



Groundwater Interim Maximum Allowable Concentration (IMAC) Summary Document

Division of Water Resources

PERFLUOROOCCTANOIC ACID (PFOA) (CASRN 335-67-1)

Health Effects Summary

Human health effects associated with chronic, low environmental exposures to perfluorooctanoic acid (PFOA) are unknown. PFOA has an estimated biological half-life (time necessary for half of the dose to be eliminated from the body) of 2.1-10.1 years in humans (ATSDR, 2021).

Animals exposed to perfluorooctanoic acid at high doses via ingestion exhibited liver toxicity, immune effects, developmental effects and liver, testicular, and pancreatic cancer. Epidemiological studies of workers exposed to perfluorooctanoic acid via inhalation and general populations exposed via drinking water suggest associations between PFOA exposure and health outcomes such as high cholesterol, increased liver enzymes, decreased vaccination response, small decreases in birth weight, pregnancy induced hypertension and preeclampsia, and testicular and kidney cancer (ATSDR, 2021).

Uses

Perfluorooctanoic acid is used as a water and oil repellent, a surfactant in firefighting foams, and as an intermediate in the synthesis of fluoroacrylic esters. It is used in Teflon, floor waxes and polishes, outdoor clothing, and similar chemicals (known as fluorotelomers). According to the 2010/2015 EPA PFOA Stewardship Program, manufacture of PFOA was scheduled to be phased out by 2015 (U.S. EPA, 2022a).

PFOA IMAC

An interim maximum allowable concentration (IMAC) of 2 µg/L was established under 15A NCAC 02L .0202(c) for perfluorooctanoic acid in 2006. New toxicological information relevant to the derivation of a North Carolina groundwater standard has become available since that time. U.S. EPA Office of Water issued a Drinking Water Health Advisory for PFOA in 2016 (U.S. EPA, 2016). The health advisory of 0.07 µg/L was calculated based on potential adverse effects for fetuses during pregnancy and breastfed infants using the 90th percentile drinking water intake and body weight of lactating women.

U.S. EPA Office of Water released a new interim updated Drinking Water Health Advisory on June 15, 2022 (U.S. EPA, 2022b). This interim health advisory is based on new scientific information and replaces the advisory issued in 2016. EPA states that this interim health advisory for PFOA will remain in place until a National Primary Drinking Water Regulation is established for PFOA (U.S. EPA, 2022c). The interim health advisory of 0.004 ng/L (4×10^{-6} µg/L) was calculated based on potential adverse developmental immune health outcomes for children based on human epidemiological studies. The interim health advisory was calculated using the 90th percentile drinking water intake and body weight of children ages 0 to <5 years.

No aqueous odor threshold, aqueous taste threshold, federal maximum contaminant level (MCL) or secondary drinking water standard has been established for PFOA.

DWR recommends the removal of the 2006 IMAC for PFOA based on more recently published data and anticipated forthcoming regulations from EPA (U.S. EPA, 2022c). With the removal of the IMAC, in accordance with 15A NCAC 02L .0202(c), PFOA shall not be permitted in groundwater in concentrations at or above the practical quantitation limit.



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References

Agency for Toxic Substances and Disease Control (ATSDR). 2021. Toxicological Profile for Perfluoroalkyls. U.S. Department of Health and Human Services.
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U.S. EPA. 2016. Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA). Office of Water. (EPA 822-R-16-005) https://www.epa.gov/sites/default/files/2016-05/documents/pfoa_health_advisory_final_508.pdf

U.S. EPA. 2022a. Fact Sheet: 2010/2015 PFOA Stewardship Program. <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program>

U.S. EPA. 2022b. INTERIM Drinking Water Health Advisory: Perfluorooctanoic Acid (PFOA). Office of Water. (EPA/822/R-22/003) <https://www.epa.gov/system/files/documents/2022-06/interim-pfoa-2022.pdf>

U.S. EPA. 2022c. Drinking Water Health Advisories for PFOA and PFOS. Office of Water.
<https://www.epa.gov/sdwa/drinking-water-health-advisories-pfoa-and-pfos>