

Potential Priority Chemicals:

Perfluoroalkyl and Polyfluoroalkyl Substances (PFASs)

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Meeting of the Scientific Guidance Panel
Biomonitoring California¹

At the March 13, 2015 meeting of the Scientific Guidance Panel (SGP), the Panel recommended including the class “perfluoroalkyl and polyfluoroalkyl substances (PFASs)” as designated chemicals for Biomonitoring California. PFASs are a class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom.²

The class of PFASs is now under consideration by the SGP as potential priority chemicals. The criteria for recommending priority chemicals as specified in the enabling legislation (SB 1379³) are:

- The degree of potential exposure to the public or specific subgroups, including, but not limited to, occupational.
- The likelihood of a chemical being a carcinogen or toxicant based on peer-reviewed health data, the chemical structure, or the toxicology of chemically related compounds.
- The limits of laboratory detection for the chemical, including the ability to detect the chemical at low enough levels that could be expected in the general population.
- Other criteria that the panel may agree to.

The twelve PFASs currently on the list of priority chemicals are shown below. These are all perfluoroalkyl substances (also known as perfluorochemicals [PFCs]). The Environmental Chemistry Laboratory⁴ measures these PFCs in serum.

2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid
2-(N-Methyl-perfluorooctane sulfonamido) acetic acid
Perfluorobutane sulfonic acid
Perfluorodecanoic acid

¹ California Environmental Contaminant Biomonitoring Program (also known as Biomonitoring California), codified at Health and Safety Code section 105440 et seq.

² Buck et al. (2011; as cited in OEHHA, 2015) defines the class of PFASs as “aliphatic substances containing one or more C atoms on which all the H substituents present in the nonfluorinated analogues from which they are notionally derived have been replaced by F atoms, in such a manner that PFASs contain the perfluoroalkyl moiety C_nF_{2n+1} .”

³ SB 1379, Perata and Ortiz, Chapter 599, Statutes of 2006, available at : http://www.oehha.ca.gov/multimedia/biomon/pdf/sb_1379_bill_20060929.pdf

⁴ The Environmental Chemistry Laboratory is in the Department of Toxic Substances Control.

Perfluorododecanoic acid
Perfluoroheptanoic acid
Perfluorohexane sulfonic acid
Perfluorononanoic acid
Perfluorooctane sulfonamide
Perfluorooctane sulfonic acid (PFOS)
Perfluorooctanoic acid (PFOA)
Perfluoroundecanoic acid

Biomonitoring California results for PFCs available so far can be accessed here:
<http://biomonitoring.ca.gov/results/chemical/154>.

Table 1 shows examples of additional PFASs that would be included as priority chemicals if the entire class is listed. Table 1 also notes some detections of these PFASs in humans, biota, and the environment. For detailed information on PFASs, including a description of the toxicity of this class, refer to OEHHA (2015) and the additional references listed at the end of this document.

Californians are widely exposed to large numbers of PFASs, many of which have only recently been detected in people and/or the environment. A recommendation to add this class to the priority list would emphasize the importance of tracking exposures to known and emerging PFASs in California residents over time.

Table 1. Examples of additional PFASs that will be included as priority chemicals if the entire chemical class is listed

Additional PFASs ^a (examples)		Detections in humans	Other detections
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	Serum, urine	Drinking water, surface water, groundwater, dust
	Perfluoropentanoic acid	Serum, urine	Drinking water, surface water, groundwater, fish, biosolids
	Perfluorohexanoic acid	Serum, urine	Drinking water, surface water, groundwater, biosolids, dust
	Perfluorotridecanoic acid	Serum	Fish and shellfish, herring gull eggs, dust
	Perfluorotetradecanoic acid	Serum	Fish and shellfish, herring gull eggs, surface water, dust
Perfluoroalkane sulfonic acids	Perfluoropentane sulfonic acid	Serum	-- ^b
	Perfluoroheptane sulfonic acid	Serum	Surface water
	Perfluorodecane sulfonic acid	Serum	Fish, herring gull eggs, surface water, biosolids
	Perfluoro-4-ethylcyclohexane sulfonic acid	--	Fish, herring gull eggs, surface water
Polyfluoroalkyl phosphoric acid esters (PAPs)	6:2 DiPAP	Serum, breast milk	Dust, WWTP ^c sludge
	8:2 DiPAP	Serum, breast milk	Dust, WWTP sludge
	10:2 DiPAP	Serum, breast milk	Dust, WWTP sludge
Perfluoroalkyl phosphinic acids (PFPiAs)	C6/C6 PFPiA	Serum	Fish, dust
	C6/C8 PFPiA	Serum	Fish, dust
Fluorotelomer sulfonic acids	6:2 Fluorotelomer sulfonic acid	Serum	Groundwater
	8:2 Fluorotelomer sulfonic acid	Serum	Groundwater
Perfluoroalkyl ether carboxylic acids and sulfonic acids		--	Surface water

^a These are example PFASs. If the SGP recommends inclusion of the class as priority chemicals, the Program would determine which PFASs to target for measurement.

^b No studies located.

^c Wastewater treatment plant (WWTP)

References

Potential designated chemical document on PFASs:

Office of Environmental Health Hazard Assessment (OEHHA, 2015). Potential Designated Chemicals: Perfluoroalkyl and Polyfluoroalkyl Substances (PFASs). Materials for Biomonitoring California Scientific Guidance Panel Meeting. March 13, 2015. Available at:
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