

# PFAS: 2022 Legislative Updates & Health Impacts

Jonathan Petali, Ph.D., Toxicologist



# NHDES Environmental Health Program & Risk Assessment

The Environmental Health Program specializes in evaluating how people are exposed to harmful chemicals found in their environment. Where chemical exposures present significant risks, we make recommendations to reduce those risks and educate stakeholders.

We're here for residents, community groups *and other stakeholders who are looking for information* about environmental health hazards or risk communication and education.

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# Health Risks Associated with Per- and Polyfluoroalkyl Substances (PFAS)

- Increased cholesterol levels
- Changes in liver enzyme levels
- Small changes in infant birth weight
- Altered immune system function
- Increased risk of high blood pressure or pre-eclampsia in pregnant women
- Changes in thyroid and/or reproductive hormones
- Possibly increased risks for kidney or testicular cancer

PFAS-related health effects are being studied nationwide by the **Agency for Toxic Substances and Disease Registry (ATSDR)**, as well as private and academic institutions.

This is a **constantly evolving area of scientific research**. For more information from ATSDR, follow this link: <https://www.atsdr.cdc.gov/pfas/index.html>

# Primary Routes of Exposure & Relevant Environmental Media

## Ingestion

### Relevant Media

- Groundwater
- Surface Water
- Soil (Incidental ingestion)
- Biota & Food

*Primary Route of Exposure for PFAS*

## Dermal (Skin) Contact

### Relevant Media

- Groundwater
- Surface Water
- Soils

*Less Significant Route of Exposure for PFAS at Certain Concentrations*

## Inhalation

### Relevant Media

- Ambient Air
- Soil/Dusts
- Vapors

*Least Characterized Route of Exposure for PFAS, and Poorly Understood*

# Per- & Polyfluoroalkyl Substances & Ingestion

## Ingestion

### Relevant Media

- Groundwater
- Surface Water
- Soil
- Biota & Food

*Primary Route of Exposure for PFAS*

For more technical information:  
Jonathan Petali, Ph.D.  
603-271-1359

**2019-2020** - Drinking Water Maximum Contaminant Level (MCL) and Ambient Groundwater Quality Standards (AGQS)

- Developed for 4 PFAS: PFOA (12 ng/L), PFOS (15 ng/L), PFHxS (18 ng/L) & PFNA (11 ng/L)

**2022** - EPA issued final Health Advisories for GenX (10 ng/L) and PFBS (2,000 ng/L)

**2022** - EPA announced *Interim* Health Advisories for PFOA (0.004 ng/L) and PFOS (0.020 ng/L)

- Tentatively proposing MCLs for PFOA and PFOS in Fall 2022

**2022 and forward** - EPA is developing RfDs for other PFAS (PFBA, PFHxA, PFHxS, PFNA, and PFDA) and looking towards a grouping strategy

# Per- & Polyfluoroalkyl Substances & Ingestion

## Ingestion

### Relevant Media

- Groundwater
- Surface Water
- Soil
- Biota & Food

### *Primary Route of Exposure for PFAS*

For more technical information:  
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### 2019 – Direct Contact Risk-Based Soil Concentrations:

- Developed for 4 PFAS:  
Residential Scenario – PFOA (0.2 mg/kg), PFOS, PFHxS (0.1 mg/kg) and PFNA (0.1 mg/kg)  
Construction Scenario – PFOA (1.3 mg/kg), PFOS (0.6 mg/kg), PFHxS (0.9 mg/kg) and PFNA (0.9 mg/kg)
- Combination of Incidental Ingestion & Skin Contact
- Full Information Available at:  
<https://www4.des.state.nh.us/nh-pfas-investigation/wp-content/uploads/PFAS-DCRB-value-121119.pdf>

### 2022 and Future Issues

- Other PFAS – GenX, PFBS, PFBA, PFHxA, PFHxS, PFNA, and PFDA
- Impacts to home produce and agricultural soils? Current topic of USDA, EPA and NHDES research
  - Collaboration with USGS to understand PFAS in soils
  - Collaboration with NHTI to study PFAS in garden plants

# Per- & Polyfluoroalkyl Substances & Ingestion

## Ingestion

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## 2020-2021 – Freshwater Fish Tissue Sampling across Southern NH

- More information at:
  - Weston Solution Report - <https://www4.des.state.nh.us/nh-pfas-investigation/?p=1405>
  - NHDES Fish Advisories - <https://www.des.nh.gov/news-and-media/nhdes-issues-new-fish-consumption-advisories-5-lakes-southern-new-hampshire>

## 2021 and ongoing – Collaborations with Dartmouth College & Clarkson University

- PFAS in Shellfish Sampling (Oysters, Mussels, Clams)
- PFAS in Gulf of Maine Fish
- NH Fish Consumption Survey (*in preparation for publication*)
- Primary Partners – Dr. Celia Chen, Dr. Megan Romano, Dr. Tom Holsen and Dr. Sujan Fernando
- Preview of Great Bay Estuary work available here: <https://www.youtube.com/watch?v=aGaNloneJQg>

# Per- & Polyfluoroalkyl Substances & Dermal Contact

## Dermal (Skin) Contact

### Relevant Media

- Groundwater
- Surface Water
- Soils

### *Less Significant Route of Exposure*

For more technical information:  
Jonathan Petali, Ph.D.  
603-271-1359

### 2019 – Direct Contact Risk-Based Soil Concentrations:

- Combination of Incidental Ingestion & Skin Contact
- Full Information Available at: <https://www4.des.state.nh.us/nh-pfas-investigation/wp-content/uploads/PFAS-DCRB-value-121119.pdf>

