

# The Forever Topic, PFAS and Pesticides

Tuesday March 10<sup>th</sup>, 2026

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What do you say when your customer asks,  
“You aren’t spraying PFAS are you?”

# The Everywhere Chemicals: A Guide to PFAS in Products

Since the 1950s, PFAS have been used commercially for their unique properties, including resistance to heat, water, oil, and stains. These "forever chemicals" have been integrated into more than 200 documented uses across a vast number of industries and products.



## Aviation & Aerospace

Used in hydraulic fluids, cables, seals, and corrosion-prevention coatings.



## Firefighting & Safety

A key ingredient in Class B firefighting foams and water-repellent protective clothing.



## Electronics & Energy

Found in insulators, circuit boards, cell phones, solar panels, and fuel cells.

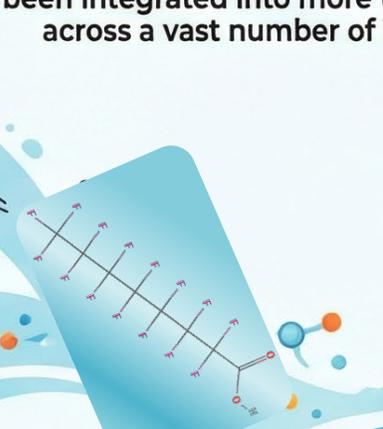


## Manufacturing & Plating

Act as mist suppressants for vapors and processing aids for fluoropolymers.



## Major Industrial Uses



## Common Consumer Products

### Stain-Resistant Textiles & Carpets



Provide water, soil, and stain repellency to upholstery, carpets, and clothing.



### Grease-Proof Food Packaging

Used as oil and grease-repellent coatings for paper, paperboard, and take-out containers.



### Non-Stick & Cleaning Products

Form non-stick coatings on cookware and are used in floor polishes and waxes.



### Cosmetics & Personal Care

Added to increase durability and water resistance in makeup, sunscreen, and dental floss.

Figure 2-1. Health Effect Endpoints Examined in Epidemiological Studies

All of these are different types of PFAS

Health Effect Endpoint	Perfluoroalkyl												
	PFOA	PFOS	PFHxS	PFNA	PFDA	PFUnA	PFHpA	PFBS	PFBA	PFDoDA	PFHxA	FOSA	
Body weight	•	•	•	•	•	•					•		•
Respiratory	•												
Cardiovascular	•	•	•	•	•	•	•	•	•	•	•	•	•
Gastrointestinal		•											
Hematological	•	•											
Musculoskeletal	•	•	•	•									
Hepatic	•	•	•	•	•	•	•	•	•	•			
Renal	•	•	•	•	•			•		•	•		
Dermal													
Ocular													
Endocrine	•	•	•	•	•	•				•			
Immunological	•	•	•	•	•	•	•	•		•	•		•
Neurological	•	•	•	•									
Reproductive	•	•	•	•	•	•		•		•	•		•
Developmental	•	•	•	•	•	•	•		•	•			•
Other noncancer	•	•	•	•	•	•	•						•
Cancer	•	•	•	•	•	•	•			•			•

FOSA = perfluorooctane sulfonamide; PFBA = perfluorobutanoic acid; PFBS = perfluorobutane sulfonic acid; PFDA = perfluorodecanoic acid; PFDoDA = perfluorododecanoic acid; PFHpA = perfluoroheptanoic acid; PFHxA = perfluorohexanoic acid; PFHxS = perfluorohexane sulfonic acid; PFNA = perfluorononanoic acid; PFOA = perfluorooctanoic acid; PFOS = perfluorooctane sulfonic acid; PFUnA = perfluoroundecanoic acid

Figure 2-1. Health Effect Endpoints Examined in Epidemiological Studies

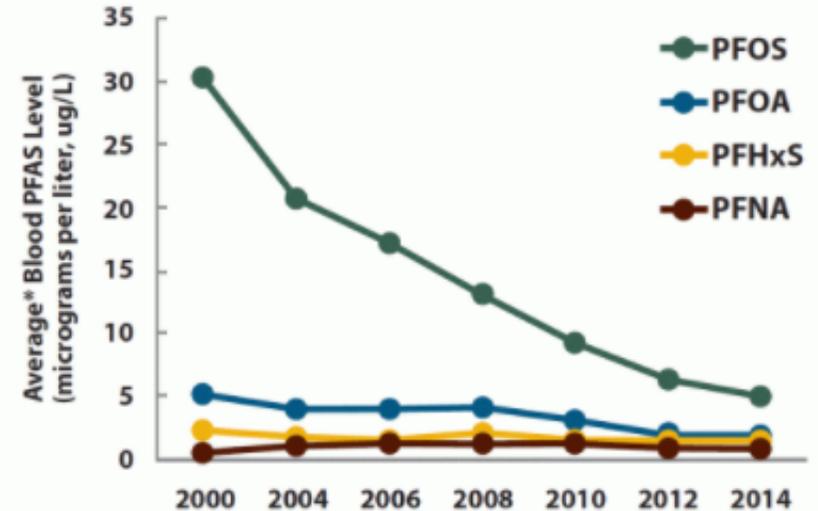
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Respiratory	•											
Cardiovascular	•	•	•	•	•	•	•	•	•	•	•	•
Gastrointestinal		•										
Hematological	•	•										
Musculoskeletal	•	•	•	•								
Hepatic	•	•	•	•	•	•	•	•	•	•		
Renal	•	•	•	•	•			•		•	•	
Dermal												
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Endocrine	•	•	•	•	•	•			•			
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# Phase out PFOA & PFOS

- PFOS (green) down dramatically
- PFOA (blue) in the U.S. general population is 2.08 micrograms per liter ( $\mu\text{g}/\text{L}$ ) of blood
  - *-about 1/2 lost every 3 years from your body*

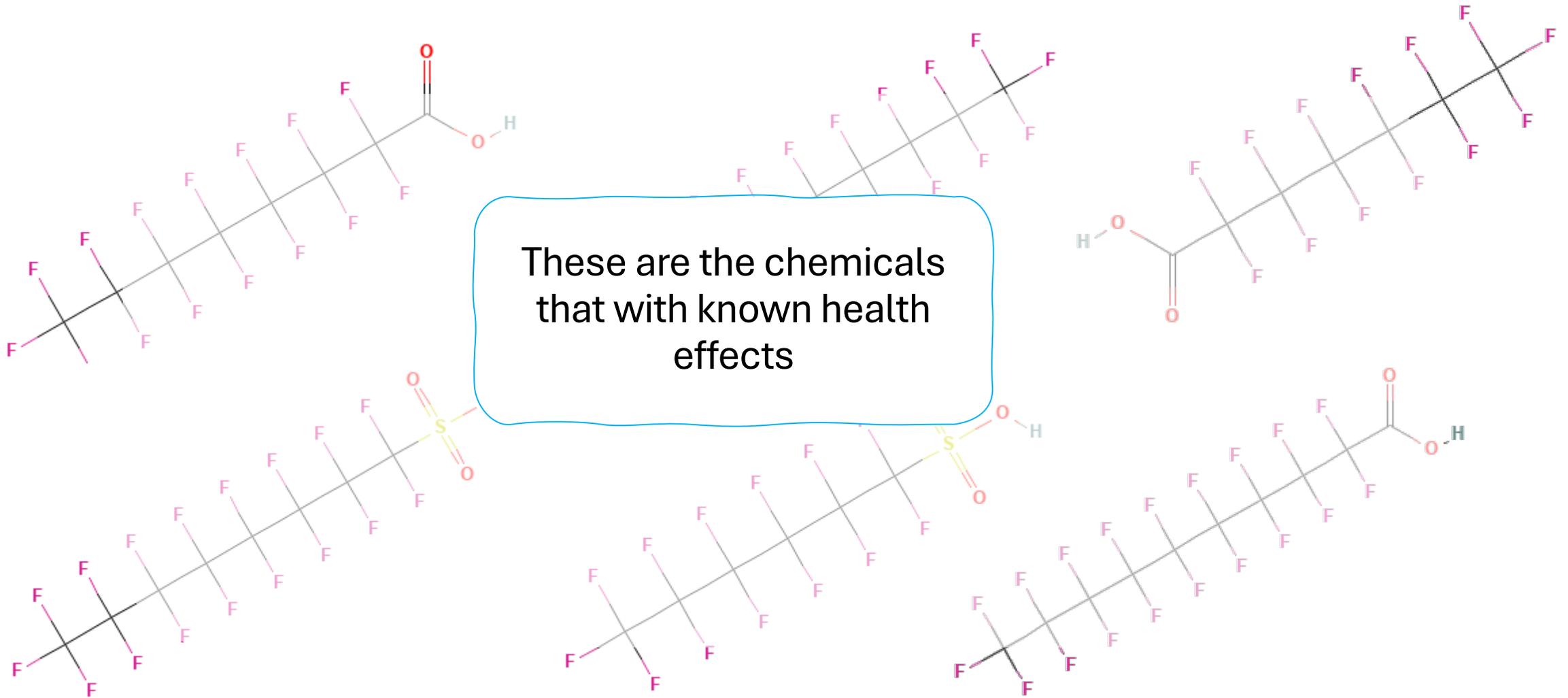
Blood Levels of the Most Common PFAS in People in the United States from 2000-2014



\* Average = geometric mean

**Data Source:** Centers for Disease Control and Prevention. Fourth Report on Human Exposure to Environmental Chemicals, Updated Tables, (January 2017). Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

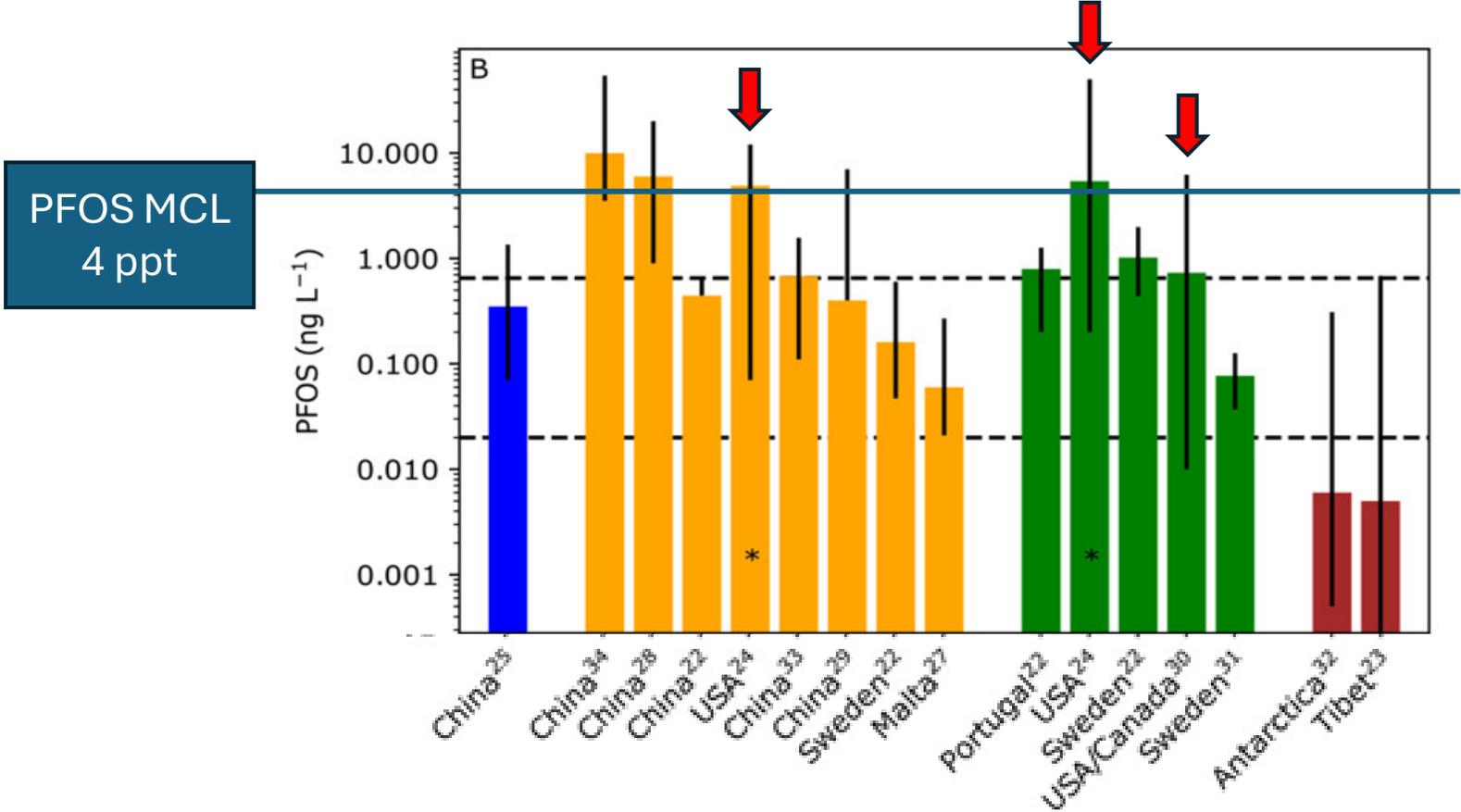
# “Old Fashioned PFAS”



# Sources of PFAS in agriculture\*

\*PFAS is not only an ag problem but that is what we hear in the discussions around PFAS pesticides

# Sources of Farm PFAS Inputs: Rainwater

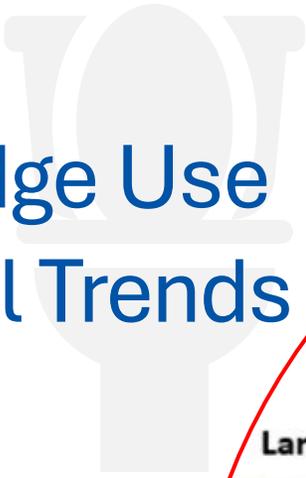


Rainwater chart shows PFOS in rain across the globe and compares it to the new EPA MCL.

