

Current Efforts in Delaware: PFAS Sampling and Remediation Efforts

A complicated topic, a path forward through dark waters, and the light at the end of the tunnel.

September 11th, 2025



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AND SOCIAL SERVICES
Division of Public Health

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Where do we find PFAS?

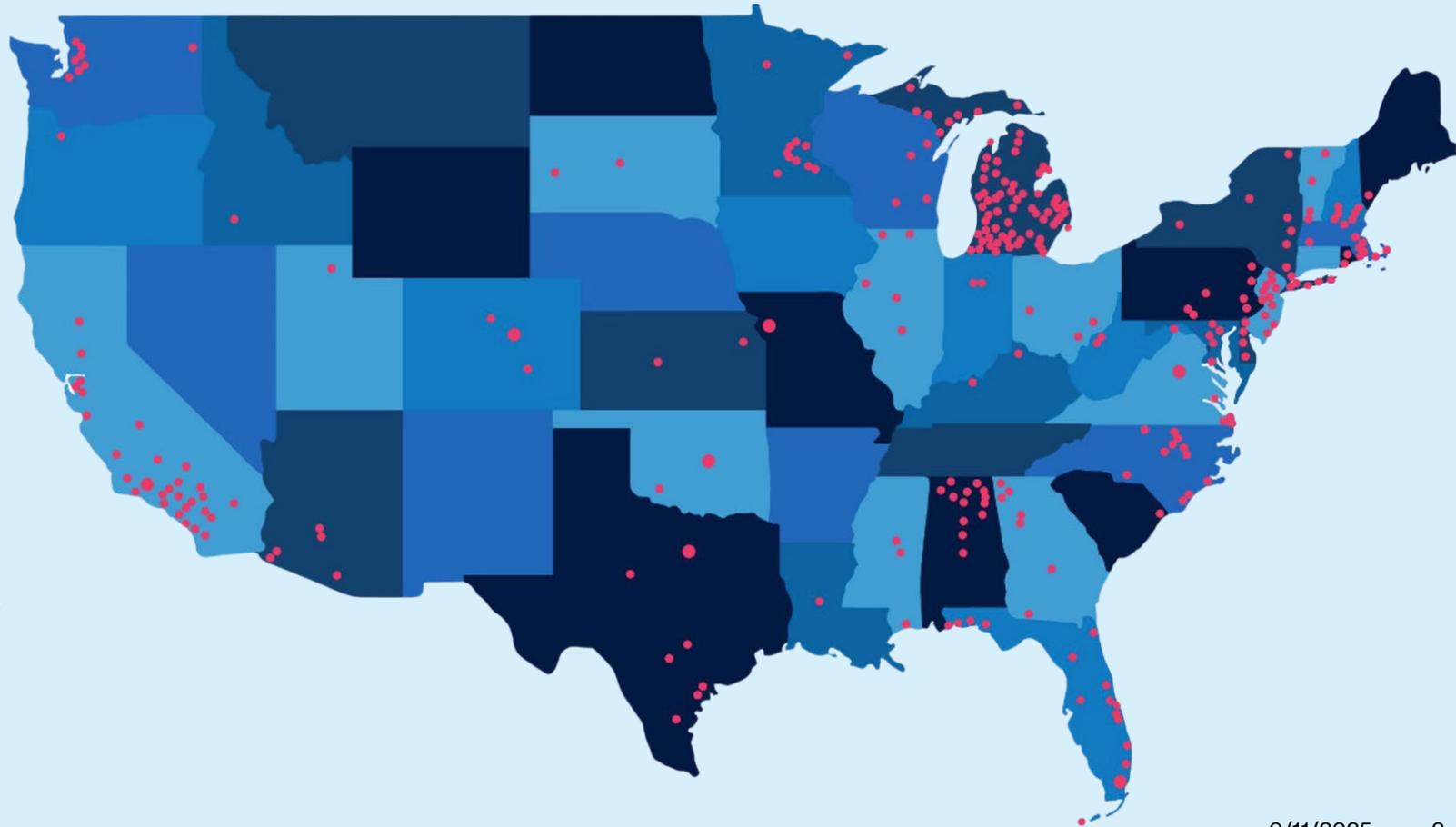


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- PFAS are a class of chemicals found globally in water, fish, soil, daily-use products and in the blood of humans and animals.
- The highest concentrations have been found:
 - near sites of current/past manufacturing processes.
 - sites where PFAS containing firefighting foams were used (military bases, wildfires, etc.)
- Red dots indicate where PFAS have been identified.



PFAS PATHWAYS

Visit de.gov/pfas for more information.

Color Guide

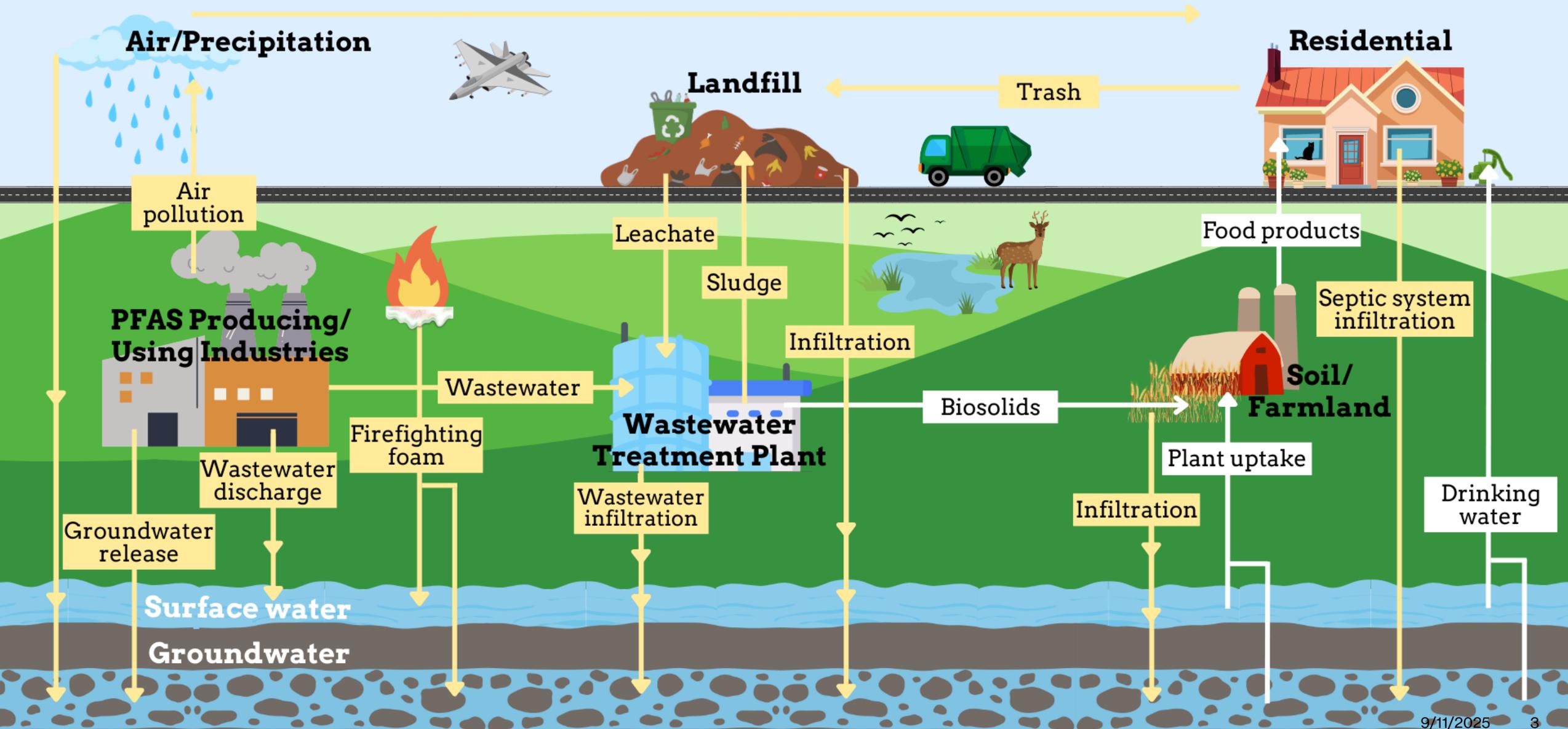
- PFAS released into environment
- PFAS priority exposure pathways



