



ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE CONTAMINATED SITES PROGRAM

and

DIVISION OF ENVIRONMENTAL HEALTH DRINKING WATER PROGRAM

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Technical Memorandum

Action Levels for PFAS in Water and Guidance on Sampling Groundwater and Drinking Water

Purpose

This document was prepared by the Alaska Department of Environmental Conservation (DEC or “department”) to provide clear, consistent guidance on responding to Per- and Polyfluoroalkyl Substances (PFAS) in groundwater and surface water, and to establish health-based action levels for drinking water.

Regulatory Authority

18 AAC 75.325(d): “A responsible person shall investigate, contain, and perform a cleanup of a discharge or release of a hazardous substance...”

18 AAC 75.325(f)(1)(D): “A responsible person shall to the maximum extent practicable, ...prevent, eliminate, or minimize potential adverse impacts to human health, safety, and welfare, and to the environment, onsite and offsite, from any hazardous substance remaining at the site.”

18 AAC 75.990(17): Cleanup is defined to include “efforts to mitigate environmental damage or a threat to human health, safety, or welfare resulting from a hazardous substance, and includes . . . measures that are necessary to mitigate or avoid further threat to human health, safety, or welfare.”

18 AAC 75.345(d): “Where the department determines that toxicity information is insufficient to establish a cleanup level for a hazardous substance or a pollutant that ensures protection of human health, safety, and welfare, and of the environment, the department may require a responsible person to provide an alternative source of drinking water for the affected parties or implement other institutional controls under 18 AAC 75.375 until a cleanup level is established under (b)(2), (3), or (4) of this section.”

18 AAC 75.345(c): “The department will set a more stringent cleanup level than the applicable level under (b) of this section, if the department determines that a more stringent cleanup level is necessary to ensure protection of human health, safety, or welfare, or of the environment, and based on actual onsite and actual or likely offsite uses of the groundwater that are likely to be affected by the hazardous substance. In making a determination under this subsection, the department may consider:

(2) the presence of sensitive subpopulations who respond biologically to lower levels of exposure to a hazardous substance...

(5) a health advisory value developed by EPA's Office of Water..."

18 AAC 80.005(a): "The purpose of this chapter is to protect public health and safety by establishing..."

(2) contaminant monitoring requirements for drinking water provided by a public water system."

18 AAC 80.015(a): "A person may not

(1) cause pollution or contamination to enter a public water system; or

(2) create or maintain a condition that has a significant potential to cause or allow the pollution or contamination of a public water system."

Background and Basis for Guidance

To ensure public drinking water is safe for consumption, Alaska relies on and adopts the U.S. Environmental Protection Agency's (EPA's) drinking water maximum contaminant levels (MCLs), rather than establishing state specific MCLs.

The EPA has not yet established MCLs for PFAS. However, in 2009 the EPA published Provisional Health Advisory Levels of 0.4 µg/L perfluorooctanoic acid (PFOA) and 0.2 µg/L perfluorooctane sulfonate (PFOS), and recommended people not drink water containing higher levels of these compounds.

In 2012, EPA published the third Unregulated Contaminant Monitoring Rule (UCMR3) under the Safe Drinking Water Act (SDWA). The rule required a subset of public drinking water systems to monitor for thirty unregulated contaminants including six PFAS compounds [PFOS, PFOA, perfluorohexane sulfonate (PFHxS), perfluorononanoic acid (PFNA), perfluoroheptanoic acid (PFHpA) and perfluorobutane sulfonate (PFBS)] between 2013 and 2015. PFAS have since been found in many public and private water supplies across the country.

In 2016, EPA published lifetime health advisories (LHAs) under the SDWA for two PFAS, specifically PFOS and PFOA. These LHAs were created to assist state and local officials and drinking water system operators, in evaluating risks from these contaminants in drinking water, so they can take appropriate action to protect residents. The EPA recommends people not drink water containing a total concentration of PFOS+PFOA above 0.07 µg/L (70 parts per trillion).

The EPA LHA levels assume an adult body weight of 80 kilograms and a daily drinking water intake rate of 4.32 liters for a nursing mother. In addition, each LHA level incorporates a relative source contribution (RSC) that assumes 20% of the exposure to PFOS and PFOA is from drinking contaminated water and the remaining 80% is from exposure from other sources (e.g. consuming contaminated food, contact with household products, and occupational exposure).

In 2016, the department incorporated the published EPA LHA reference dose (RfD) into its determination of risk-based groundwater cleanup levels at contaminated sites for two of the UCMR3 compounds -- PFOS and PFOA. Groundwater cleanup levels for contaminants regulated by the department are calculated using a risk-based approach that does not include an RSC factor.

In June 2018, the Agency for Toxic Substances and Disease Registry (ATSDR) issued a draft Toxicological Profile for Perfluoroalkyls for public review and comment. The document provides a compilation of information from available studies on the toxicologic properties and adverse health effects associated with PFAS compounds and identifies numerous on-going studies.

Based on review of available information, DEC considers the six PFAS compounds addressed in this memorandum to be hazardous substances under state law.¹ Several of these compounds have been found in groundwater and surface water used as drinking water. The department finds that action levels are necessary to consistently determine where drinking water treatment or alternative drinking water sources are necessary to ensure adequate protection of human health.