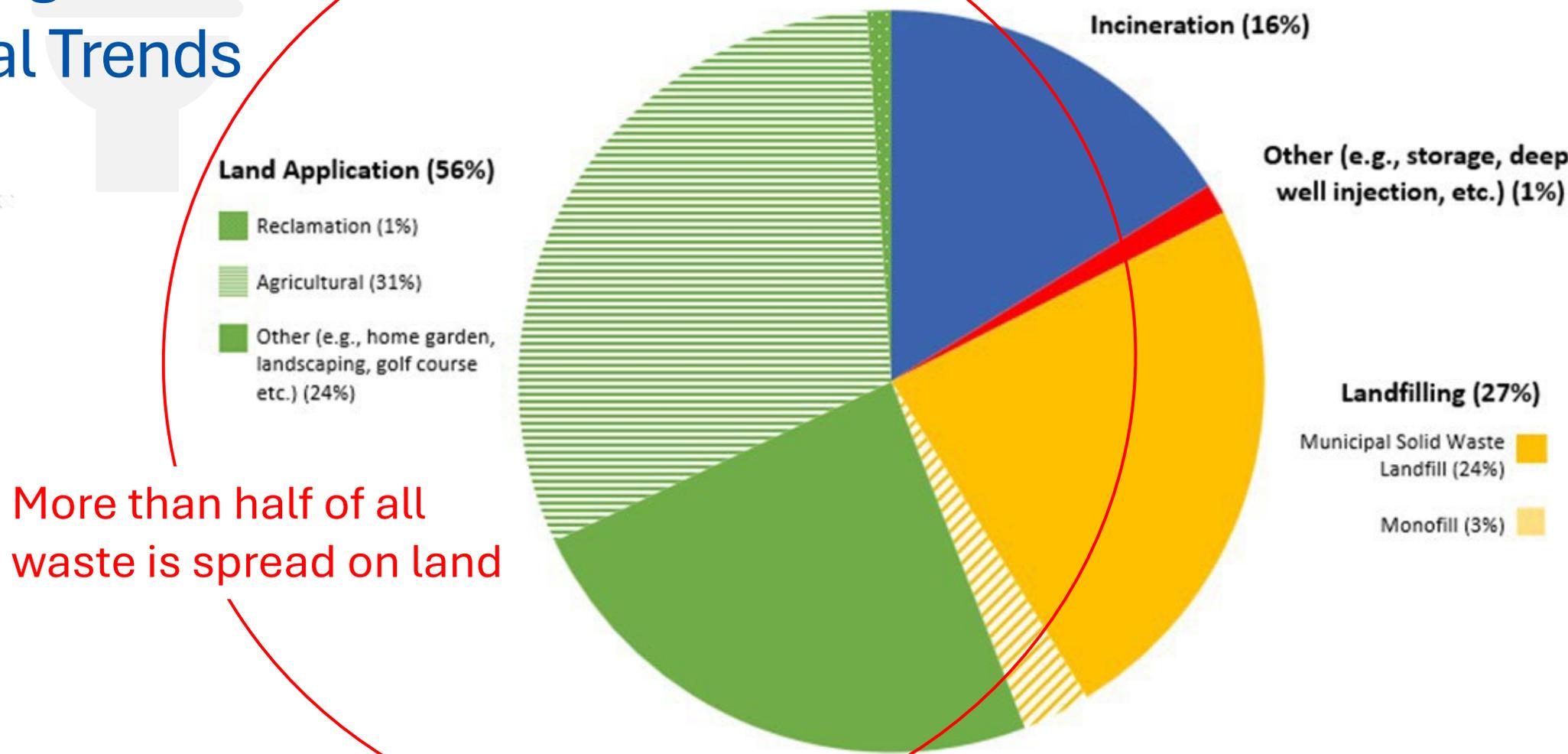
<https://pubs.acs.org/doi/10.1021/acs.est.2c02765?fig=fig1&ref=pdf>



# Background: Sewage Sludge Use and Disposal Trends



## Biosolids Use & Disposal from 2022 Biosolids Annual Reports



More than half of all waste is spread on land

# Draft Risk Estimates: Pasture Farm Scenario

- Annual applications of 10 DMT/ha (median rate) for 40 years containing 1 ppb PFOA or PFOS. No tilling.

VT "background soil" = 1-3 ppb

- Farm family lives on site for 10 years.
- In some scenarios, there may be risks associated with **drinking water**, consuming **fish**, pasture-raised **beef**, chicken, **eggs**, or **milk**

- **Milk**: cancer risks can exceed  $1 \times 10^{-3}$ ; HQ up to 34 for children, 18 for adults
- **Drinking water, fish, beef, and eggs**: cancer risk can exceed  $1 \times 10^{-4}$ ; **fish** HQ up to 45 for children and 39 for adults

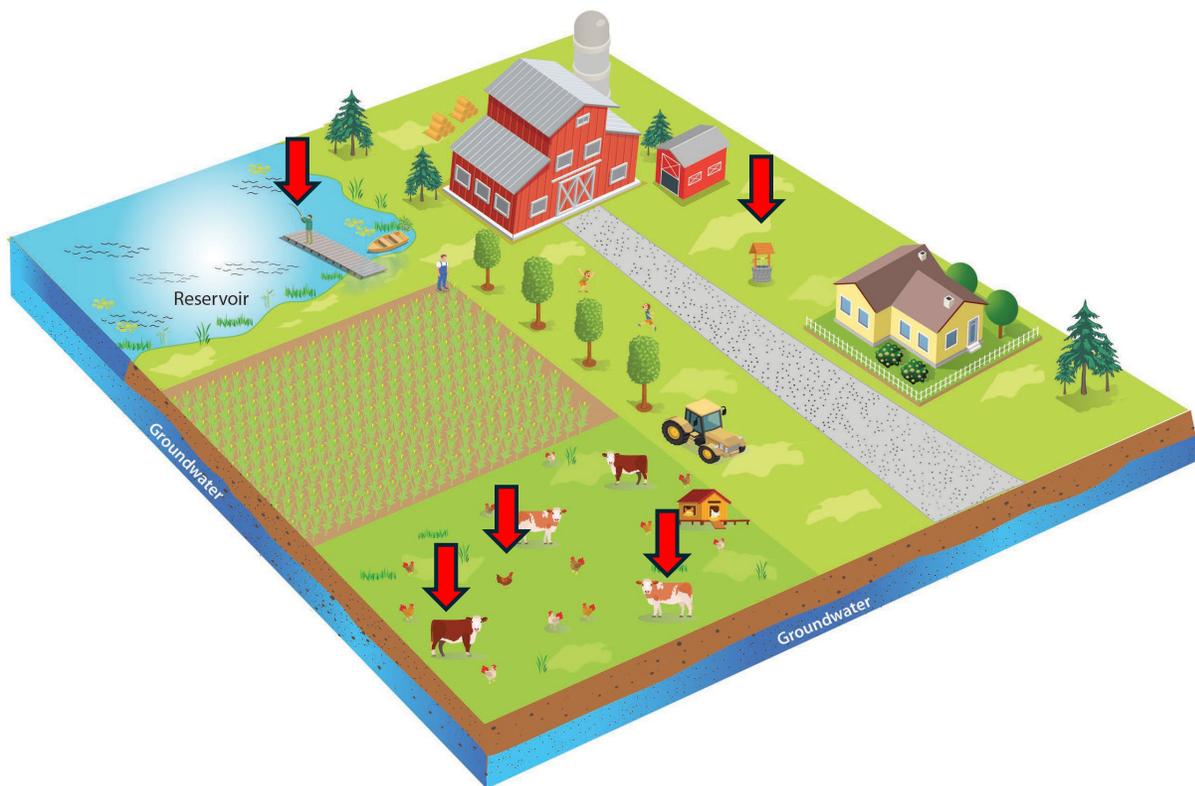
(**Bold** indicates highest risk pathways)



# Draft Risk Estimates: Pasture Farm Scenario

- 10 dry metric tonnes per hectare annually containing 1 ppb PFOA or PFOS
- Farm family lives on site for 10 years.
- In some scenarios, there may be risks associated with **drinking water**, consuming **fish**, pasture-raised **beef**, chicken, **eggs**, or **milk**
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MT/ha containing 1 ppb PFOA or PFOS  
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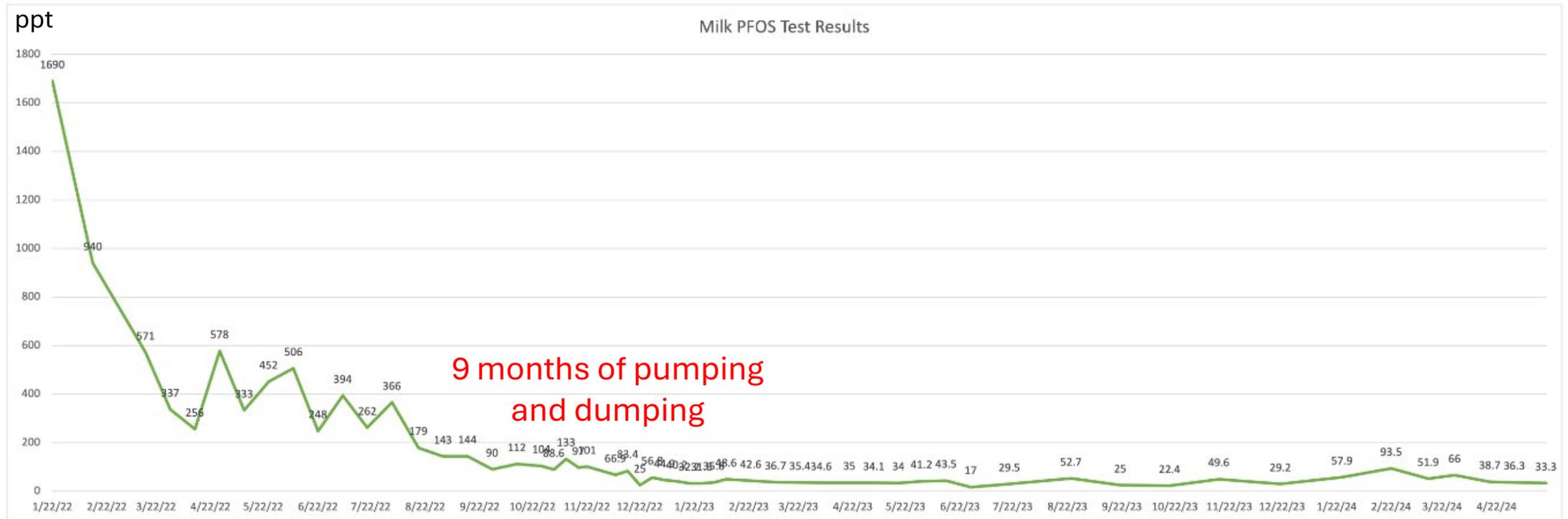


(**Bold** indicates highest risk pathways)

# Maine farm

“Our goal is still non-detect and it’s frustrating when you think you have a plan that works and conditions change. Brendan fed the same ratio of feed from the same fields the year before, but we’d had a dryer year, so now we wonder if the soil moisture at the time of hay harvest has something to do with the amount of PFAS compounds in the feed.”