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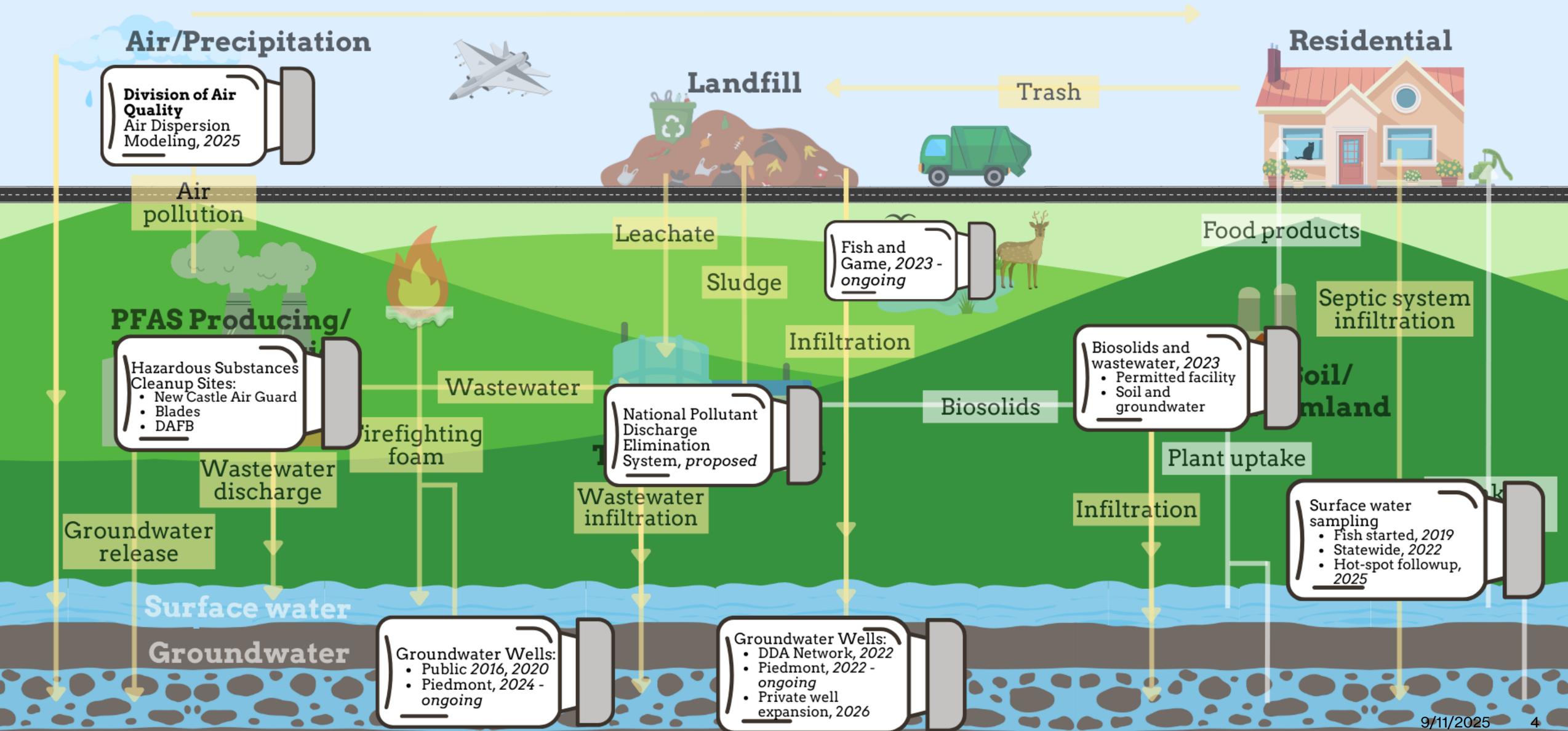


