroalkyls 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. A list of some select state drinking water regulations/guidelines or health-based values are summarized in Table 7-2.

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 perfluoroalkyls.

Table 7-1. Regulations and Guidelines Applicable to Perfluoroalkyls

Agency	Description	Information	Reference
	Air		
EPA	RfC	No data	IRIS 2018
WHO	Air quality guidelines	No data	WHO 2010
	Water & Food		
EPA	Drinking water standards and health advisories		EPA 2018
	DWEL		
	PFOA	0.00037 mg/L	EPA 2016e
	PFOS	0.00037 mg/L	EPA 2016f
	Lifetime Health Advisory		
	PFOA	0.07 µg/L	EPA 2016e
	PFOS	0.07 µg/L	EPA 2016f
	National primary drinking water regulations	No data	EPA 2009d
	RfD	No data	IRIS 2018
	PFOA	$2x10^{-5}$ mg/kg/day	EPA 2016e
	PFOS	$2x10^{-5}$ mg/kg/day	EPA 2016f
WHO	Drinking water quality guidelines	No data	WHO 2017
FDA	Substances added to food	No data[a]	FDA 2018
	Cancer		
ACGIH	Carcinogenicity classification		
	APFO	A3[b]	ACGIH 2001
HHS	Carcinogenicity classification	No data	NTP 2016a
EPA	Carcinogenicity classification	No data	IRIS 2018
	PFOA	Suggestive evidence for carcinogenic potential	EPA 2016e

Table 7-1. Regulations and Guidelines Applicable to Perfluoroalkyls

Agency	Description	Information	Reference
	PFOS	Suggestive evidence for carcinogenic potential	EPA 2016f
	10^{-6} Cancer risk		
	PFOA	0.5 µg/L	EPA 2016e
IARC	Carcinogenicity classification		IARC 2017
	PFOA	Group 2B[c]	
	Occupational		
ACGIH	TLV-TWA		
	APFO	0.01 mg/m^3 [d]	ACGIH 2001
OSHA	PEL (8-hour TWA) for general industry, shipyards and construction	No data	OSHA 2018b 29 CFR 1910.1000, Table Z-1
	PEL (8-hour TWA) for shipyards and construction	No data	OSHA 2018a 29 CFR 1915.1000, Table Z
	PEL (8-hour TWA) for construction	No data	OSHA 2018c 29 CFR 1926.55, Appendix A
NIOSH	REL (up to 10-hour TWA)	No data	NIOSH 2016
	Emergency Criteria		
EPA	AEGLs-air	No data	EPA 2016b
DOE	PACs-air		DOE 2018b
	PFOA		
	PAC-1[c]	1.1 mg/m^3	
	PAC-2[c]	12 mg/m^3	
	PAC-3[c]	75 mg/m^3	
	PFBA		
	PAC-1[c]	0.5 mg/m^3	
	PAC-2[c]	5.5 mg/m^3	
	PAC-3[c]	33 mg/m^3	

[a]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".
[b]A3: confirmed animal carcinogen with unknown relevance to humans.
[c]Group 2B: possibly carcinogenic to humans.
[d]Skin notation.
[e]Definitions of PAC terminology are available from DOE (2018a).

ACGIH = American Conference of Governmental Industrial Hygienists; AEGL = acute exposure guideline level; AIHA = American Industrial Hygiene Association; APFO = ammonium perfluorooctanoate; 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; FAO = Food and Agriculture Organization of the United Nations; FDA = Food and Drug Administration; FEMA = Federal Emergency Management Agency; GRAS = generally recognized as safe; HHS = Department of Health and Human Services; IARC = International Agency for Research on Cancer; IRIS = Integrated Risk Information System; JEFCA = Joint FAO/WHO Expert Committee on Food Additives; NIOSH = National Institute for Occupational Safety and Health; NTP = National