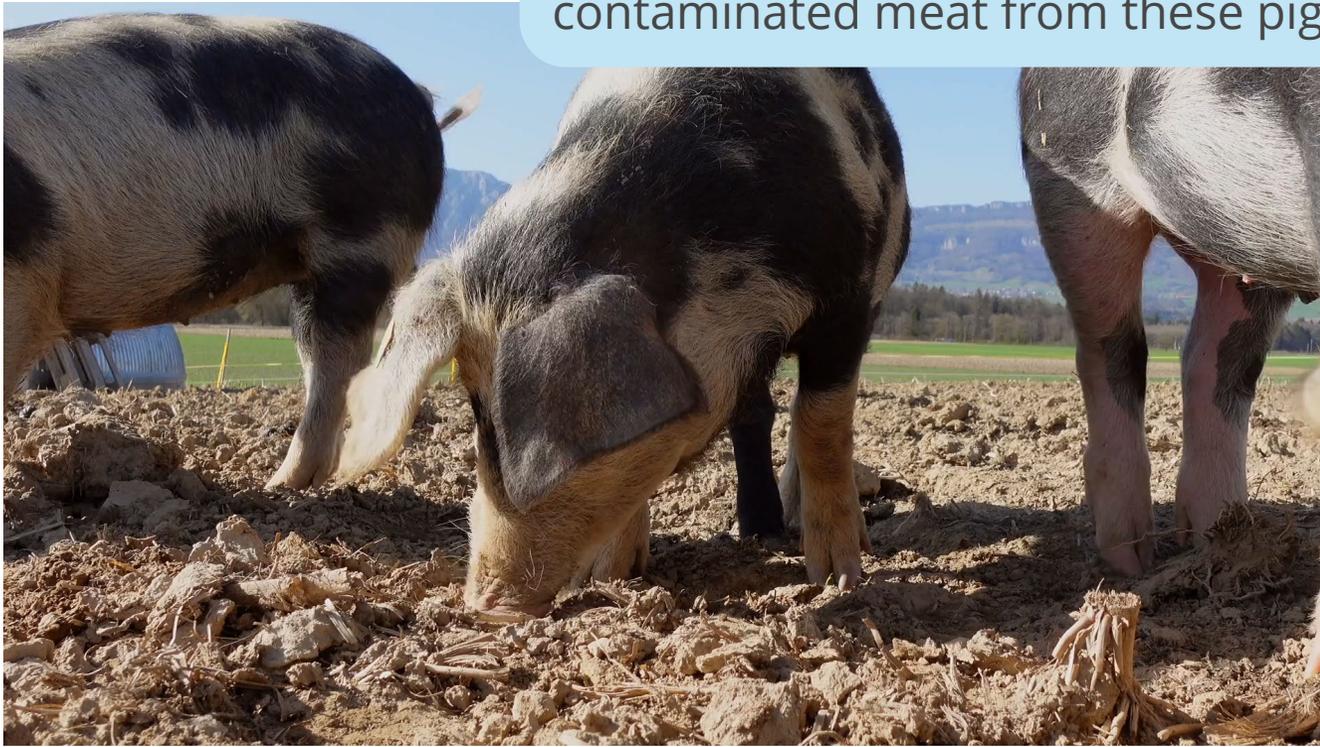
----> PFAS ---->



----> months ---->

# Maine farm

“But the pigs that had been pastured on soil with levels of about 9 ppb PFOS had detectable levels in the meat, so we stopped pasturing pigs on soils with PFAS compounds. All of the contaminated meat from these pigs was sent to the landfill.”



# Contamination as PFAS source

# Contaminants from unknown sources

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) ensures consumer protections for pesticide products and mandates that the products contain exactly what was approved when they were registered with EPA, no more and no less. The entire product ingredient list is reviewed by EPA prior to allowing a pesticide product on the market.

**Federal: 40 CFR § 159.179(b)**

As per its current PFAS-Packaging website EPA states, "EPA considers any level of PFAS to be potentially toxicologically significant."



**Federal: 7 U.S.C. 136(j) (FIFRA Section 12(a)(1)(c))**

Establishes as an unlawful act: composition that differs at the time of distribution or sale from its composition as described ... with its registration

**Federal: 40 CFR § 158.167**

Requires all impurities of toxicological significance to be reported and accepted as part of product registration

**Federal: 7 U.S.C. 136(d) (FIFRA Section 6(a)(2)) & 12(a)(1)(c)**

Requires registrants to report impurities and prohibits composition of the product that differs from that registered with the Agency

**Federal: 40 CFR § 159.155(a)(5)**

Information about impurities must be received by EPA no later than the 30<sup>th</sup> calendar day after the registrant first possesses or knows of the information



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# Contaminants from unknown sources

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requires that pesticide products contain exactly what was approved when they were registered. The entire product ingredient list must be included in the label to allow for a pesticide product on the market.

## Federal: 40 CFR § 159.179(b)

As per its current PFAS-Packaging website EPA states, "EPA considers any level of PFAS to be potentially toxicologically significant."



Federal: 7 U.S.C. § 136-136f  
Establishes a standard for the composition of a pesticide product that differs at the time of registration.

## Federal: 40 CFR § 158.167

Requires all impurities of toxicological significance to be reported and accepted as part of product registration

prohibits composition of the product that differs from that registered with the Agency

## Federal: 40 CFR § 159.155(a)(5)

but impurities must be received by the registrant on or before the 30<sup>th</sup> calendar day

after the registrant first possesses or knows of the information



And yet

In general

• Only a  
cover



## Hold My Beer: The Linkage between Municipal Water and Brewing Location on PFAS in Popular Beverages

Jennifer Hoponick Redmon,\* Nicole M. DeLuca,\* Evan Thorp, Chamindu Liyanapatirana, Laura Allen, and Andrew J. Kondash

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Cite This: <https://doi.org/10.1021/acs.est.4c11265>



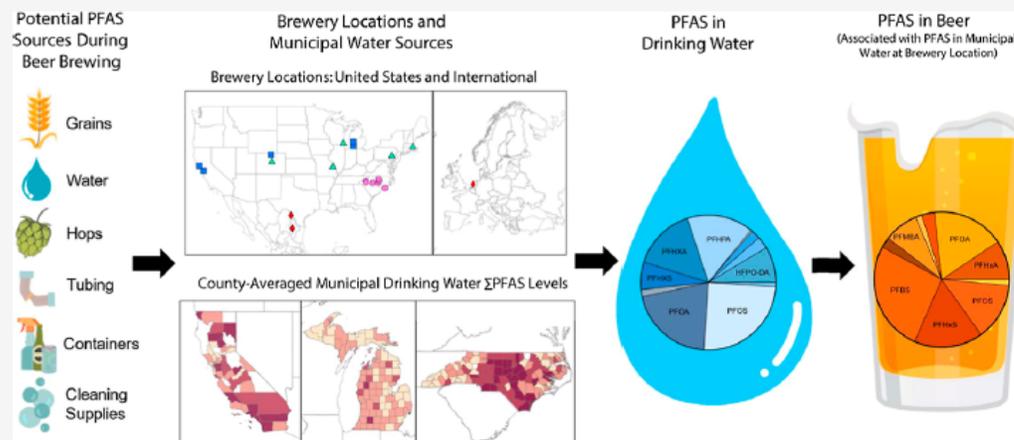
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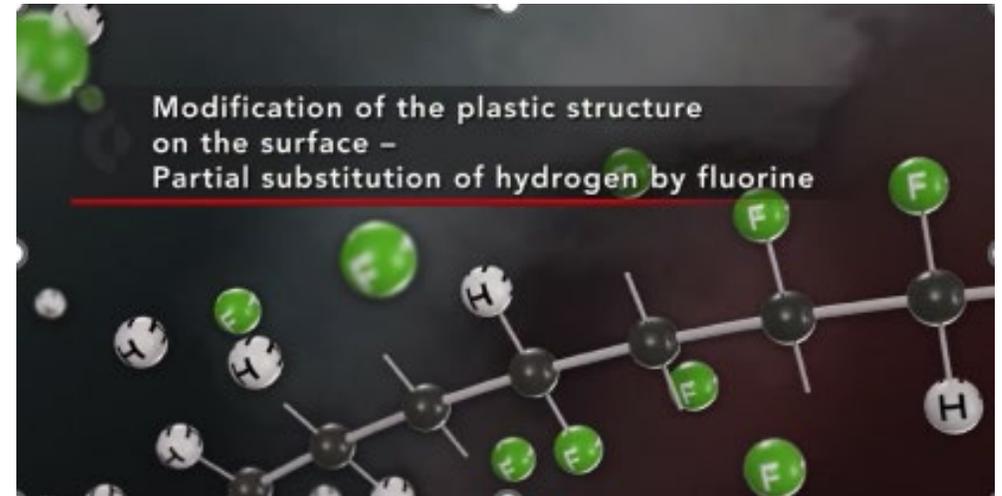


**ABSTRACT:** Beer has been a popular beverage for millennia. As water is a main component of beer and the brewing process, we surmised that the polyfluoroalkyl substances (PFAS) presence and spatial variability in drinking water systems are a PFAS source in

# Fluorinated plastic containers as source of PFAS

# Container fluorination

										DISPLAY PROPERTY/TREND																									
										Chemical Group Block																									
										Atomic Number										Atomic Mass u															
										17										35.45															
										Cl																									
										Chlorine																									
										Halogen																									
										Plot Atomic Mass																									
1	2																	18																	
1	H																	2	He																
3	Li	4	Be																	10	Ne														
11	Na	12	Mg																	18	Ar														
19	K	20	Ca	21	Sc	22	Ti	23	V	24	Cr	25	Mn	26	Fe	27	Co	28	Ni	29	Cu	30	Zn	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
37	Rb	38	Sr	39	Y	40	Zr	41	Nb	42	Mo	43	Tc	44	Ru	45	Rh	46	Pd	47	Ag	48	Cd	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe
55	Cs	56	Ba	57	La	58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb	71	Lu		
87	Fr	88	Ra	89	Ac	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr		