PFAS PATHWAYS

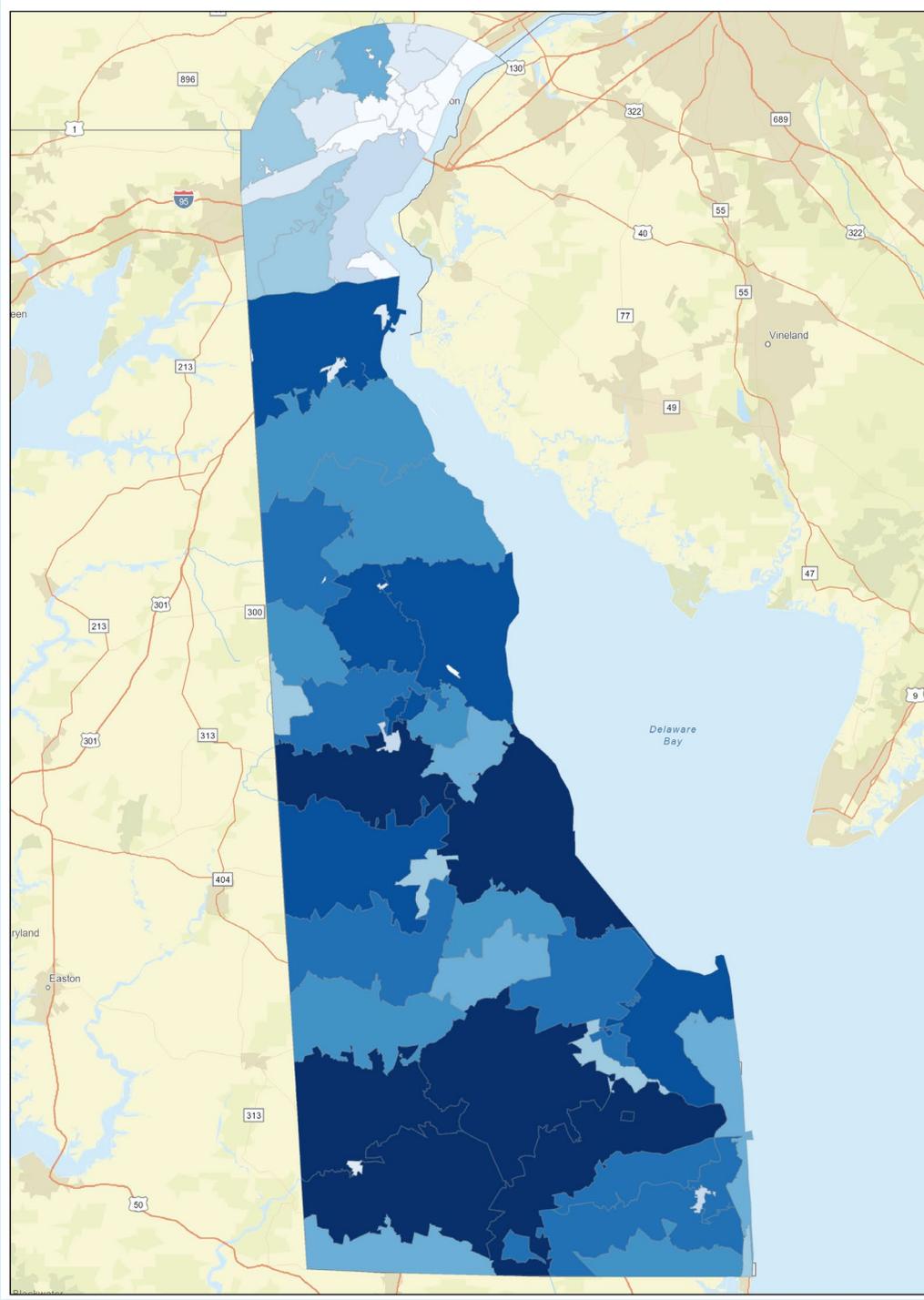
Visit de.gov/pfas for more information.

Color Guide

- PFAS released into environment
- PFAS priority exposure pathways



Private Wells in Delaware



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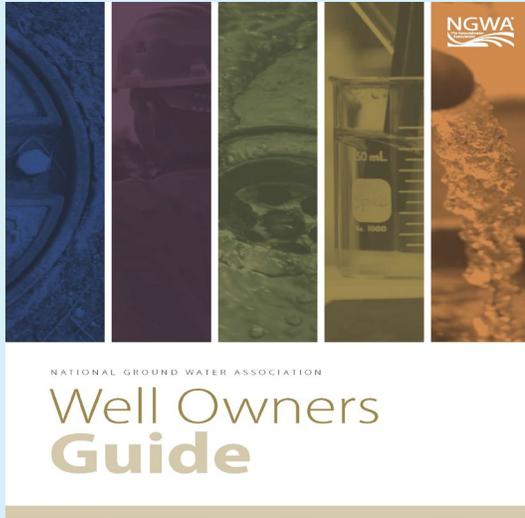
Private Well Sampling Considerations



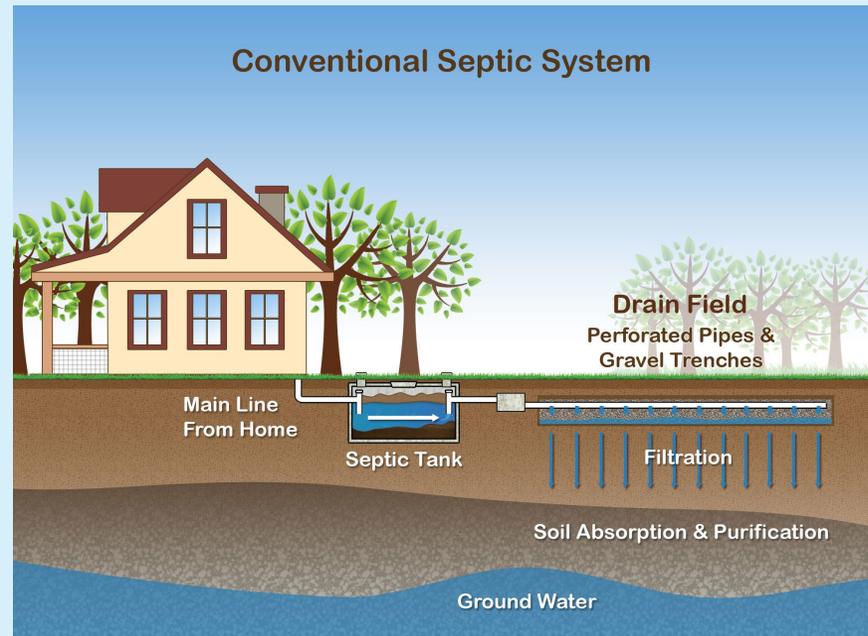
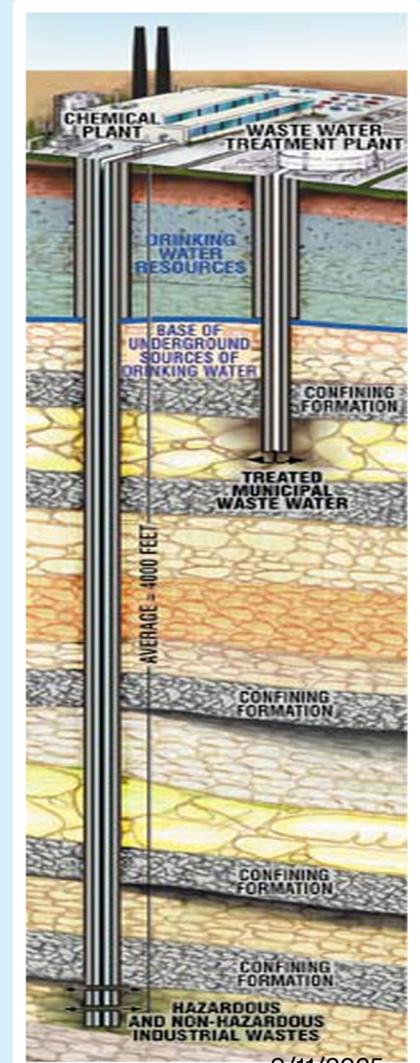
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- Private well, private septic?
- How do you use your water in your home?
- Filter capability and duration. What can they do, what they cannot do, and for how long?
- What water should you consider filtering for domestic use?
- Where else can PFAS be originating?
 - **Environmental factors:** Are there potential nearby sites/sources?
 - **Products:** What do you use in your home that may be a source of PFAS?