Action Levels

Action levels for PFAS compounds in groundwater and surface water used as drinking water are as follows:

- **Where one or more of the PFAS compounds, PFOS, PFOA, PFNA, PFHxS, or PFHpA are detected in a water sample analytical result, the sum of the concentrations for all detected compounds will be compared to an action level of 0.07 µg/L.**
- **Where PFBS is present in a water sample analytical result, the detected concentration will be compared to an action level of 2.0 µg/L.**

Contaminant	CAS Registry Number	
perfluorooctanesulfonic acid (PFOS)	1763-23-1	Summed Action Level 0.07 µg/L
perfluorooctanoic acid (PFOA)	335-67-1	
perfluorononanoic acid (PFNA)	375-95-1	
perfluorohexanesulfonic acid (PFHxS)	355-46-4	
perfluoroheptanoic acid (PFHpA)	375-85-9	
perfluorobutanesulfonic acid (PFBS)	375-73-5	Action Level 2.0 µg/L

- **Where the above PFAS are not detected, refer to the April 2017 Technical Memorandum *Guidelines For Treatment Of Non-Detect Values, Data Reduction For Multiple-Detections And Comparison Of Quantitation Limits To Cleanup Values***

¹ AS 46.03.826(5) "hazardous substance" means (A) an element or compound which, when it enters into the atmosphere, or in or upon the water or surface or subsurface land of the state, presents an imminent and substantial danger to the public health or welfare, including but not limited to fish, animals, vegetation, or any part of the natural habitat in which they are found.

Scientific Basis

In taking this action, DEC concurs with the state of Massachusetts and other states that several factors together warrant applying the PFOA/PFOS LHA of 0.07 µg/L as a total threshold level for five of the six UCMR3 compounds.^{2 3} These factors include:

- 1) the molecular structure of the compounds PFNA, PFHxS, and PFHpA is substantially similar (between six and eight fluorinated carbons) to that of PFOS and PFOA, thus similar biological activities are predicted;
- 2) evidence indicates the compounds have similar biological half-lives, which is indicative of toxicity;
- 3) toxicity information, though limited, indicates these compounds cause adverse health effects at similar doses;
- 4) the presence of multiple contaminants may cause additive or synergistic health effects; and
- 5) the additive approach is consistent with EPA's LHA approach where PFOS and PFOA are summed together. Including the additional three PFAS with PFOS and PFOA when assessing exposure is a reasonable and protective approach given the similarities of the compounds.

The department is setting an individual action level for PFBS due to the shorter chain structure (four fluorinated carbons versus 6-8 in the other five compounds) which implies less persistence in the body and the available data, although limited, indicates that it exhibits lower toxicity than PFOS and PFOA. This value is based on a chronic reference dose (RfD) established by the state of Minnesota Department of Health.⁴

Guidance

At a contaminated site where a release of PFAS have been documented, a responsible party shall develop a work plan to:

- characterize the nature and extent of contamination in groundwater including, if appropriate, surface water and pore water if contaminated groundwater is discharging to surface water, using EPA Method 537 and report results for the six PFAS listed in UCMR3 at a minimum, following the ITRC sampling guidance for PFAS⁵;
- conduct a water well survey to identify wells that may be impacted; and
- sample potentially impacted drinking water supplies, both public and private, using EPA Method 537 to determine the extent of impacts.

² Massachusetts Department of Environmental Protection Office of Research and Standards. June 2018. Final Recommendations for Interim Toxicity and Drinking Water Guidance Values for Perfluorinated Alkyl Substances included in the Unregulated Chemical Monitoring Rule 3.

³ Arizona, Colorado, Connecticut, Minnesota, New Jersey, Vermont

⁴ Minnesota Department of Health. December 2017. Toxicological Summary for Perfluorobutane sulfonate.

⁵ ITRC 2018. Site Characterization Considerations, Sampling Precautions, and Laboratory Analytical Methods for Per- and Polyfluoroalkyl Substances (PFAS).

Where drinking water contamination is likely, water well surveys and drinking water sampling should be conducted as soon as feasible. The water well survey and sampling efforts shall be expanded until all potentially impacted drinking water systems have been tested. Where drinking water sources or water supply wells are affected, the RP shall:

- Provide an alternative drinking water source to all properties where drinking water has been impacted above the action levels listed above;
- Work with owners of all water supply wells containing PFAS concentrations above the action levels as soon as feasible to either:
 - ensure all water pumped and discharged is treated to concentrations below the action levels;⁶
 - disconnect the wells (disconnect power, cap water line, and label) and take them out of use; or
 - permanently decommission the wells.
- On a quarterly basis, sample all water supply wells currently in use that contain PFAS concentrations at or above one-half the action levels, subject to approval for reduced monitoring frequency if concentrations are determined to be stable or decreasing; and
- On an annual basis, sample any water supply wells currently in use that contain PFAS concentrations between 25% - 50% of the action levels, subject to approval for reduced monitoring if the concentrations are determined to be stable or decreasing.

The department is contemplating future revisions to the cleanup levels for PFOS and PFOA and adopting regulatory cleanup levels for the remaining UCMR3 PFAS compounds based on the Agency for Toxic Substances and Disease Registry draft Toxicological Profile for Perfluoroalkyls (2018)⁷ and other information that may be developed by other states or at the national level.

The department may revise this technical memorandum as new information on the science and toxicity of PFAS becomes available.

For more information or additional questions, please contact: Sally Schlichting at (907) 465-5076.

⁶ Excavation dewatering and other discharges may be permitted on a case-by-case basis under an excavation dewatering permit, DEC work plan, or other DEC authorized permit, and may involve limited or controlled discharge locations and/or heightened monitoring requirements.

⁷ ATSDR. June 2018. Draft Toxicological Profile for Perfluoroalkyls – Draft for Public Comment