## Container fluorination

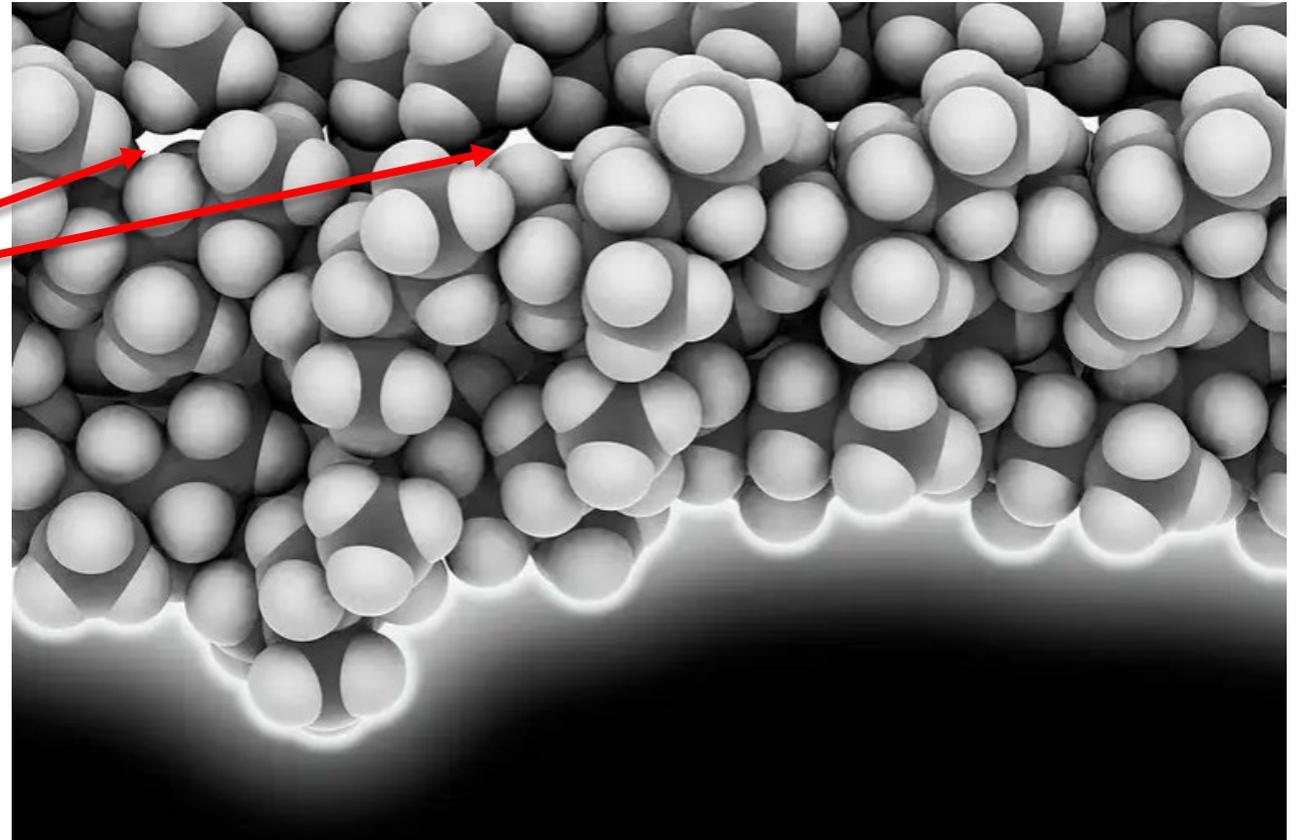
HDPE, LDPE, and PP plastics

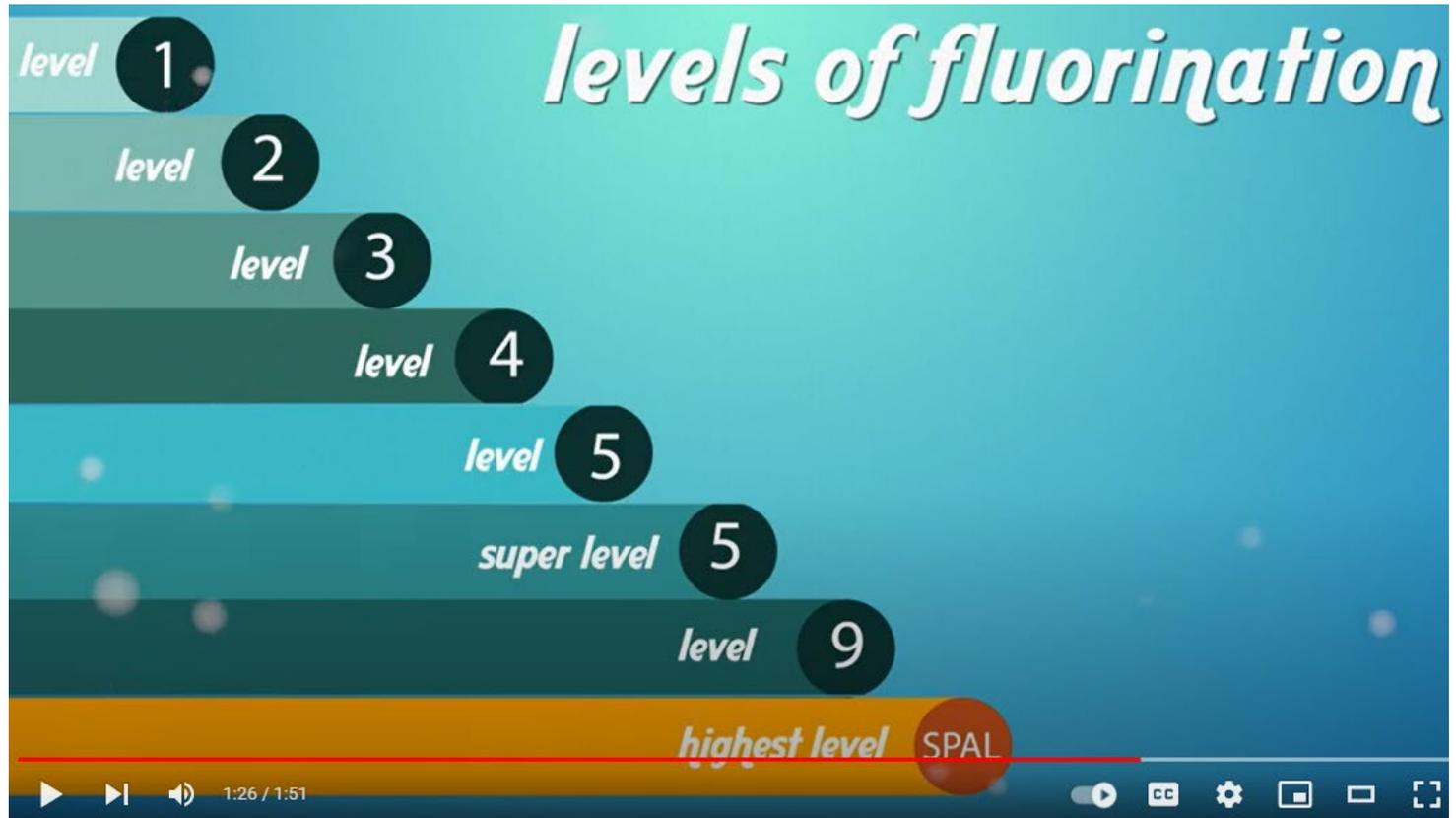
Literally - adding fluorine

# Fluorination has several roles

Fluorination fills gaps in plastic.

- Keeps oxygen out
- Keeps smells in



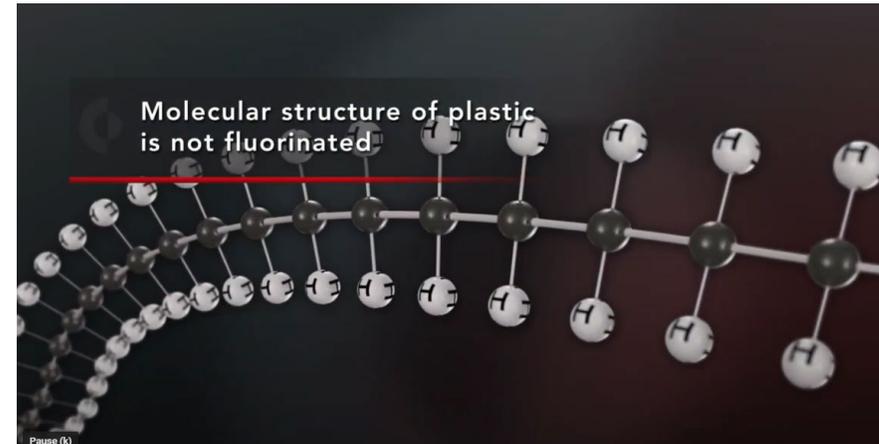
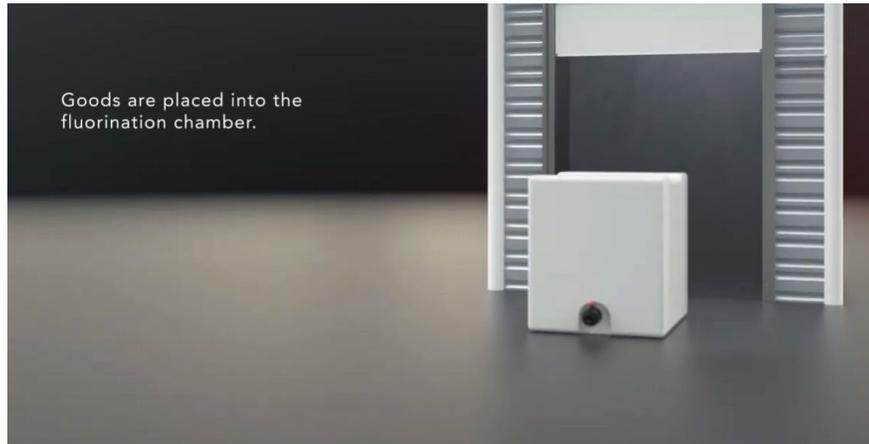


We have been fluorinating plastics since the 1990s.



From what we've heard, thicker plastic also solves the problems fluorination fixes.

# Container caused contamination



## Container fluorination

HDPE, LDPE, and PP plastics

# Container caused contamination

- This has been documented to occur.
- The contamination produces several different long-chain PFAS (associated with human health issues); including PFOA
  - Anvil 10+10 story of mosquito spraying in Massachusetts
- PFOA contamination in the ppb concentration range

Abbreviated	Full Name
PFBA	Perfluoro-butanoic acid
PFPeA	Perfluoro-pentanoic acid
PFHxA	Perfluoro-hexanoic acid
PFHpA	Perfluoro-heptanoic acid
PFOA	Perfluoro-octanoic acid
PFNA	Perfluoro-nananoic acid
PFDA	Perfluoro-decanoic acid
PFUdA	Perfluoro-undecanoic acid

# EPA's Fluorination Testing

Mosquito product from Mass

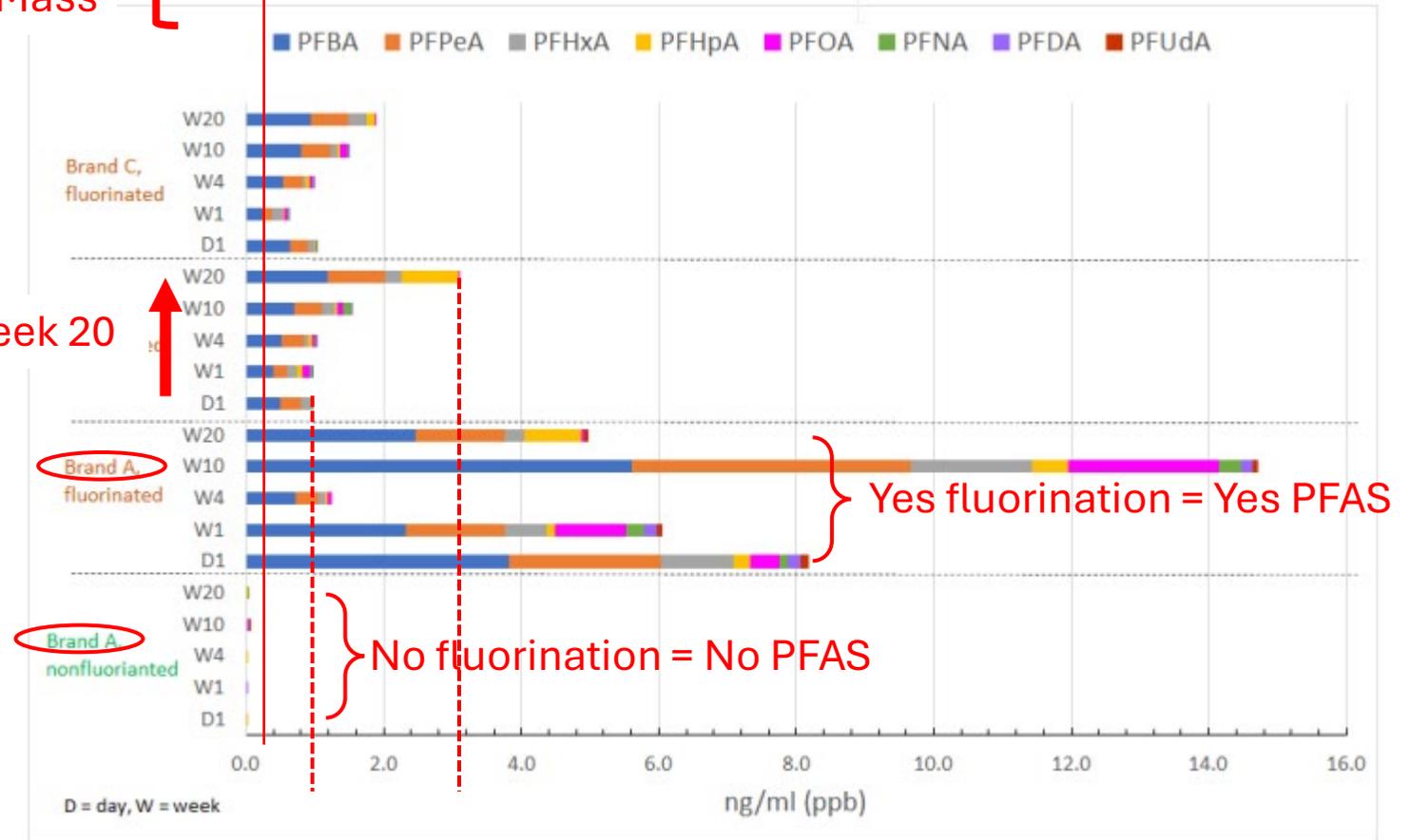


[Product] = 0.2 ppb after storage in fluorinated HDPE container; ND when never stored in fluorinated HDPE container

EPA research shows purified methanol (representing oily type pesticides) can become contaminated with PFA<sup>-</sup> being stored in fluorinated HDPE containers.

- Longer time ---> ~higher levels of PFAS
- Oily solution ---> higher levels of PFAS

Day 1 to Week 20



# How many containers are fluorinated?

- 20% to 30% ag plastic
- “All products”
- “It’s expensive”

## This isn't a pesticide container issue, per se

- Until recently PFAS were purposefully added to containers
- This is different, fluorination is just fluorine
- We know that many other items in our lives are also in fluorinated containers. Some of the containers that we know about are laundry, floor cleaning, and motor oil.

# And then there is the container disposal issue



## And then there is the container disposal issue



<https://www.wbur.org/hereandnow/2019/04/25/baltimore-waste-incinerator-garbage>

The Lasee et al. response for establishing a credible source for pesticide products

Promotion of this work by EPA published details from the Lasee et al. & EPA where the author visited other labs and they were

“Dr. Lasee noted that this was not informed EPA that he had visited where the paper was published in response from the Journal of Hazardous Materials Letters 2022/05/05-28-24-epa-respon

Journal of Hazardous Materials Letters 3 (2022) 100067

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ELSEVIER

Check for updates

### Targeted analysis and Total Oxidizable Precursor assay of several insecticides for PFAS

Steven Lasee<sup>a,\*</sup>, Kaylin McDermott<sup>a</sup>, Naveen Kumar<sup>a</sup>, Jennifer Guelfo<sup>a</sup>, Paxton Payton<sup>b</sup>, Zhao Yang<sup>a</sup>, Todd A. Anderson<sup>a</sup>

<sup>a</sup> Texas Tech University, 2500 Broadway, Lubbock, TX 79409, the United States of America  
<sup>b</sup> Cropping Systems Research Laboratory, US Department of Agriculture, 3810 4th Street, Lubbock, TX 79402, the United States of America

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**ARTICLE INFO**

**Keywords:**  
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PFOS  
Insecticides  
Exposures  
Agriculture

**ABSTRACT**

Targeted analysis for 24 Per- and Polyfluoroalkyl Substances (PFAS) was conducted on 10 insecticide formulations used on a United States Department of Agriculture crop research field. Perfluorooctane sulfonic acid (PFOS) was found in 6 of the 10 formulations with concentrations ranging from 3.92 to 19.2 mg/kg. Further analysis of soil and plant samples collected at the site found several additional PFAS, with PFOS being the most prominent. Suspect screening was then conducted on the formulations and provided several suspected PFAS in addition to the 24 targeted analyzed PFAS in 7 of the 10 samples, one of which showed no PFAS during targeted analysis. PFAS-precursor oxidation was then conducted on the two insecticide formulations with the greatest lists of suspected PFAS as validation of potential unknown PFAS in the formulations. This study revealed a previously unknown potential PFAS contamination source for rural and agricultural environments.

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#### 1. Introduction

The chemical class per- and poly-fluoroalkyl substances (PFAS) have drawn regulatory focus due to their potential toxicity (Bach et al., 2016; Barry et al., 2013; Gallo et al., 2012; Halldorsson et al., 2012; Jantzen et al., 2016; Johansson et al., 2009; Melzer et al., 2010; Midgett et al., 2015; Savitz et al., 2012; Steenland et al., 2013; Wielsøe et al., 2015), tendency to trophic transport (Awad et al., 2011; Giesy and Kannan, 2001; Hagenaaers et al., 2008; Kwadijk et al., 2010; Vestergren et al., 2013), and their environmental mobility and persistence (United States Environmental Protection Agency, 2019). Within the PFAS chemical group, perfluoroalkyl acids (PFAAs) have been the primary focus of research and legislation due to a strong display of the previously mentioned traits and relatively high environmental occurrence.