Table 7-1. Regulations and Guidelines Applicable to Perfluoroalkyls

Agency	Description	Information	Reference

Toxicology Program; OSHA = Occupational Safety and Health Administration; PAC = Protective Action Criteria; PEL = permissible exposure limit; PFBA = perfluorobutanoic acid; PFOA = perfluorooctanoic acid; PFOS = perfluorooctane sulfonic acid; REL = recommended exposure limit; RfC = inhalation reference concentration; RfD = oral reference dose; TLV = threshold limit values; TWA = time-weighted average; WHO = World Health Organization

Table 7-2. Select State Drinking Water Guidelines for Perfluoroalkyls[a]

	Value (ppb or µg/L)						
Value type	PFOA	PFOS	PFBS	PFBA	PFNA	PFHxS	Reference
Connecticut							
Drinking water action level	0.07[b]	0.07[b]	ND	ND	0.07[b]	0.07[b]	Connecticut DPH 2016
Maine							
Maximum exposure guideline for drinking water	0.07[c]	0.07[c]	ND	ND	ND	ND	MECDC 2016
Massachusetts							
Drinking water guidelines	0.07[b]	0.07b[a]	ND	ND	0.07[b]	0.07[b]	MassDEP 2018
Michigan							
Residential and nonresidential drinking water criteria	0.07[d]	0.07[d]	ND	ND	ND	ND	Michigan DEQ 2018a
Human noncancer drinking water value	0.42	0.011	ND	ND	ND	ND	Michigan DEQ 2016
Minnesota							
Health risk limit[e]							MDH 2019
Short-term	0.035	ND	ND	7	ND	ND	
Subchronic	0.035	ND	9	7	ND	ND	
Chronic	0.035	0.3	7	7	ND	ND	
Health-based value[e]							
Short-term	ND	0.015	3	ND	ND	0.047	
Subchronic	ND	0.015	3	ND	ND	0.047	
Chronic	ND	0.015	2	ND	ND	0.047	
Nevada							
Basic comparison level	0.667	0.667	667	ND	ND	ND	NDEP 2017
New Jersey							
Health-based chronic maximum contaminant level	0.014 (recommend-ation)	0.013 (recommend-ation)	ND	ND	0.013	ND	DWQI 2018a, 2017, 2018b, 2015

Table 7-2. Select State Drinking Water Guidelines for Perfluoroalkyls[a]

	Value (ppb or µg/L)						
Value type	PFOA	PFOS	PFBS	PFBA	PFNA	PFHxS	Reference
North Carolina							
Interim maximum allowable concentration in groundwater	2	ND	ND	ND	ND	ND	NC DEQ 2013, NCDENR 2012
Vermont							
Drinking water health advisory	0.02[b]	0.02[b]	ND	ND	0.02[b]	0.02[b]	Vermont DOH 2018

[a]Current as of September 2018.
[b]Value applies to the sum of PFOA, PFOS, PFHxS, PFHpA, and PFNA concentrations.
[c]MECDC notes that according to the EPA lifetime health advisory for PFOA and PFOS, when both PFOS and PFOA are present in drinking water, the combined levels are not to exceed 0.07 ppb.
[d]Value applies to the sum of PFOA and PFOS groundwater concentrations (Michigan DEQ 2018b).
[e]Health risk limits are rule values and health-based values are guidance values. Guidance is developed in-between rulemaking and may update an older rule. As a result, both rules and guidance values may be available for a contaminant (dual guidance) and the two values may be different (MDH 2014).

DEQ = Department of Environmental Quality; DOH = Department of Health; DPH = Department of Public Health; DWQI = Drinking Water Quality Institute; MassDEP = Massachusetts Department of Environmental Protection; MECDC = Maine Center for Disease Control and Prevention; MDH = Minnesota Department of Health; NCDENR = North Carolina Department of Environment and Natural Resources; ND = no data; NDEP = Nevada Division of Environmental Protection; PFBA = perfluorobutanoic acid; PFBS = perfluorobutane sulfonic acid; PFHpA = perfluoroheptanoic acid; PFHxS = perfluorohexane sulfonic acid; PFNA = perfluorononanoic acid; PFOA = perfluorooctanoic acid; PFOS = perfluorooctane sulfonic acid