

# ***State and EPA Drinking Water Guidelines for Per- and Polyfluoroalkyl Substances (PFAS)***



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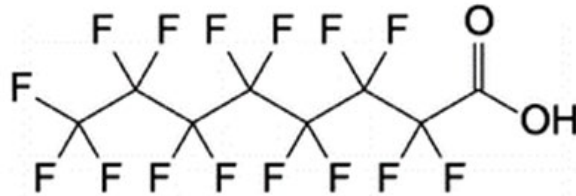
***How States and Communities Are Using Science to Address PFAS***

***National Governors Association and AAAS EPI Center***

***June 10, 2021***

# Why are PFAS of particular concern as drinking water contaminants?

- Widespread occurrence.
- Do not break down.
- Numerous toxic effects in animal studies.
- PFOA, PFOS, and other long-chain PFAS:
  - Bioaccumulate, remain in the body for many years after exposure ends.
  - Evidence for human health effects even at general population exposures.
  - Higher exposure from drinking water at low levels (e.g., ~20 ng/L for PFOA) than from generally prevalent sources (food, consumer products).
- Infants (a sensitive subpopulation) have higher exposure from contaminated drinking water.
- **Overall - indicates need for caution for drinking water exposure.**



# ***EPA & State Guidelines for Drinking Water Contaminants***

## **Include:**

- Standards: *EPA and state Maximum Contaminant Levels (MCLs)*
- Guidance: *EPA Health Advisories; state guidance values*

# ***State Drinking Water Standards (MCLs)***

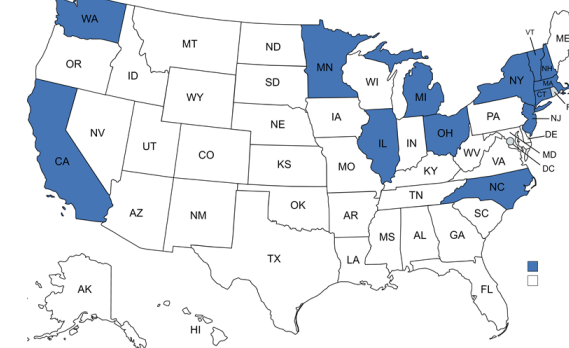


- May address contaminants with **no federal MCLs**, such as PFAS.
- May be **more stringent** than federal MCLs.
- Some states have developed their own MCLs for many years.
- Other states developed MCLs for the first time for PFAS.
- Many states do not develop their own MCLs.
  - *May be precluded from doing so by state law.*
  - *May not have expertise and resources to do so.*

# EPA & State PFAS Drinking Water Guidelines

(ng/L, ppt; includes standards & guidance values - proposed, recommended, & final)

	PFOA	PFOS	PFNA	PFHxS	PFHpA	PFDA	Total?	PFBA	PFHxA	PFBS	GenX
<b>EPA</b>	70	70	---	---	---	---	<i>Yes (2)</i>	---	---	---	---
<b>CA*</b>	5.1/ 10	6.5/ 40	---	---	---	---	<i>No</i>	---	---	500/ 5000	---
<b>CT</b>	70	70	70	70	70	---	<i>Yes (5)</i>	---	---	---	---
<b>IL</b>	2	14	---	140	---	---	<i>No</i>	---	160,000	---	---
<b>MA</b>	20	20	20	20	20	20	<i>Yes (6)</i>	---	---	2000	---
<b>MI</b>	8	16	6	51	---	---	<i>No</i>	---	400,000	420	370
<b>MN</b>	35	15	---	47	---	---	<i>No</i>	7000	---	2000	---
<b>NH</b>	12	15	11	18	---	---	<i>No</i>	---	---	---	---
<b>NJ</b>	14	13	13	---	---	---	<i>No</i>	---	---	---	---
<b>NY</b>	10	10	---	---	---	---	<i>No</i>	---	---	---	---
<b>NC</b>	---	---	---	---	---	---	---	---	---	---	140
<b>OH</b>	70	70	21	140	---	---	---	---	---	140,000	---
<b>VT</b>	20	20	20	20	20	---	<i>Yes (5)</i>	---	---	---	---
<b>WA</b>	10	15	13	65	---	---	<i>No</i>	---	---	345	---