In February 2019, the United States' Environmental Protection Agency (EPA) published an action plan concerning PFAS exposure and contamination in the United States (United States Environmental Protection Agency, 2019). One of the research areas identified by the action plan as needing additional input was "What are the sources, fate and transport pathways, and exposures to humans and ecosystems?" (United States Environmental Protection Agency, 2019). The most common characterized sources of environmental PFAS contamination are associated with wastewater and biosolids, aqueous firefighting foam (AFFF), and products containing PFAS and PFAS precursor manufacturing and use (Key et al., 1997; Prevedouros et al., 2006). This list is not comprehensive, especially for agricultural or rural communities. To promote advancement in this area, the United States' EPA allocated \$5 million on August 20th, 2020 for new research on managing PFAS in agricultural and rural communities.

In a trial run of a prior study on plant uptake of PFAS (Lasee et al., 2019, 2020), it was discovered that there was detectable PFAS contamination in control plant samples grown in a United States Department of Agriculture (USDA) cropping systems research laboratory greenhouse. Targeted Liquid Chromatography-Mass Spectrometry (LC-MS/MS) analysis was performed to find the source of the PFAS contamination; identified PFAS in the soil on site, other research plants grown on site, and various insecticides used on the site, while site water, potting soil, and fertilizers were all non-detect for PFAS. The objective of this study was to characterize the PFAS found in the tested insecticide formulations and to attempt to connect that PFAS to PFAS found in the soil. Suspect screening was conducted on the insecticide products in an effort to identify possible "unknown" PFAS in the products. Then we

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E-mail address: [hello@laseeconsulting.com](mailto:hello@laseeconsulting.com) (S. Lasee).  
<sup>1</sup> Present address: Lasee Research and Consulting, the United States of America.

<https://doi.org/10.1016/j.jhazl.2022.100067>  
Received 21 June 2022; Received in revised form 29 August 2022; Accepted 21 September 2022  
Available online 22 September 2022  
2666-9110/© 2022 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

credible source for pesticide products

find any PFOS. He also (Journal of Hazardous Materials Letters) was waiting for a files/documents/2024-

# The Lasee *et al.* 2022 paper is not a credible source for establishing contamination in pesticide products

Promotion of this work by PEER, EWG, CBD, etc. stopped after EPA published details from emails and meetings between Lasee & EPA where the author states he'd sent split samples to two other labs and they were also not able to detect PFAS.



“Dr. Lasee noted that those two laboratories, like EPA, did not find any PFOS. He also informed EPA that he had contacted the JHML (Journal of Hazardous Materials Letters) where the paper was published to retract his publication and he was waiting for a response from the Journal.” p7 [https://www.epa.gov/system/files/documents/2024-05/5-28-24-epa-response-to-peer\\_4-22-24.pdf](https://www.epa.gov/system/files/documents/2024-05/5-28-24-epa-response-to-peer_4-22-24.pdf)

# Active Ingredients (a.i.s) as PFAS

You should know that there is a newer expanded definition of PFAS that now includes many chemicals already in use.

(and I apologize if you really hate chemistry)

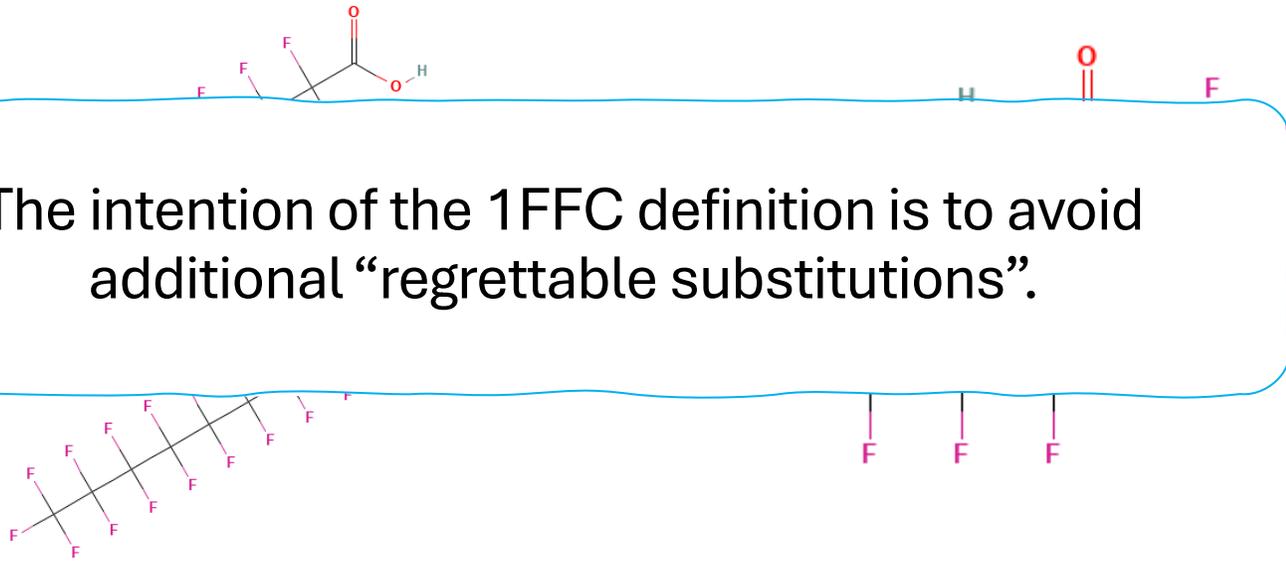
# Regrettable substitutions

When PFOA and PFOS were withdrawn from the US market 20 years ago...

...they were simply replaced with similar chemicals

...which also have health effects

The intention of the 1FFC definition is to avoid additional “regrettable substitutions”.



# Differing definitions

OECD

PFASs are defined as fluorinated substances that contain at least one **fully fluorinated methyl or methylene carbon atom (without any H/Cl/Br/I atom attached to it)**, i.e. with a few noted exceptions, any chemical with at least a perfluorinated methyl group ( $-\text{CF}_3$ ) or a perfluorinated methylene group ( $-\text{CF}_2-$ ) is a PFAS.

MN & ME

(q) "Perfluoroalkyl and polyfluoroalkyl substances" or "PFAS" means a class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom.

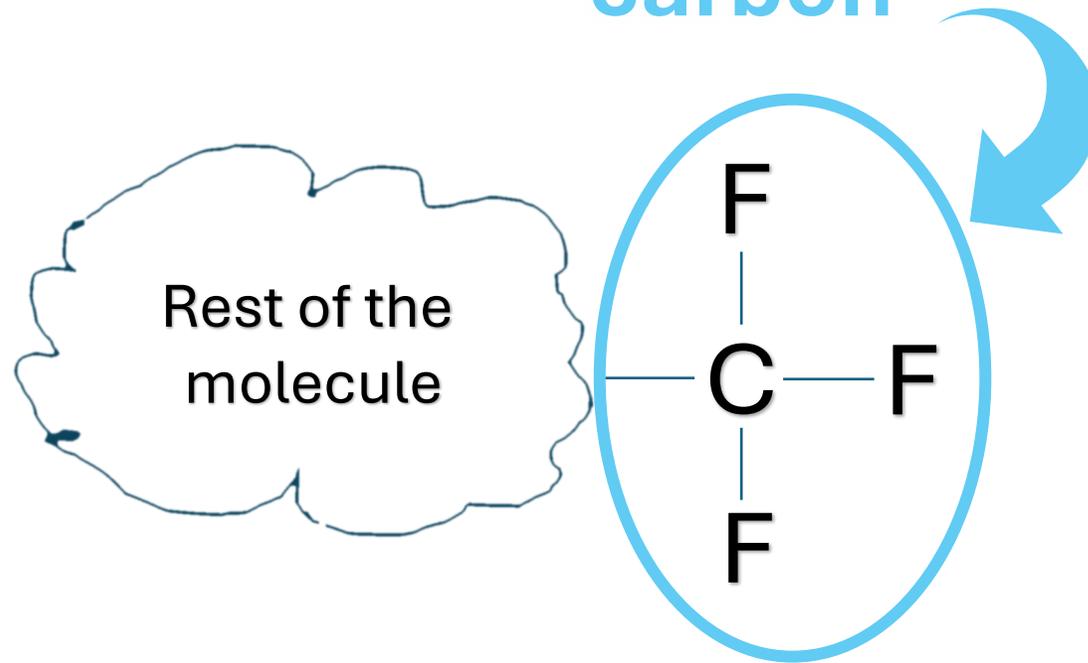
EPA's  
OPP

In 2023, EPA's Office of Pollution Prevention and Toxics (OPPT) in a final rule defined PFAS as a chemical containing at least one of these three structures:

1.  $\text{R}-(\text{CF}_2)-\text{CF}(\text{R}')\text{R}''$ , where both the  $\text{CF}_2$  and  $\text{CF}$  moieties are saturated carbons
1.  $\text{R}-\text{CF}_2\text{OCF}_2-\text{R}'$ , where  $\text{R}$  and  $\text{R}'$  can either be  $\text{F}$ ,  $\text{O}$ , or saturated carbons
1.  $\text{CF}_3\text{C}(\text{CF}_3)\text{R}'\text{R}''$ , where  $\text{R}'$  and  $\text{R}''$  can either be  $\text{F}$  or saturated carbons.

# 1FFC PFAS

Good example of  
a fully fluorinated  
carbon



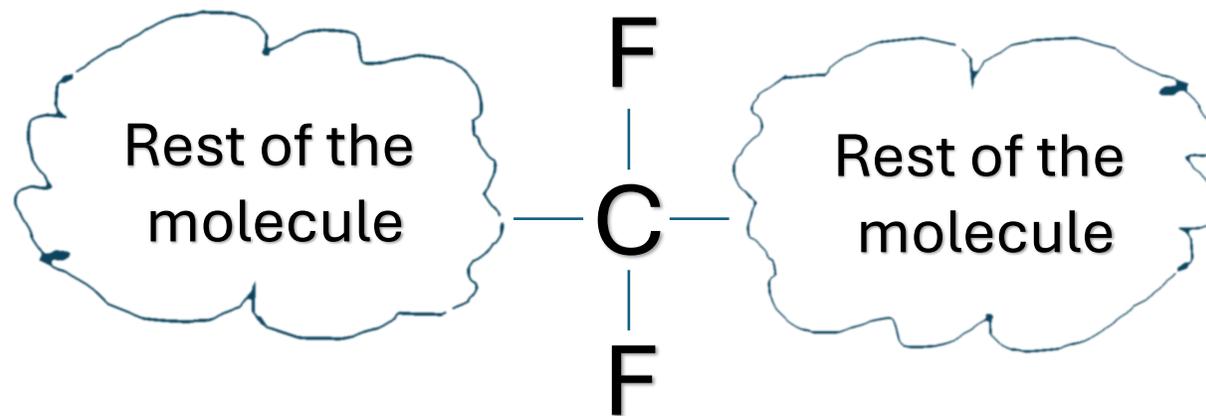
OECD

MN

ME

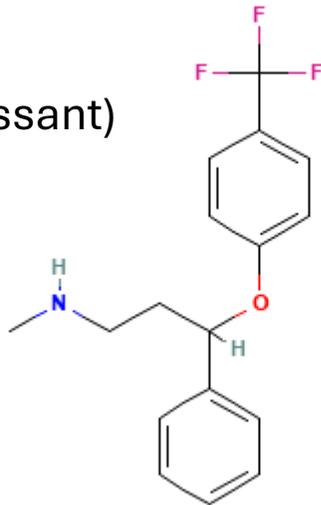
EPA OPP

# 1FFC PFAS

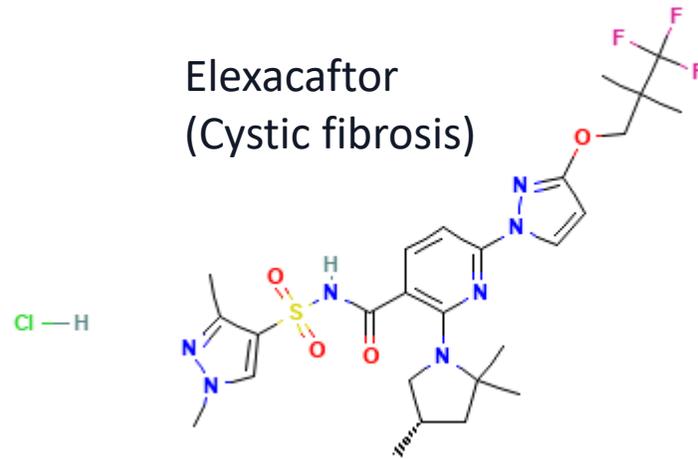


# 1FFC PFAS definition pulls in several medicines and pesticide active ingredients

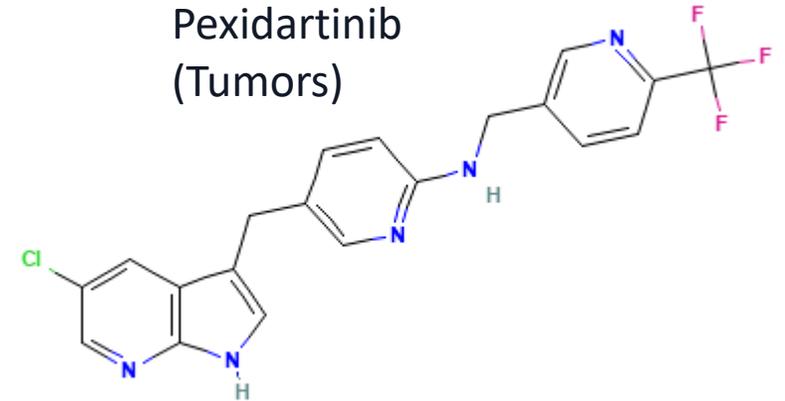
Prozac  
(Anti-depressant)