STATE OF DELAWARE
 DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
 DIVISION OF WASTE AND HAZARDOUS SUBSTANCES
 391 LUKENS DRIVE
 NEW CASTLE, DELAWARE 19720

PHONE: (302) 395-2600
 FAX: (302) 395-2555

REMEDIATION SECTION

September 2, 2025

J.Q. Public
 1234 Main Street
 Everytown, DE 00000

RE: Results of June 2025 Private Well Sampling
 for Property Located at 1234 Everytown, DE 00000

Dear J.Q. Public:

A contractor on behalf of the Delaware Department of Natural Resources and Environmental Control (DNREC) recently collected water samples from the domestic water supply well. The sample was analyzed for per- and polyfluoroalkyl substances (PFAS) by Eurofins ~~TestAmerica~~ in West Sacramento, California. The United States Environmental Protection Agency (USEPA) and DNREC has established an Maximum Contaminant Level (MCL) of 4 parts per trillion (ppt) for two PFAS compounds in drinking water: perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), 10 ppt for three PFAS: ~~Perfluorohexanesulfonic acid (PFHxS), Perfluorononanoic acid (PFNA), and hexafluoropropylene oxide dimer acid (HFPO-DA, referred to as "GenX"), and for a mixture of PFAS including Perfluorobutanesulfonic acid (PFBS).~~ The MCL is used to evaluate providing treatment to remove PFAS from drinking water. The results of the PFAS testing are in the table below.

Date Sample	ID Number	PFOA (ppt)	PFOS (ppt)	PFBS (ppt)	PFHxS (ppt)	PFNA (ppt)	HFPO-DA (ppt)
06/10/2023	EveTwn-088	33.0	49.0	3.0	6.4	7.7	ND

ND = Not Detected

J = Estimated Value

The PFAS results for the water sample from your well are above the action level of 4 ppt for PFOS and PFOA and the action levels of 10ppt for PFBS, ~~PFHxS~~, and PFNA. Hexafluoropropylene oxide dimer acid (HFPO-DA, referred to as "GenX") was not detected. On 6/25/2025 you were provided a reverse osmosis point of use filter for your kitchen faucet and a contract plumber was contacted on your

behalf to install the filter. The long-term solution will be to replace your shallow well with a deeper aquifer well accessing clean water.

The results of the sampling will be included in the Town of Everytown investigation and will not identify the address or name of the well owner in the scientific report. DNREC may request additional sampling of the well in the future because the Town of Everytown investigation is ongoing.

For information on PFAS, visit these websites:

- State of Delaware website serving as the main resource for public information regarding PFAS in Delaware <https://de.gov/pfas>
- USEPA website including basic information, USEPA actions, and links to informational resources <https://www.epa.gov/pfas>

Additionally, the Delaware Department of Health and Social Services collected samples for bacteriological and specific water quality parameters (anions, routine metals, alkalinity, and pH) from your domestic water well and these samples were analyzed by the Division of Public Health laboratory in Smyrna, Delaware and the attached test results are provided to you for your information. The bacteriological and specific water quality parameters in the water sample from your domestic water well conform to drinking water standards. However, the nitrate concentrations were approaching the action level. The reverse osmosis filtration was provided to address nitrate and PFAS.

We appreciate your cooperation and assistance with our sampling and if you have any questions, comments, or concerns, regarding PFAS please contact me at 302-395-2602 (or by email: Todd.Keyser@delaware.gov).

Sincerely,

Todd Keyser

Hydrologist

Enclosures: Interpreting Your Drinking Water Chemical Results
 Drinking Water Test Results

Cc: Katherine Caudle, Ombudsman, DNREC – WHS – Strategic Services



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Typical PFAS results Letter.

More data available upon request.

Options for Solutions

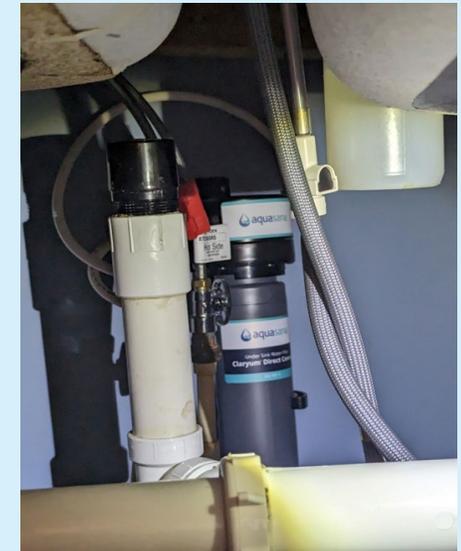
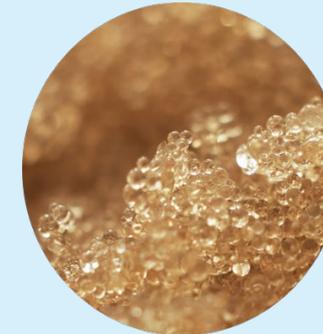


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- Treatment – add treatment system to existing well
- Interconnection – connect to known unimpacted water
- Replacement Well
 - Different location – move location away from source
 - Different aquifer – drill new well to unimpacted depth



Confirmation that deep, confined aquifers in Kent and Sussex County are PFAS non-detect.