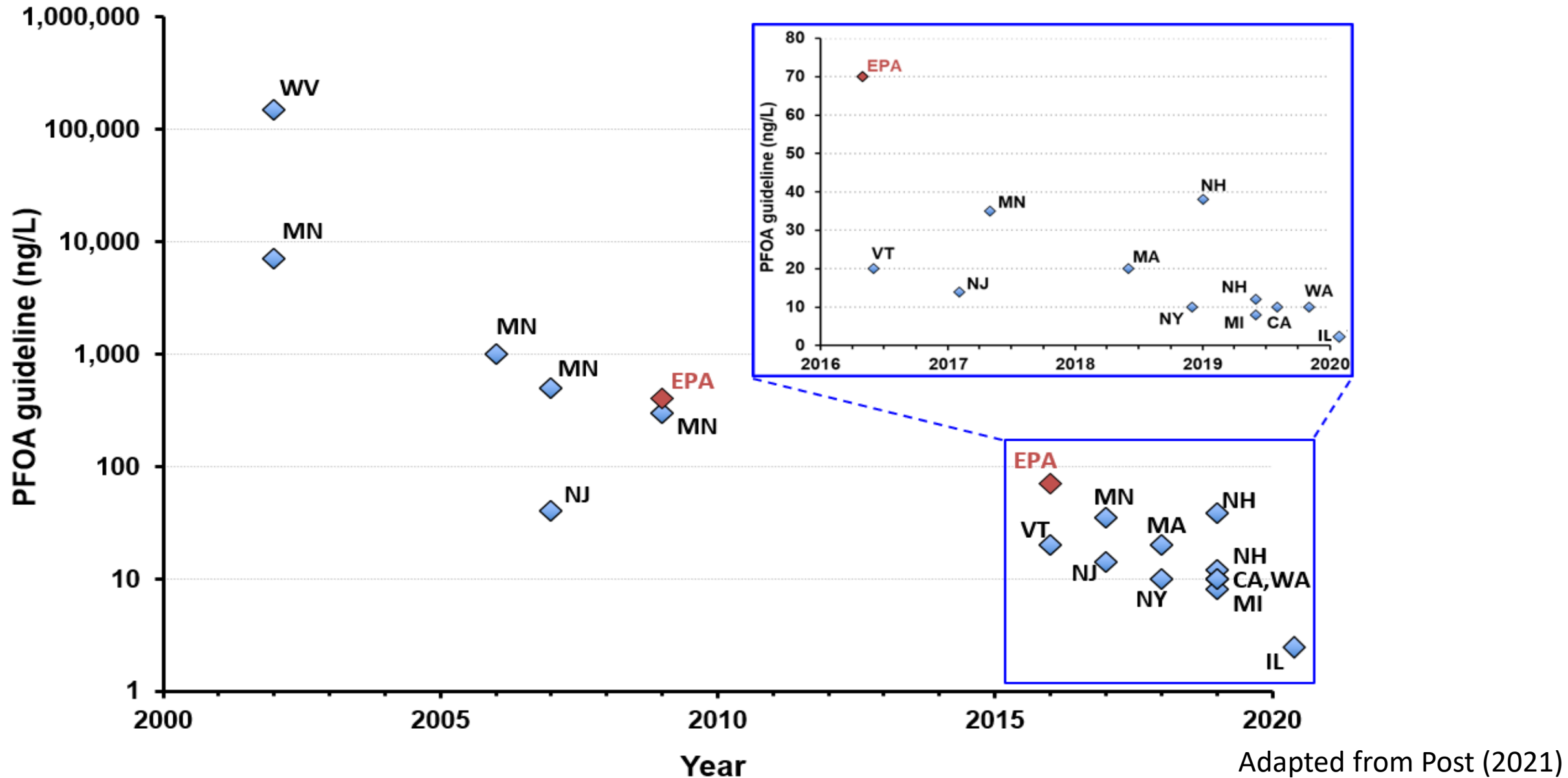


States not listed generally use EPA Health Advisories of 70 ng/L for PFOA and PFOS as guidance.

\* California Notification Level/Response Level

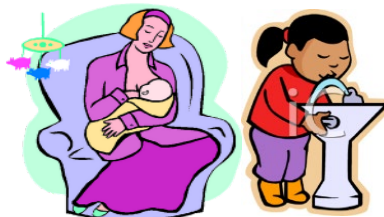
Adapted from Post (2021)

# Decrease in PFOA Drinking Water Guidelines Over Time



Adapted from Post (2021)

# How are drinking water standards developed?



Human Epidemiology Data



Animal Toxicology Data

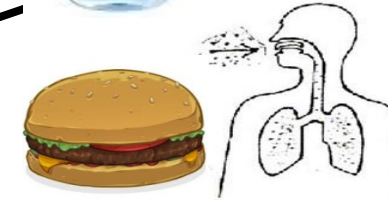
TOXICITY  
FACTOR

$$\frac{A+B}{C}$$

EXPOSURE  
ASSUMPTIONS



How much  
water do people drink?



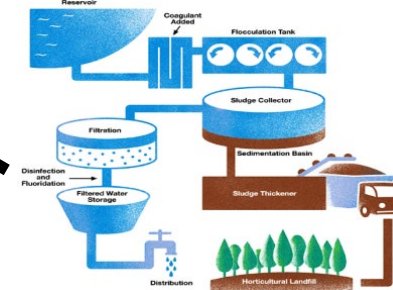
How much exposure from  
other sources (e.g. food,  
consumer products, air)?

HEALTH-BASED GOAL  
(EPA MCLG;  
NJ Health-based MCL)

CAN IT BE ANALYZED TO BELOW THE  
HEALTH-BASED LEVEL?  
(PRACTICAL QUANTITATION LEVEL;  
PQL)



CAN TREATMENT TECHNOLOGY  
REMOVE TO BELOW  
HEALTH-BASED LEVEL?