Elexacaftor  
(Cystic fibrosis)

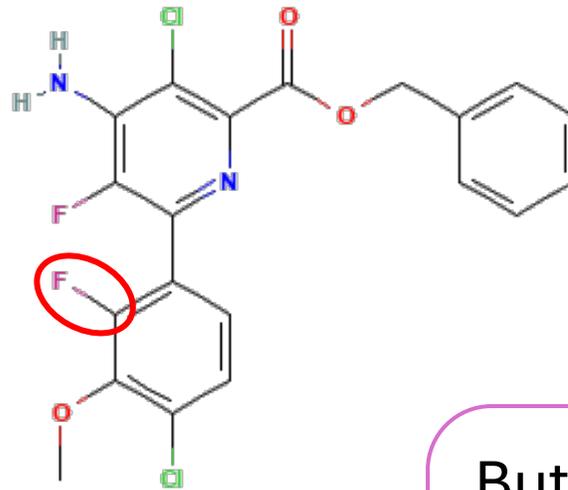


Pexidartinib  
(Tumors)



# ProcellaCOR –florpyrauxifen-benzyl

In Minnesota  
florpyrauxifen-benzyl  
is a PFAS



In Maine  
florpyrauxifen-benzyl  
is NOT a PFAS

But... Minnesota and  
Maine have the same  
PFAS definition  
*verbatim*



DEFINITIONS: This is a panda.

# Definitions

THIS IS A PANDA WHALE.

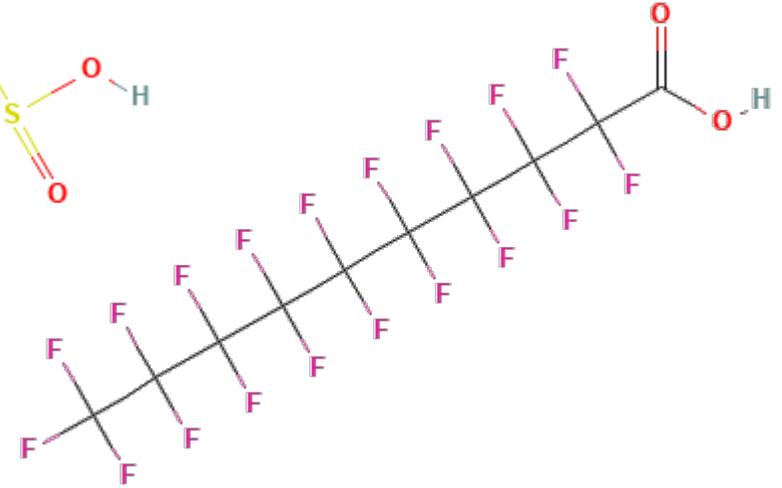
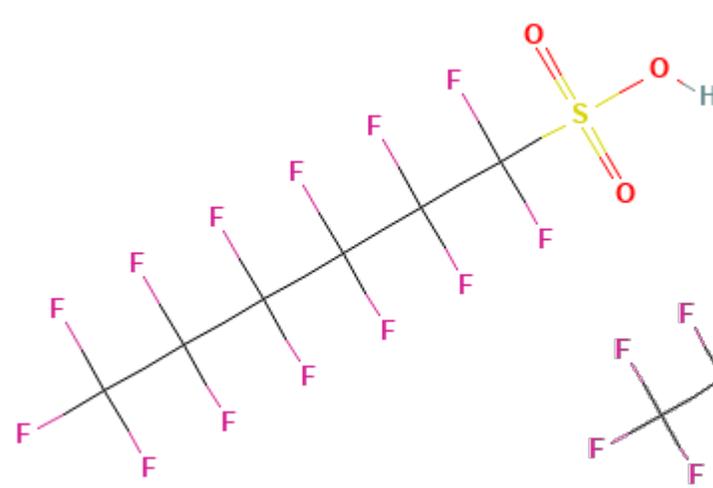
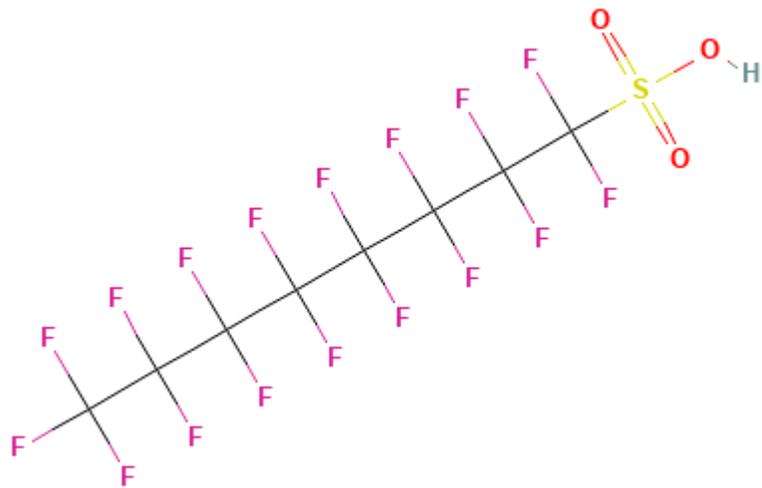
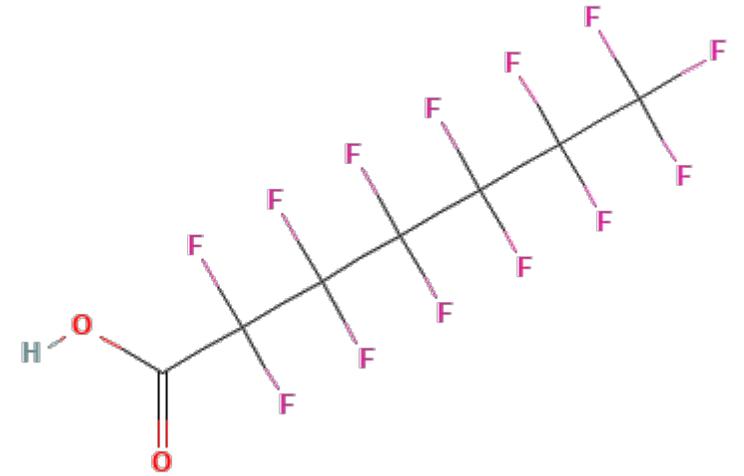
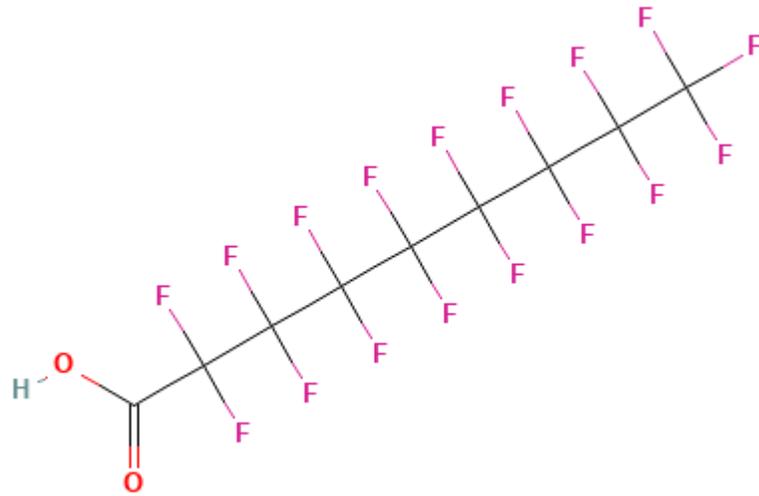
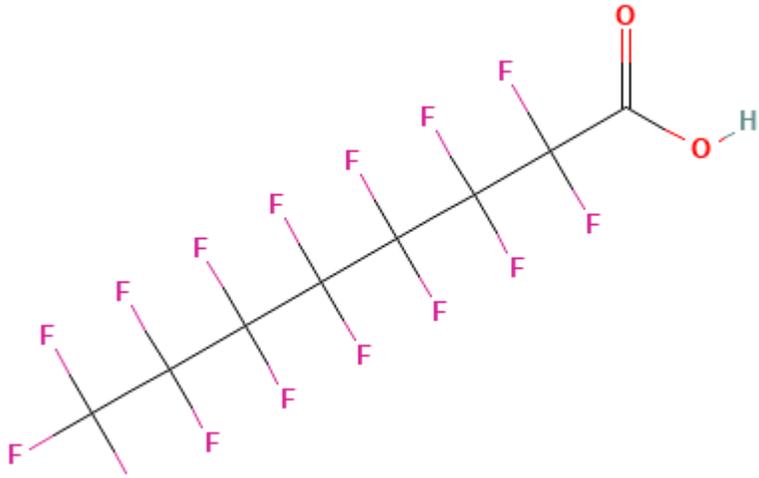




THESE ARE TRASH PANDAS.

Structurally similar,  
however, each is quite  
unique.

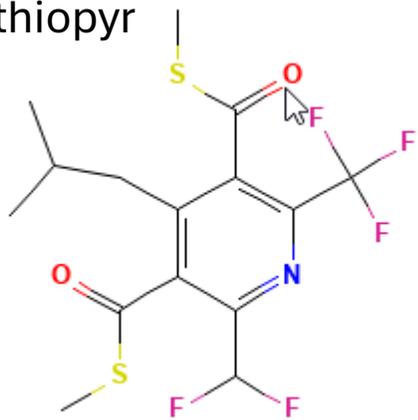
# Old fashioned PFAS



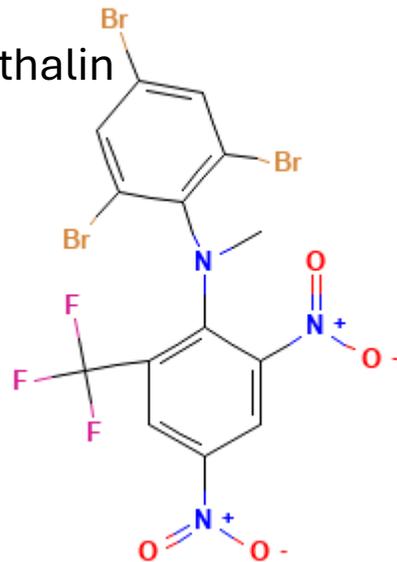
# 1 FFC PFAS definition pulled in several medicines and 56 pesticide active ingredients

-All pesticides now classified as PFAS have been tested for health effects prior to registration. The safety profile of these compounds has not changed.

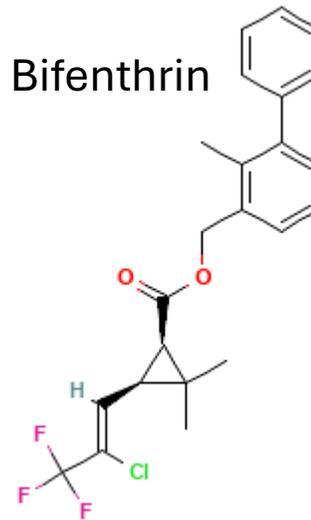
Dithiopyr



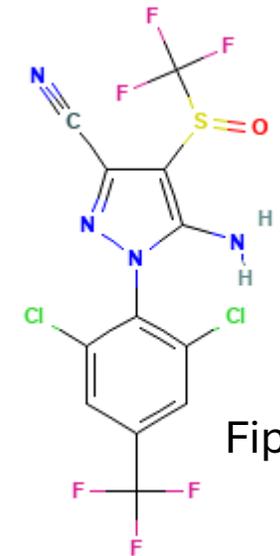
Bromethalin



Bifenthrin



Fipronil



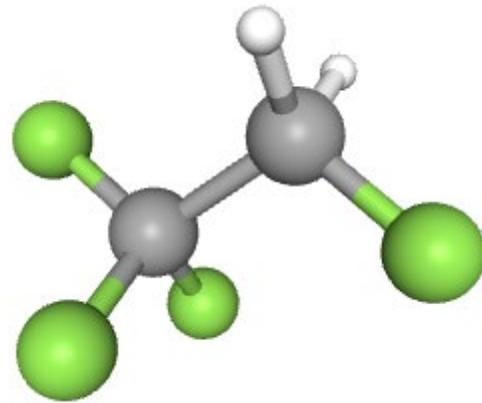
# Examples of PFAS-pesticides in Maine

Acifluorfen-sodium	Ethalfluralin	Flutolanil	Norflurazon	Pyrasulfotole	Tralopyril
Benfluralin	Fipronil	Fluvalinate	Novaluron	Pyridalyl	Trifloxystrobin
Bicyclopyrone	Fluazifop-P-butyl	Fomesafen	Noviflumuron	Pyrifluquinazon	Triflumizole
Bifenthrin	Fludioxonil	Fomesafen-sodium	Oxathiapiprolin	Pyroxasulfone	Trifluralin
Broflanilide	Fluensulfone	$\gamma$ -Cyhalothrin	Oxyfluorfen	Saflufenacil	Triflusulfuron-methyl
Bromethalin	Flufenacet	Hexaflumuron	Penoxsulam	Tefluthrin	$\lambda$ -Cyhalothrin
Chlorfenapyr	Fluopicolide	Hydramethylnon	Penthiopyrad	Tembotrione	
Cyflufenamid	Fluopyram	Indoxacarb	Picoxystrobin	Tetraconazole	
Cyflumetofen	Fluridone	Lactofen	Prodiamine	Tetraniliprole	
Dithiopyr	Flurprimidol	Mefentrifluconazole	Prosulfuron	Tiafenacil	

Minnesota has 93 a.i.s. compared to Maine's 56.