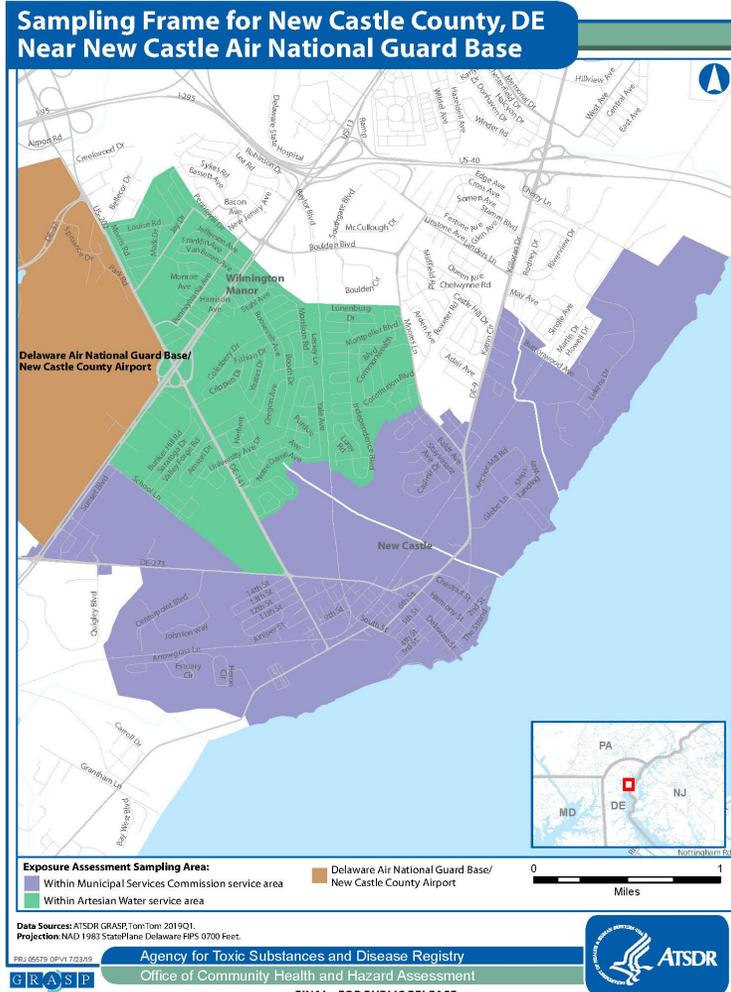
Research Studies in Delaware



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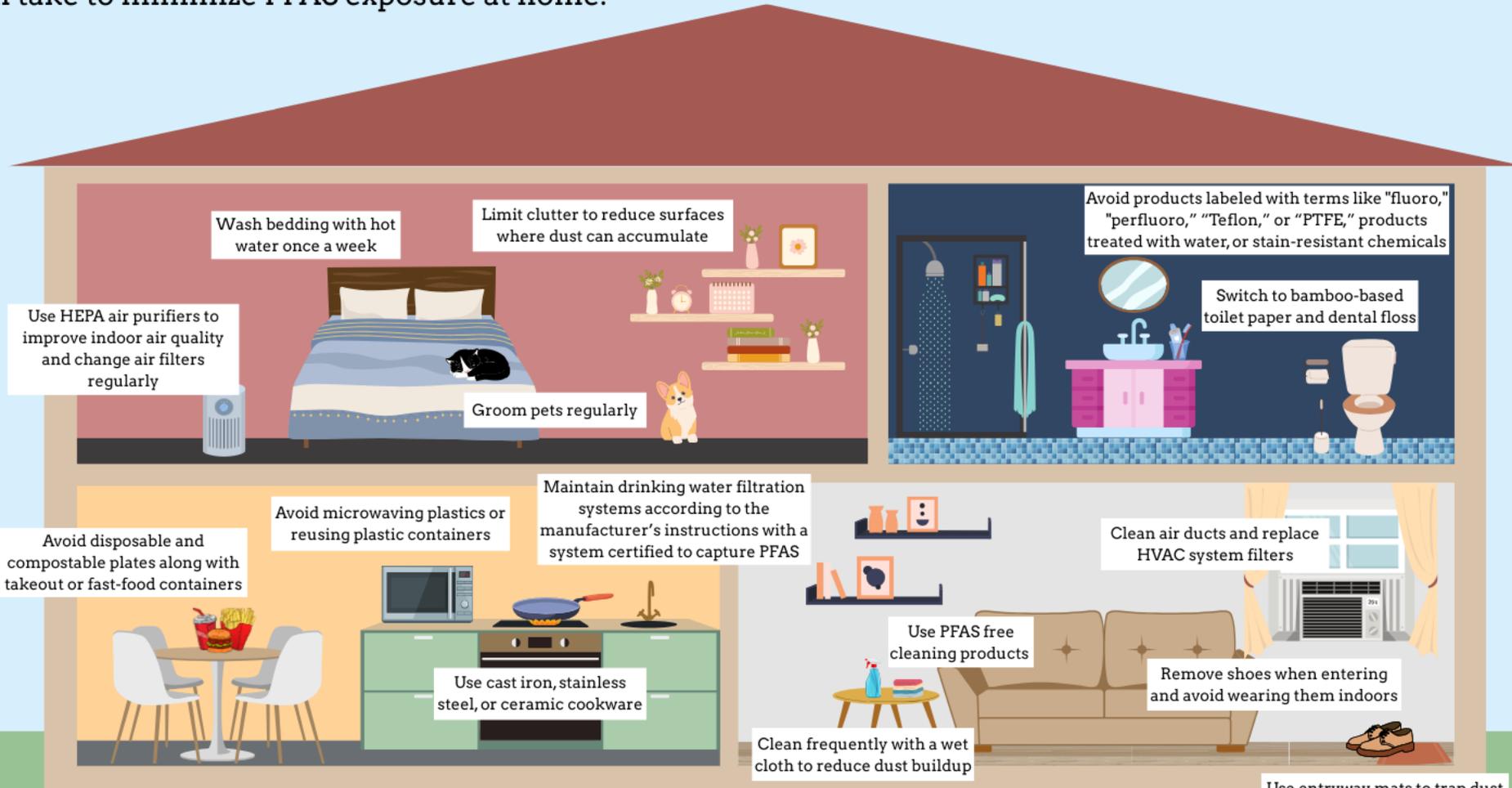
PFAS Exposure Assessment: New Castle County, Delaware | PFAS and Your Health | ATSDR

- **At least one PFAS was detected in all participants, with 7 PFAS detected in more than 60% of participants.**
- **Correlation link between the PFAS in dust in people's homes and the PFAS in their blood.**
- **In October 2019, ATSDR collected samples and other information from participants. ATSDR collected and analyzed data from the following:**
 - 214 people
 - 203 adults
 - 11 children
 - 134 households
 - Questionnaires completed by all participants.
 - Blood and urine samples provided by most participants.
 - The serum portion of the blood from blood samples.
 - Samples of tap water and dust from some homes.
 - ATSDR sent individual results to each participant in November 2020.

Ways to Reduce PFAS in Your Home

Per- and polyfluoroalkyl substances (PFAS) have been widely used since the 1940s in manufacturing, firefighting, and consumer products. These substances are known to persist in the environment and accumulate in living organisms, posing a significant public health concern.

Toxicological studies suggest that exposure to PFAS can lead to serious health issues. Fortunately, there are several steps everyone can take to minimize PFAS exposure at home.



AVOIDING PFAS: A SHOPPING GUIDE

Per- and polyfluoroalkyl substances (PFAS) are a class of chemicals known to persist in the environment and accumulate in living organisms, posing a significant public health concern.

Since the 1940s, PFAS have been widely used in consumer products. The absence of regulations and mandatory labeling can confuse and mislead consumers in identifying PFAS-containing products.

This brief guide from the Delaware Division of Public Health (DPH) aims to educate consumers on common PFAS products and how to find safer alternatives.

PRODUCTS COMMONLY KNOWN TO HAVE HIGHER LEVELS OF PFAS:



WAYS PFAS CAN BE FOUND IN PRODUCTS

1 INTENTIONALLY: ADDED INGREDIENTS

Companies will intentionally add PFAS to products for their properties (i.e. heat resistant, non-stick, waterproof, grease/stain repelling, wrinkle-free).



2 UNINTENTIONALLY: CONTAMINATION

Products can be contaminated by PFAS in the production processes (i.e. machine equipment lubricant touching the final product) or leaching packaging containing PFAS.