DRINKING WATER  
STANDARD (MCL)

# ***Why are there differences among state PFAS drinking water guidelines?***

All states used risk assessment approaches recommended by EPA.

However....

- Guidelines are based on scientific data available at the time.*
- Risk assessment is not a “cookbook” – it involves scientific judgement.*

**Numerical differences among state values are not large or unexpected:**

- In the context of independently derived risk-based values.*
- Especially as compared to older values that were generally **100s to 1000s of times higher.***



# Why are state drinking water guidelines lower than EPA Health Advisories?

These states conclude that EPA PFOA and PFOS Health Advisories of 70 ng/L are **not sufficiently protective** for one or more of the following reasons:

1. Most states consider **more sensitive toxicological effects** than EPA Health Advisories.

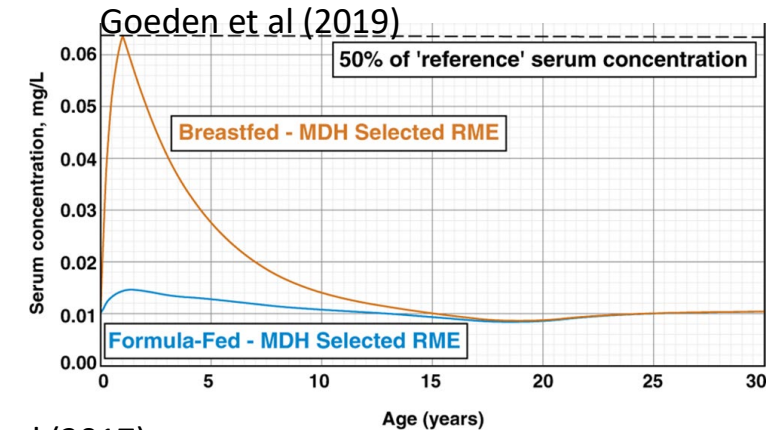
- e.g., immune system suppression, mammary gland development.

2. Some states model **higher exposures to breastfed infants** via contaminated water.

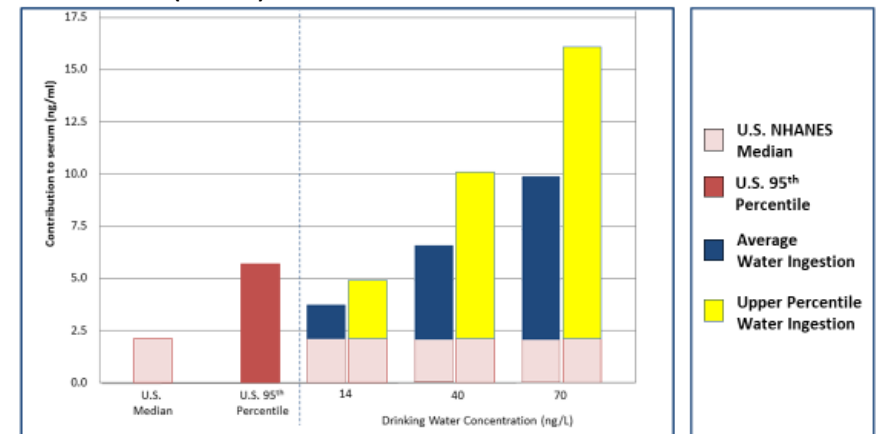
- Model not available when EPA Health Advisories developed in 2016.

3. Some states consider **increase in blood serum PFAS levels** from contaminated drinking water.

- Blood serum levels from drinking water at EPA Health Advisory (70 ng/L) are associated with multiple human health effects.
- Not considered in EPA Health Advisories.



Post et al (2017)



# *Why are drinking water standards for PFAS lower than for many other contaminants?*

Some major reasons:

- 1. Health-based levels** are low because PFAS are highly bioaccumulative in humans.
- 2. Analytical and treatment removal technology** considerations do not prevent setting PFAS standards at health-based levels.
  - For some other contaminants, standard must be set higher than health-based level.

<i>(Units are ng/L, ppt)</i>	New Jersey Health-based MCL	Analytical Limit	Treatment Removal Limit	New Jersey Drinking Water Standard (MCL)
<i>PFOA</i>	<b>14</b>	<b>6</b>	Not limiting	<b>14</b>
<i>Chlordane</i>	<b>13</b>	<b>500</b>	Not limiting	<b>500</b>
<i>Arsenic</i>	<b>3</b>	<b>3000</b>	<b>5000</b>	<b>5000</b>

## ***Resources:***

- Interstate Technology & Regulatory Council (ITRC) [PFAS Water and Soil Values Table Excel file](#) (updated monthly)
- Environmental Council of the States (ECOS) White Paper: Processes and Considerations for Setting State PFAS Standards, 2021 update.  
<https://www.ecos.org/documents/ecos-white-paper-processes-and-considerations-for-setting-state-pfas-standards-2021-update/>
- Post G. B. (2021). Recent US State and Federal Drinking Water Guidelines for Per- and Polyfluoroalkyl Substances. *Environmental Toxicology & Chemistry* 40: 550–563.  
Open access at: <https://setac.onlinelibrary.wiley.com/doi/epdf/10.1002/etc.4863>

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