# Inerts as PFAS

“Plus, nobody knows what is in the inerts”



1,1,1,2-Tetrafluoroethane

Can I pass a drug test after drinking a Coke?

I've heard they still use coca leaves.



## Nutrition Facts

1 serving per container

Serving Size 1 Bottle (20 FL OZ)

Amount per serving

Calories 240

% Daily Value\*

### Nutritional Composition

Total Fat 0g 0%

Sodium 75mg 3%

Total Carbohydrate 65g 24%

Total Sugars 65g -

Includes Added Sugars 65g 130%

Protein 0g -

## Ingredients

CARBONATED WATER, HIGH FRUCTOSE CORN SYRUP, CARAMEL COLOR, PHOSPHORIC ACID, NATURAL FLAVORS, CAFFEINE.

\* Not a significant source of saturated fat, trans fat, cholesterol, dietary fiber, vitamin D, calcium, iron and potassium.

# EPA's Inert Finder Webpage

An official website of the United States government [Here's how you know](#) ▾

 United States Environmental Protection Agency

Search EPA.gov 🔍

[Environmental Topics](#) ▾ [Laws & Regulations](#) ▾ [Report a Violation](#) ▾ [About EPA](#) ▾

[Home](#) / [Pesticide Registration](#)

## Pesticide Registration

- [About Pesticide Registration](#)
- [Electronic Submission of Applications](#)
- [Pesticide Registration Manual](#)
- [Fees and Waivers](#)
- [Registration Information by Type of Pesticide](#)
  - [– Antimicrobial Registration](#)
  - [– Biopesticide Registration](#)
  - [– Conventional Registration](#)
  - [– Inert Ingredient Regulation](#)
- [Requirements and Guidance](#)
  - [– Data](#)
  - [– Forms](#)
  - [– Labeling](#)

[Contact Us about Pesticide Registration](#)

## Inert Ingredients Overview and Guidance

**On this page:**

- [Inert ingredient listings in InertFinder](#)
  - [Food and nonfood use](#)
  - [Nonfood use only](#)
  - [Fragrance ingredient list](#)
- [Guidance documents for inert ingredients](#)
- [For more information](#)

### Inert Ingredient Databases

#### EPA Databases for individual inert ingredient approvals

For approvals prior to February 1, 2024, EPA's [InertFinder](#) allows users to search for historical individual inert ingredient approvals by chemical name and CAS Reg. No.

For approvals starting on or after February 1, 2024, EPA's [Individual Inert Ingredient Database](#) also allows users to search for newer individual inert ingredient approvals by chemical name and CAS Reg. No.

Inert Ingredients are approved in the following categories:

#### Related Information

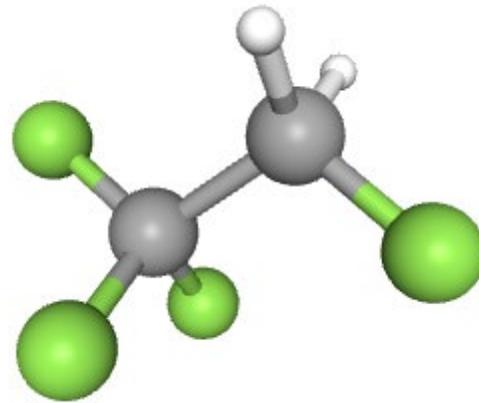
[Read EPA's notice on removing 12 inert chemicals identified as PFAS from the approved list of inert ingredients.](#) ↗

#### What are Inert Ingredients?

Most pesticide products contain substances in addition to the active ingredient(s) that are referred to as inert ingredients or sometimes as "other ingredients." An inert ingredient

<https://www.epa.gov/pesticide-registration/inert-ingredients-overview-and-guidance>

“Plus, nobody knows what is in the inerts”



1,1,1,2-Tetrafluoroethane

Fun fact: It's on List 4,  
meaning it is allowed in  
organic agriculture.

MN went through the EPA Inert Finder database and found these inerts:

<https://www.mda.state.mn.us/environment-sustainability/pfas-pesticide-active-inert-ingredients>

**Preliminary list of pesticide inert ingredients that meet the Minnesota Statute (MINN. STAT. 18B.01 Subd. 15(c)) definition of PFAS. Inert ingredients approved by the EPA and included in the InertFinder database as of February 2024 were screened.**

CAS Number	Ingredient Name
63148-56-1	Siloxanes and silicones, Me 3,3,3-trifluoropropyl
88795-12-4	1-Butanol, 4-(ethenyloxy)-, polymer with chlorotrifluoroethene, (ethenyloxy) cyclohexane and ethoxyethene
24937-79-9	Ethene, 1,1-difluoro-, homopolymer
188027-78-3	5H-1,3-Dioxolo[4,5-f]benzimidazole, 6-chloro-5-[(3,5-dimethyl-4-isoxazolyl)sulfonyl]-2,2-difluoro
67786-14-5	2-Naphthalenesulfonic acid, 6-amino-4-hydroxy-5-{{2-(trifluoromethyl)phenyl}azo}-, monosodium s
52238-92-3	Pigment red 242
42557-13-1	Poly(oxy(methyl(3,3,3-trifluoropropyl)silylene)), alpha-(trimethylsilyl)-omega((trimethylsilyl)oxy)-
88485-37-4	Fluxofenim (as a safener)
98-56-6	p-Chlorobenzotrifluoride
29118-24-9	Trans-1,3,3,3-tetrafluoroprop-1-ene
9002-84-0	Teflon
811-97-2	1,1,1,2-Tetrafluoroethane

# EPA's view of PFAS a.i.s

The screenshot shows the EPA website page for 'Pesticides Containing a Single Fluorinated Carbon'. The page has a blue header with navigation links: 'Environmental Topics', 'Laws & Regulations', 'Report a Violation', and 'About EPA'. Below the header is a breadcrumb trail: 'Home / Ingredients Used in Pesticide Products'. On the left side, there is a sidebar with the title 'Ingredients Used in Pesticide Products' and several links: 'Basic Information About Pesticide Ingredients', 'Pesticide Groups', 'Pesticide Product Information System', 'About Biopesticides', and 'Contact Us about Ingredients Used in Pesticide Products'. The main content area features the title 'Pesticides Containing a Single Fluorinated Carbon' and a list of bullet points. On the right side, there is a section titled 'On this page' with three links: 'How does EPA evaluate pesticides containing a single fluorinated carbon?', 'Are there any benefits of pesticides containing a single fluorinated carbon?', and 'Have other countries registered pesticides containing a single fluorinated carbon?'. Below these links is a link for 'Background on the Definition of PFAS'.

Environmental Topics ▾ Laws & Regulations ▾ Report a Violation ▾ About EPA ▾

[Home](#) / [Ingredients Used in Pesticide Products](#)

## Ingredients Used in Pesticide Products

- [Basic Information About Pesticide Ingredients](#)
- [Pesticide Groups](#)
- [Pesticide Product Information System](#)
- [About Biopesticides](#)

[Contact Us about Ingredients Used in Pesticide Products](#)

# Pesticides Containing a Single Fluorinated Carbon

- EPA undertakes comprehensive scientific assessments to evaluate any potential pesticide risks to human health and the environment
- EPA ensures that no human health risks of concern exist when pesticides are used according to the label
- Many of the uses of these pesticides are reduced risk compared to other product uses currently on the market
- When setting dietary limits, EPA ensures with “reasonable certainty” that no harm will result to human health
- In 2023, EPA’s Office of Pollution Prevention and Toxics (OPPT) established a definition for PFAS that specifically does not include single fluorinated carbons
- Extensive scientific evidence and public input demonstrate molecules with only one fluorinated carbon generally lack the persistence and bioaccumulation properties that are commonly associated with forever chemicals.
- Single fluorinated pesticides registered or proposed for use by EPA have been registered in other countries, including the European Union, Canada, and Australia, among others

On this page

- [How does EPA evaluate pesticides containing a single fluorinated carbon?](#)
- [Are there any benefits of pesticides containing a single fluorinated carbon?](#)
- [Have other countries registered pesticides containing a single fluorinated carbon?](#)

[Background on the Definition of PFAS](#)

<https://www.epa.gov/ingredients-used-pesticide-products/pesticides-containing-single-fluorinated-carbon>

# Pesticide breakdown products as PFAS

# Pesticide breakdown products as PFAS

Sidenote: in the PFAS space there is a term called a “precursor”

# Breakdown products as PFAS

Sidenote:

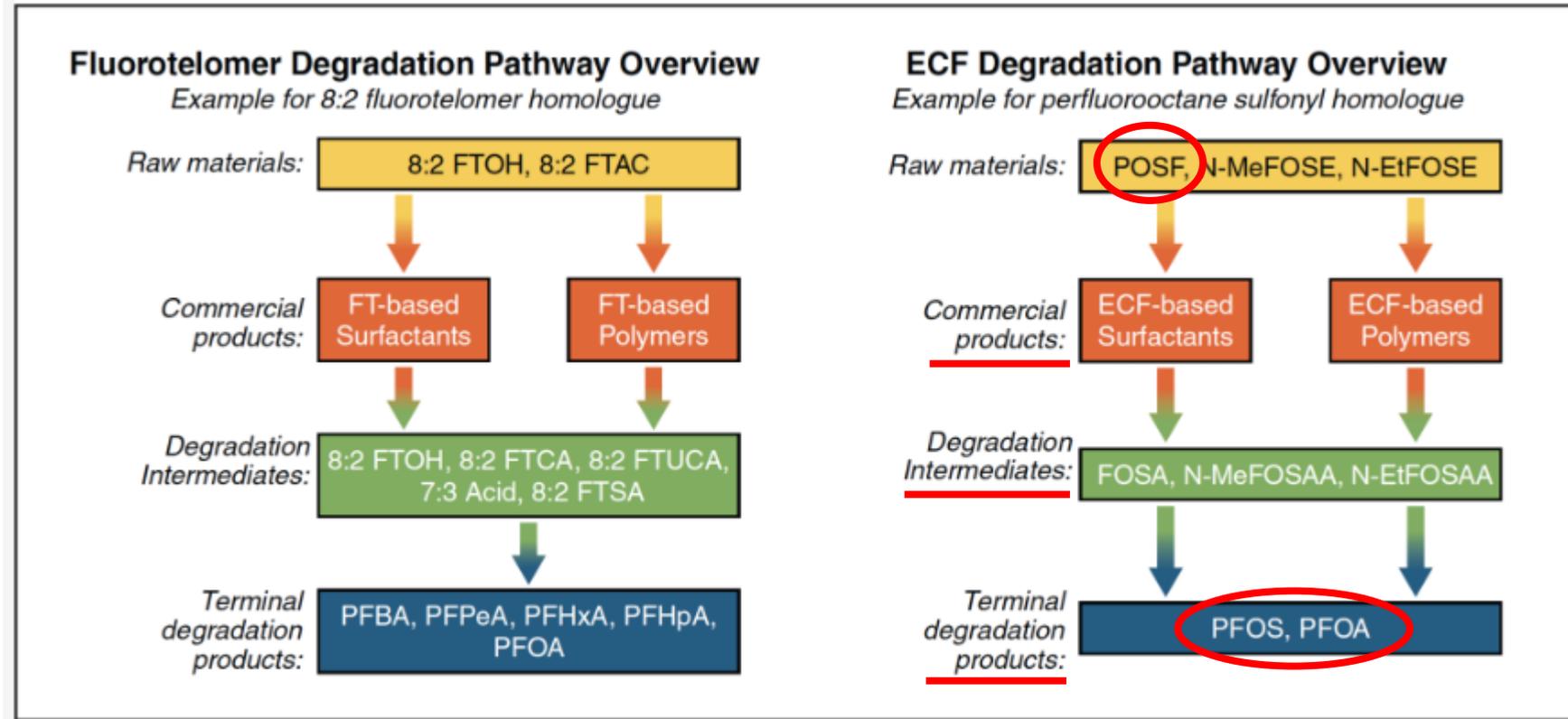


Figure 2-11. Example polyfluoroalkyl substance transformation pathways.