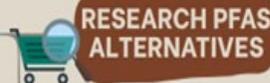


When shopping for “PFAS-free” products, you should focus on avoiding products with intentionally added PFAS because these have higher concentrations, compared to PFAS-contaminated products; still, be conscious of production processes that may include PFAS. Unfortunately, not all companies disclose PFAS compounds in their labels.

PFAS-CONSCIOUS CONSUMPTION



“Fluoro,” “perfluoro,” “PFTE,” “polyfluoroalkyl,” “PFBS,” “PFOS,” “PFOA,” and “GenX” often indicate PFAS.” Even buzzwords like “natural” or “sustainable” don’t always mean PFAS-free.



Glass and wooden products are generally safer. Do your research on specific products you are interested in before buying. Though DPH cannot endorse specific companies or products, the following links may be helpful:

- [PFAS Free Product List](#)
- [Article: An overview of the uses of PFAS](#)
- [Shopper's Guide to Avoiding PFAS](#)



HEALTH EFFECTS from PFAS



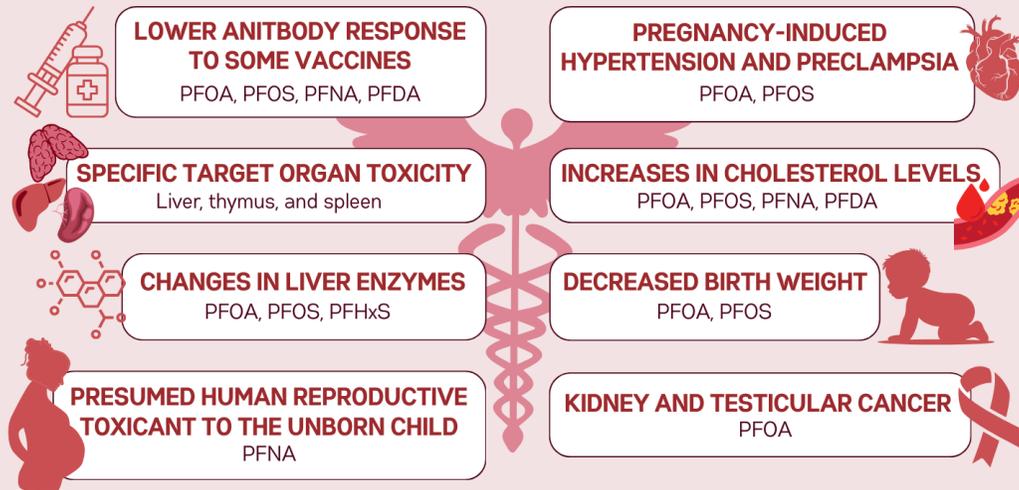
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Per- and polyfluoroalkyl substances (PFAS) accumulate in animals and humans once entered the system through contaminated water and food sources, skin contact, or airborne particles.

Epidemiological evidence suggests associations between increases in exposure to (specific) PFAS and certain health effects, such as:



The risk of health effects associated with PFAS depends on:



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Analytical Testing Methods for Detecting PFAS



- **Method 533** - 25 different short-chain PFAS which are not reliably detected with method 537.1
- **Method 537** - 14 PFAAs (perfluorinated alkyl acids) in drinking water.
- **Method 537.1** - 18 different PFAS compounds in drinking water (mainly long-chain, exclude short-chain PFAS and fluorotelomers or FTs)
- **Method 1633** - 40 PFAS compounds in wastewater, surface water, groundwater, soil, biosolids, sediment, landfill leachate, and fish tissue
- **Total Oxidizable Precursor (TOP) Assay** – PFAS precursors that standard methods might miss by converting them into measurable perfluoroalkyl carboxylic acids (PFCAs)
- **Blood method – 9 panel PFAS in blood** [PFAS Blood Test | 9 Panel PFAS Lab Test | Quest®](#)

Please do not attempt to read this slide – illustrative purposes only.

Analyte	Acronym	CAS#	EPA 537.1	EPA 533	EPA 1633	537M DNREC REM	1633M
Perfluoroalkyl carboxylic Acids							
Pentafluoropropionic acid	PFPA Acid or (PFPA)	422-64-0				x	x
Perfluorobutanoic acid	PFBA	375-22-4		x	x	x	x
Perfluoropentanoic acid	PFPA	2706-90-3		x	x	x	x
Perfluorohexanoic acid	PFHxA	307-24-4	x	x	x	x	x
Perfluoroheptanoic acid	PFHpA	375-85-9	x	x	x	x	x
Perfluorooctanoic acid	PFOA	335-67-1	x	x	x	x	x
Perfluorononanoic acid	PFNA	375-95-1	x	x	x	x	x
Perfluorodecanoic acid	PFDA	335-76-2	x	x	x	x	x
Perfluoroundecanoic acid	PFUnA	2058-94-8	x	x	x	x	x
Perfluorododecanoic acid	PFDDA	307-55-1	x	x	x	x	x
Perfluorotridecanoic acid	PFTDA	72629-94-8	x		x	x	x
Perfluorotetradecanoic acid	PFTeDA	376-06-7	x		x	x	x
Perfluoroalkyl sulfonic Acids							
Perfluorobutanesulfonic acid	PFBS	375-73-5	x	x	x	x	x
Perfluoropentanesulfonic acid	PFPS	2706-91-4		x	x	x	x
Perfluorohexanesulfonic acid	PFHS	355-46-4	x	x	x	x	x
Perfluoroheptanesulfonic acid	PFHpS	375-92-3		x	x	x	x
Perfluorooctanesulfonic acid	PFOS	1763-23-1	x	x	x	x	x
Perfluorononanesulfonic acid	PFNS	474511-07-4					x
Perfluorodecanesulfonic acid	PFDS	335-77-3			x		x
Perfluorododecanesulfonic acid	PFDDs	79780-39-5			x		x
Fluorotelomer sulfonic acids							
4:2 fluorotelomer sulfonic acid	4:2 FTS	757124-72-4		x	x	x	x
6:2 fluorotelomer sulfonic acid	6:2 FTS	27619-97-2		x	x	x	x
8:2 fluorotelomer sulfonic acid	8:2 FTS	39108-34-4		x	x	x	x
Perfluorooctane Sulfonamides							
Perfluorooctanesulfonamide	PFOSA or FOSA	754-91-6			x		x
N-Methylperfluorooctanesulfonamide	N-MeFOSA	31506-32-8			x		x
N-Ethylperfluorooctanesulfonamide	N-EtFOSA	4151-50-2			x		x
Perfluorooctane sulfonamidoacetic acids							
N-methyl perfluorooctane sulfonamido acetic acid	N-MeFOSAA	2355-31-9	x		x	x	x
N-ethyl perfluorooctane sulfonamido acetic acid	N-EtFOSAA	2991-50-6	x		x	x	x
Perfluorooctane sulfonamide ethanols							
N-Methylperfluorooctanesulfonamidoethanol	N-MeFOSE	24448-09-7			x		x
N-Ethylperfluorooctanesulfonamidoethanol	N-EtFOSE	1691-99-2			x		x
Per- and Polyfluoroether carboxylic acids							
Hexafluoropropylene oxide Dimer acid	HFPO-DA or (GenX)	13252-13-6	x	x	x	x	x
4,8-Dioxo-3H-perfluorononanoic acid	ADONA	919005-14-4	x	x	x	x	x
Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5		x	x	x	x
Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1		x	x	x	x
Perfluoro-2-methoxyacetic acid	PFMOAA	674-13-5				x	x
Perfluoro-3,6-dioxahexanoic acid	NFDHA or (PECA B)	151772-58-6		x	x	x	x
Perfluoro-3,5-dioxahexanoic acid	PFO2HxA	39492-88-1				x	x
Perfluoro-3,5,7-trioxaoctanoic acid	PF03OA	39492-89-2				x	x
Ether sulfonic acids							
11Cl-PF3OUdS	F-53B Minor	763051-92-9	x	x	x	x	x
9Cl-PF3ONS	F-53B Major	756426-58-1	x	x	x	x	x
Perfluoro-2-ethoxyethanesulfonic acid	PFEEA or (PES)	115507-82-7		x	x	x	x
7H-Perfluoro-4-methyl-3,6-dioxaoctanesulfonic acid	PFESA BP2 or (Hydro-PS Acid)	749836-20-2					
Fluorotelomer carboxylic acids							
5:3 fluorotelomer carboxylic acid	5:3 FTCA	944637-49-3			x	x	x
6:2 fluorotelomer carboxylic acid	6:2 FTCA	53826-12-3				x	x
6:2 fluorotelomer alpha, beta-unsaturated carboxylate	6:2 FTUCA	70857-88-6				x	x
3-Perfluoropropyl acid	3:3 FTCA	356-02-5			x		x
3-Perfluoroheptyl Propanoic acid	7:3 FTCA	812-70-4			x		x