### 2019 – Recreational Screening Levels (Swimming):

- Developed on a site-specific basis (e.g., Pease AFB)
- Currently no Surface Water Criteria for PFAS
- Significantly higher than drinking water guidance

2022 – EPA asserts that dermal contact is not a driver of exposure concern as it related to the interim HAs for PFOA and PFOS

### 2022 – Knowledge Gaps & Challenges:

- More research is needed to understand the dermal absorption factors (e.g., skin partitioning coefficients)
- Similar challenges with other PFAS & mixtures



# Per- & Polyfluoroalkyl Substances & Inhalation

## Inhalation

### Relevant Media

- Ambient Air
- Soils/Dusts
- Vapors

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### 2016-2022 – Major Concern for Residents in Certain Communities

- Benchmarks for Inhalation, or Reference Concentrations (RfCs), vary by state and are very limited
- Limited information is available for estimating exposure via inhalation

### 2022 – Legislative Directive to Annually Evaluate Ambient Air Limits for PFAS

- HB 1546; Effective Jan 1, 2023

### 2022 – Knowledge Gaps & Challenges:

- Extrapolating RfCs (inhalation) from RfDs (oral exposure)
- Appropriateness of exposure scenarios & exposure assumptions
- Similar challenges with other PFAS & mixtures

# Summary

## Ingestion

### Relevant Media

- Groundwater
- Surface Water
- Soil
- Biota & Food

*Primary Route of Exposure for PFAS*

## Dermal (Skin) Contact

### Relevant Media

- Groundwater
- Surface Water
- Soils

*Less Significant Route of Exposure for PFAS at Lower Environmental Concentrations*

## Inhalation

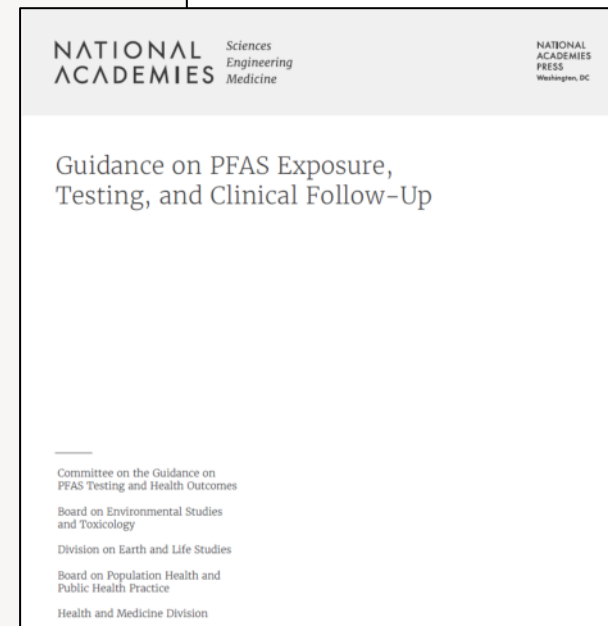
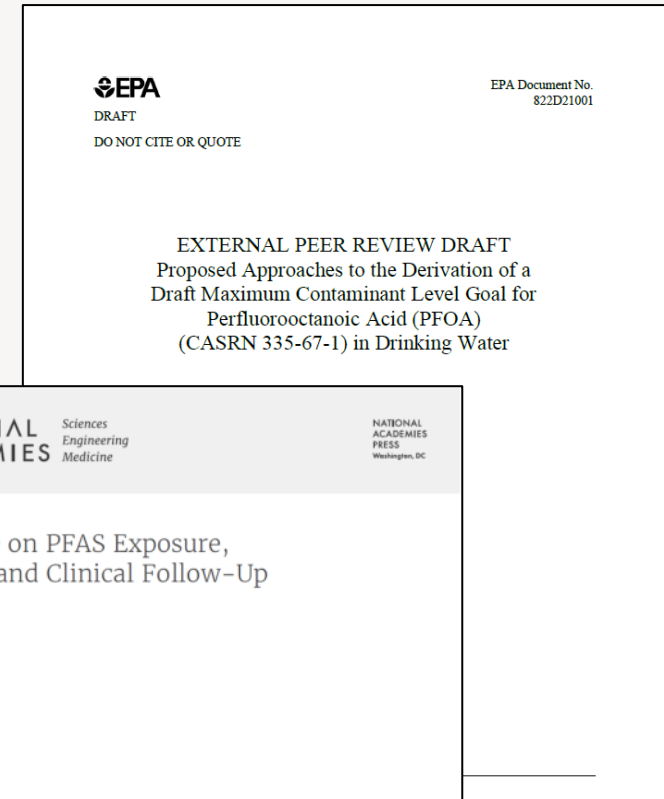
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# Evolving Understanding of PFAS Risks

- US EPA’s draft assessments for PFOA and PFOS are completing their review process.
  - Expected to be completed this fall, with new HA(s) issued for PFOA and PFOS at that time.
  - US EPA’s draft documents recommended PFOA be classified as “*Likely to Be Carcinogenic to Humans.*”
- A panel from the National Academies of Science, Engineering and Medicine (NASEM) made recommendations for CDC to update its PFAS guidance for clinicians.
- Ongoing interests in PFAS at a national level by various interest groups and policy makers.



# Looking to the Future

- Risk assessment of PFAS will **change with new research**.
- **New EPA toxicity values, health advisories or state legislation** may result in new criteria for various media.
- **More basic and applied research is needed** to assess risks from dermal contact and inhalation.
- **Local partnerships are helping** to address knowledge gaps.
- **Risk communication is critical**, especially with our affected communities, legislators and the regulated community.



# Questions?

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