# ‘Forever chemicals’, what happens when they break down?

## PPDB: Pesticide Properties DataBase

Home  
 A to Z: All  
 A to Z: Insecticides  
 A to Z: Herbicides  
 A to Z: Fungicides  
 A to Z: Other related substances  
 Search  
 Support

### Bifenthrin

#### Degradation <sup>+</sup>

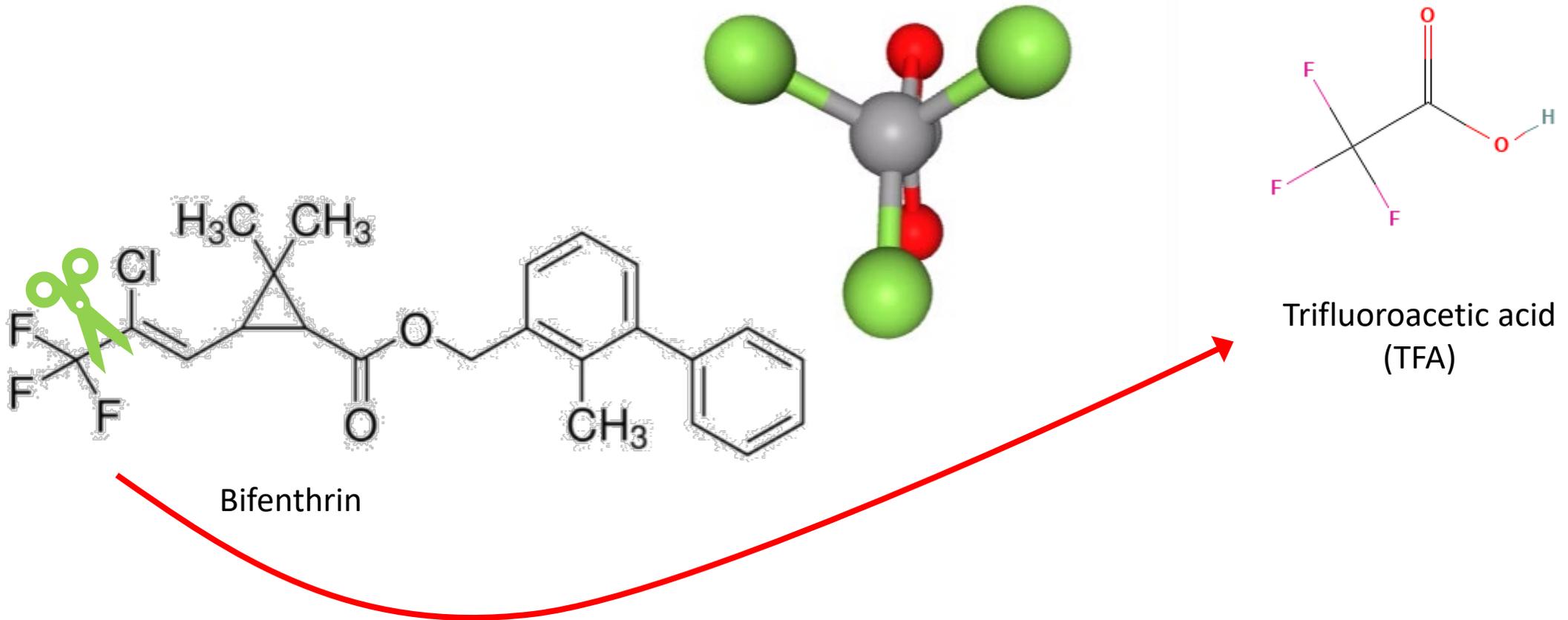
(Also known as:)

#### SUMMARY

Bifenthrin is a pyri  
 some concerns al

Property <sup>1</sup>	Value	Source; quality score; and other information <sup>1</sup>	Interpretation <sup>1</sup>
<b>General biodegradability</b>			
Soil degradation (days) (aerobic)			
DT <sub>50</sub> (typical)	26	Q3	Non-persistent
DT <sub>50</sub> (lab at 20 °C)	102.2	A5	Persistent
DT <sub>50</sub> (field)	86.8	A5	Moderately persistent
DT <sub>90</sub> (lab at 20 °C)	346.5	A5	Persistent
DT <sub>90</sub> (field)	3410.8	A5	-
DT <sub>50</sub> modelling endpoint	-	-	-
Note	EU dossier lab studies DT <sub>50</sub> range 54.2-173.7 days, DT <sub>90</sub> range 223-577 days, field studies DT <sub>50</sub> range 5.4-267 days, DT <sub>90</sub> range 135.3-965.2 days; Other studies DT <sub>50</sub> (1) range 65-125 days, (2) range 2-6 months depending on soil type.		
Dissipation rate RL <sub>50</sub> (days) on plant matrix	6.1	R4	-
Note	Published literature RL <sub>50</sub> range 1.3-27.0 days, 5 field & undercover grown crops, various matrices, n=6		
Dissipation rate RL <sub>50</sub> (days) on and in plant matrix	4.34	R4	-
Note	Published literature RL <sub>50</sub> range 0.59-16.0 days, 12 field & undercover grown crops, various matrices, n=21		
Aqueous photolysis DT <sub>50</sub> (days) at pH 7	12	B5	Moderately fast
Note	DT <sub>50</sub> : 255 days in natural sunlight, 12 days in artificial light		
Aqueous hydrolysis DT <sub>50</sub> (days) at 20 °C and pH 7	Stable	A5	Stable
Note	Stable pH 5 to pH 9 at 25 °C. Hydrolysis occurs at elevated temperatures e.g. DT <sub>50</sub> 20 mins at pH 4, 90 °C		
Water-sediment DT <sub>50</sub> (days)	161	A5	Slow
Water phase only DT <sub>50</sub> (days)	8	K4	Moderately fast
Sediment phase only DT <sub>50</sub> (days)	-	-	-
Air degradation	As this parameter is not normally measured directly, a surrogate measure is used: ‘Photochemical oxidative DT <sub>50</sub> ’. Where data is available, this can be found in the Fate Indices section below.		
Decay in stored produce DT <sub>50</sub>	-		

# When they do break down where does the PFAS-part go?



# When they do break down where does the PFAS-part go?

- There is registration data on breakdown
- Sometimes TFA is formed but not 100% of the time

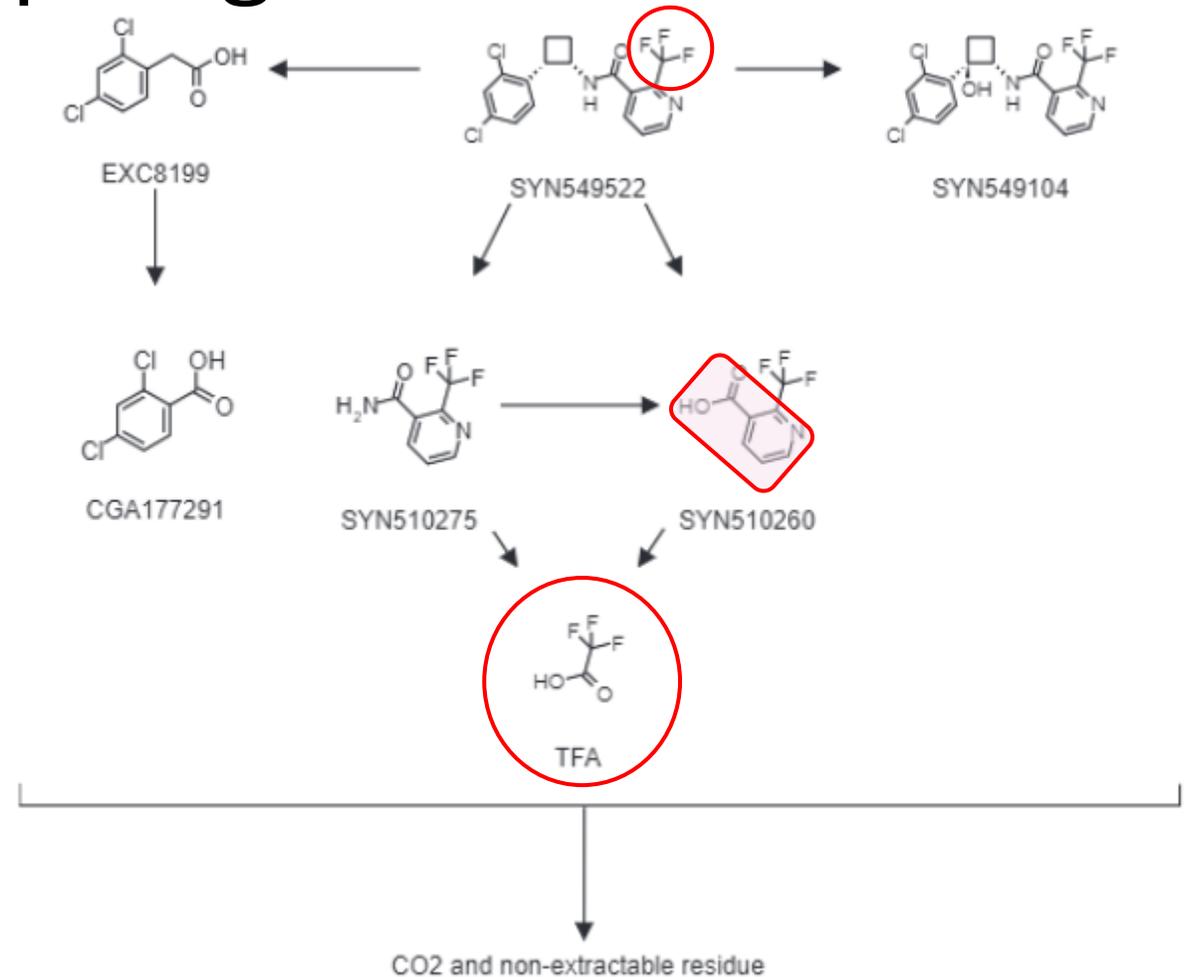


Figure 1. Proposed Metabolic Pathway of Cyclobutrifluram in Soil.



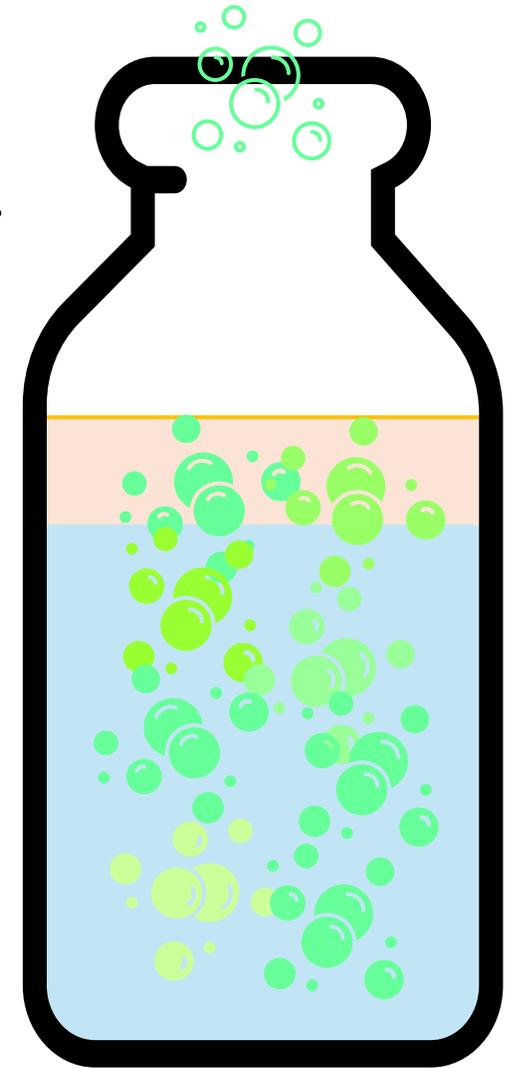
# PFAS & Pesticides

Everyone's favorite topics together!



# Things I wish people knew

- There are no mystery ingredients in pesticide products.
- Harmful PFAS are not allowed in pesticides.
- Other countries' PFAS-pesticide stories (past/current) does not change anything here in the US.
  - What was true 10+ years ago is not true now.
- We are much further along in understanding PFAS in pesticides than in any other chemical product (aside maybe medicine).
- 1FFC definition is helping guide the conversation but we need to remember that each chemical has it's own unique risk and all 7+ million PFAS are not the same.



# Proposed bill in Vermont

The screenshot shows the Vermont General Assembly website. At the top left is the Vermont State Capitol dome logo and the text "VERMONT GENERAL ASSEMBLY". To the right is a search bar with the text "SEARCH FOR:" and tabs for "Bill or Resolution", "Legislator", and "Committee". Below the search bar is a navigation menu with tabs for "BILLS & RESOLUTIONS", "COMMITTEES", "VERMONT LAWS", "HOUSE", "SENATE", "JOINT FISCAL OFFICE", "REPORTS & RESEARCH", "THE STATE HOUSE", and "STAFF & OFFICES".

## H.911

An act relating to prohibiting PFAS chemicals in pesticides and pesticide packaging

Sponsor(s) [Rep. David Durfee](#)

Location [House Committee on Agriculture, Food Resiliency, and Forestry](#)

Last Recorded Action [House 2/24/2026 - Read first time and referred to the Committee on Agriculture, Food Resiliency, and Forestry](#)

Bill/Resolution Text

[As Introduced](#)

Status [Committee Activity](#) [Staff & Other](#)

[Detailed Status](#) [Roll Call Votes \(0\)](#)

Detailed Status

Statement of purpose of bill as introduced: This bill proposes to prohibit the use and sale by any person of any pesticide containing perfluoroalkyl and polyfluoroalkyl substances (PFAS) in the State. This bill also would prohibit the use and sale of any pesticide packaging that contains PFAS.

# Thank you!

Pam Bryer

[pam.bryer@vermont.gov](mailto:pam.bryer@vermont.gov) | Division of Plant Industry  
Vermont Agency of Agriculture, Food, & Markets