PFAS Family Groups



Perfluoroalkyl Carboxylic Acids (PFCAs)

PFBA, PFHxA,
PFOA, PFDoA

Perfluoroalkyl Sulfonic Acids (PFSA)

PFBS, PFHxS,
PFOS,
PFDoDS

Fluorotelomer Sulfonic Acids (FTSAs)

4:2 FTS
6:2 FTS
8:2 FTS

Perfluorooctane Sulfonamides (FOSAs)

PFOSA
N-MeFOSA
N-EtFOSAA

Perfluorooctane Sulfonamidoacetic Acids (PFSAA)

N-MeFOSAA
N-EtFOSAA

Per- and Polyfluoroether Carboxylic Acids (PPFCAs)

HFPO-DA
ADONA
PFMOAA
PFO3OA

Ether Sulfonic Acids (ESAs)

F-53B Minor
F-35B Major
PES

Fluorotelomer Carboxylic Acids (FTCAs)

5:3 FTCA
6:2 FTCA
6:2 FTUCA
7:3 FTCA

Perfluorooctane Sulfonamide Ethanols (FOSEs)

N-MeFOSE
N-EtFOSE

Result

NASEM Recommended Summation Unit of Measure: ng/mL	3.21
MeFOSAA Desired Range: <0.1 ng/mL	NOT DETECTED
PFHxS Desired Range: <0.1 ng/mL	0.59
Linear PFOA (n PFOA) Desired Range: <0.1 ng/mL	1.19
Branched PFOA (Sb PFOA) Desired Range: <0.1 ng/mL	NOT DETECTED
PFDA Desired Range: <0.1 ng/mL	NOT DETECTED
PFUnDA Desired Range: <0.1 ng/mL	NOT DETECTED
Linear PFOS (n PFOS) Desired Range: <0.1 ng/mL	0.62
Branched PFOS (Sm PFOS) Desired Range: <0.1 ng/mL	0.26
PFNA Desired Range: <0.1 ng/mL	0.27

PFAS 9-Panel Comments:
Polyfluorinated alkyl substances (PFAS) are man-made forever chemicals used in industry and consumer products. They have been used in nonstick cookware, water-repellent clothing, stain resistant fabrics and carpets, and some cosmetics and firefighting foams. PFAS do not break down.

For additional information, please refer to <https://www.questdiagnostics.com/faq295>
(This link is being provided for informational/ educational purposes only.)

The National Academies of Science, Engineering, and Medicine (NASEM) Guidance on PFAS Exposure, Testing and



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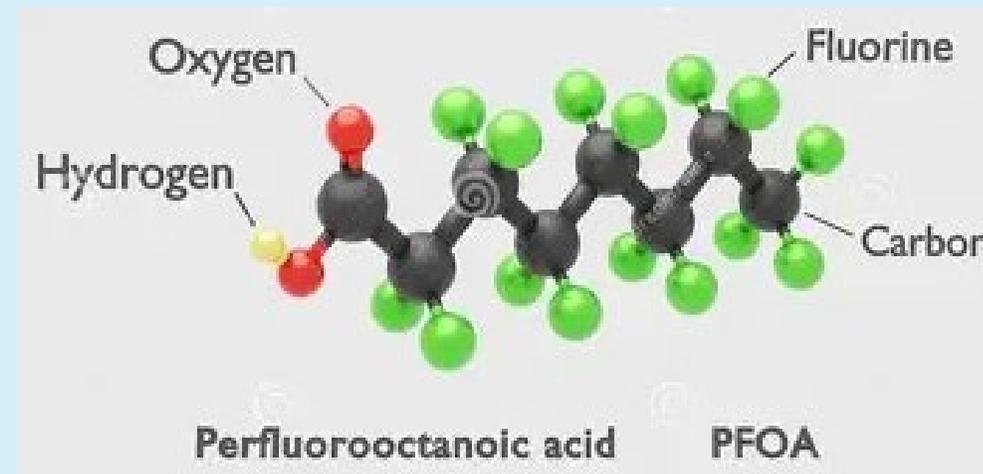
9 Panel blood test results
- Isomers bioaccumulate at different rates
- Exposure was indicated from the 3.21 NASEM Recommended Summation at the top.
 Optimal Result: 0 - 2 ng/mL (ppt)
 Over 2 ng/mL = screen for various health conditions

Water Sample	PFOA (ppt)	PFOS (ppt)	PFHxS (ppt)	PFNA (ppt)	HFPO-DA GenX (ppt)	MeFOSSA (ppt)
9/5/2024	17.5	3.81	4.63	.75	3.61	4.51

The Carbon – Fluorine Bond

- The bond that holds together carbon and fluorine is the strongest bond known to chemistry.
- It takes 452 kJ/mol of energy to break the bond. Currently, there is not an efficient method to destroy these bonds. Filtration to reduce exposure on multiple fronts is the best option for now.
- When some PFAS break down, it is the carbon-carbon bonds that are breaking. Then we have smaller, shorter chain PFAS, but the carbon-fluorine bonds hold.

Relationship between bond length, strength, and atoms		
Bond	Bond Length (nm)	Bond Energy (kJ/mol)
C - F	0.138	452
C - Cl	0.177	339
C - Br	0.194	280
C - I	0.214	230



Perfluorooctanoic Acid (PFOA)



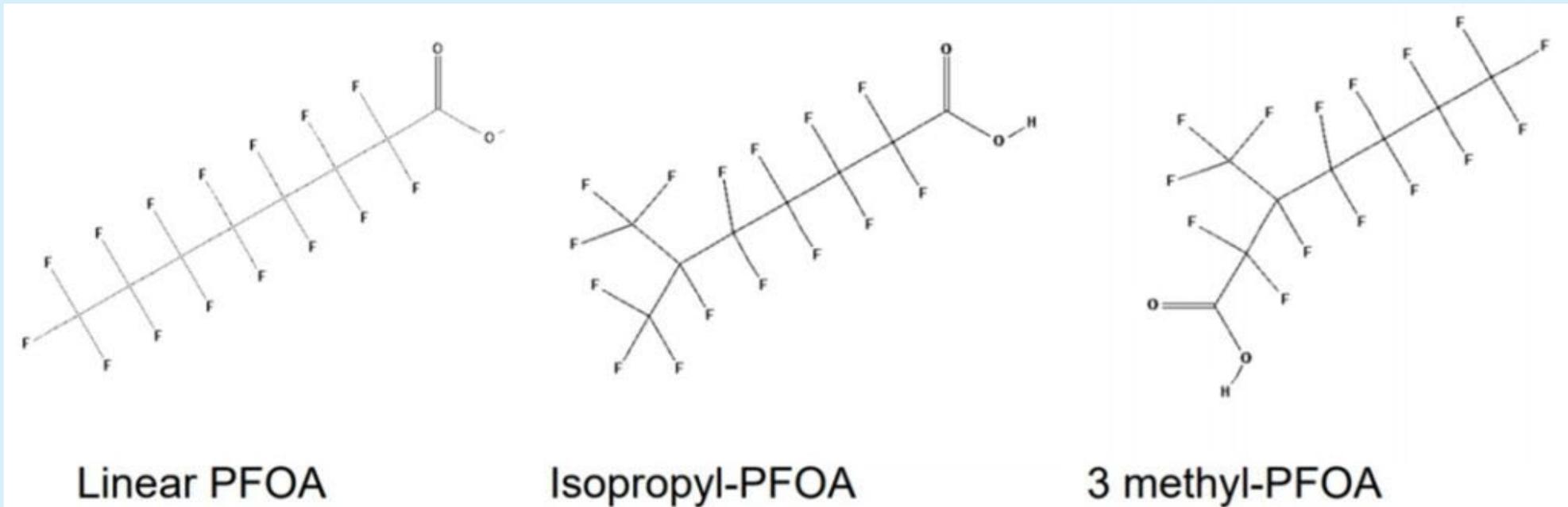
- PFOA has 38 unique branched isomers
- PFOS has 87 unique branched isomers



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Delaware Senate Bill 72

Drinking Water Maximum Contaminant Levels (MCL)

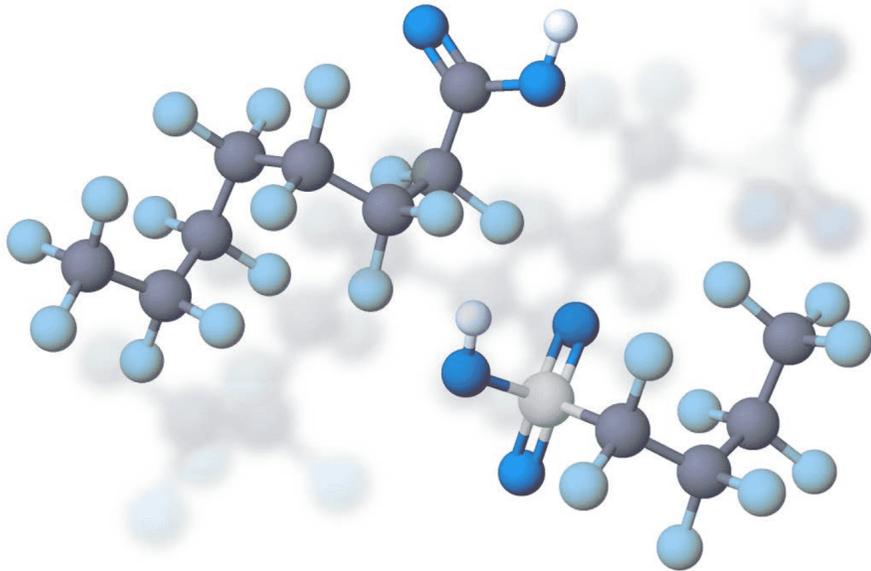


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EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan



SB 72 sets the Maximum Contaminant Level (MCL) for notification purposes on the 5 PFAS below.

Currently, these values are not for enforcement or compliance.

Notifications will be available via the Office of Drinking Water's website by 1/15/2026.

<https://drinkingwater.dhss.delaware.gov/>

Parts per Trillion (PPT)

4 PPT - PFOA (perfluorooctanoic acid)

4 PPT - PFOS (perfluorooctane sulfonate)

10 PPT - PFHxS (perfluorohexane sulfonic acid)

10 PPT - PFNA (perfluorononanoic acid)

10 PPT - HFPO-DA (Gen-X) Hexafluoropropylene Oxide

The Hazard Index (HI) applies to mixtures containing at least two of the following PFAS: PFHxS, PFNA, *PFBS*, and HFPO-DA (GenX). The HI is calculated by summing the ratios of each PFAS concentration to its respective MCL. The HI is deemed safe if below a value of 1.

Knowledge is Powerful.



- Resources for more information
 - **Eurofins Webinars:** <https://sustainabilityservices.eurofins.com/events/webinar-pfas-regulations-and-testing-for-consumer-products/>
 - **ITRC Webinars:** <https://pfas-1.itrcweb.org/pfas-training/>
 - **NEWMOA Webinars:** [NEWMOA - Northeast Waste Management Officials' Association](#)
 - **NEMA:** [PFAS Training Calendar - NEMA](#)
- Delaware Specific Resources
 - [DE.gov/PFAS](#)
 - Delaware Department of Health and Social Services, Division of Public Health, Health Systems Protection, Office of Drinking Water [Public Water System Supervision – Delaware Health and Social Services – State of Delaware – Division of Public Health](#)
 - **Funding available for Public Systems** via The Delaware Division of Public Health – Health Systems Protection – Drinking Water State Revolving Fund (DWSRF), Emerging Contaminants for Small and Disadvantaged Communities (EC-SDC) Grants, and Bond Bill Funding Sources.



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Together, we can
reduce the impact of
PFAS, leave a legacy of
hope, and live to thrive!
Thank you.

Questions?

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Todd Keyser
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