
Per- and Polyfluoroalkyl Substances (PFAS)

The devil we know (trailer):

<https://www.youtube.com/watch?v=7cCkADnhRqk>

The devil we know (full documentary):

<https://www.youtube.com/watch?v=NJFbsWX4MJM>

HAVE YOU BEEN READING THE PAPERS? GROWN-UPS REALLY HAVE THE WORLD FOULED UP.



ACID RAIN, TOXIC WASTES,
HOLES IN THE OZONE,
SEWAGE IN THE OCEANS,
AND ON AND ON!

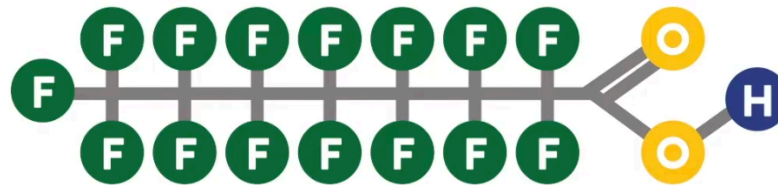


THE ONLY BRIGHT SIDE TO
ALL THIS IS THAT EVENTUALLY
THERE MAY NOT BE A PIECE
OF THE PLANET WORTH
FIGHTING OVER.

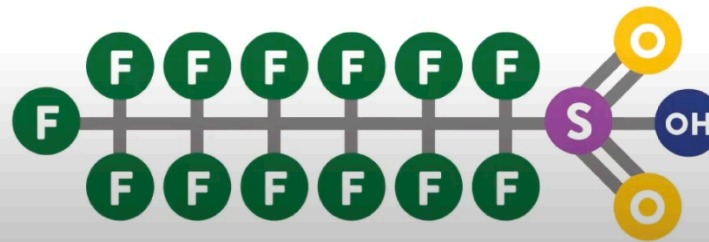


What are PFAS?

- ❖ PFAS is an acronym for per- and polyfluoroalkyl substances
- ❖ These are manmade fluorinated chemicals
- ❖ Thousands of PFAS -like compounds have been identified:
 - ❖ PFC – perfluorinated compounds (but does not include polyfluorinated substances)
 - ❖ PFOS – specific type of PFAS - perfluorooctane sulfonic acid
 - ❖ PFOA – specific type of PFAS - perfluorooctanoic acid
 - ❖ AFFF – specific type of PFAS - aqueous film forming foam
 - ❖ GenX – “replacement” PFAS

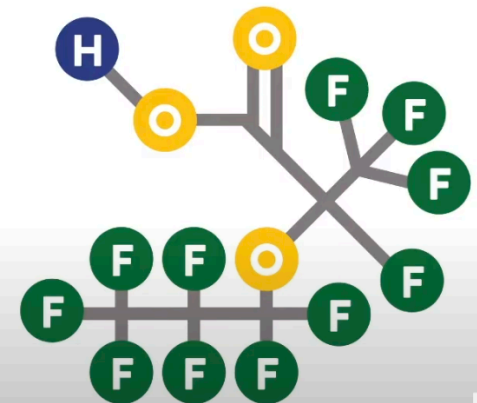


Perfluoroalkyl sulfonates and perfluoroalkyl carboxylates
(includes PFOA and PFOS)

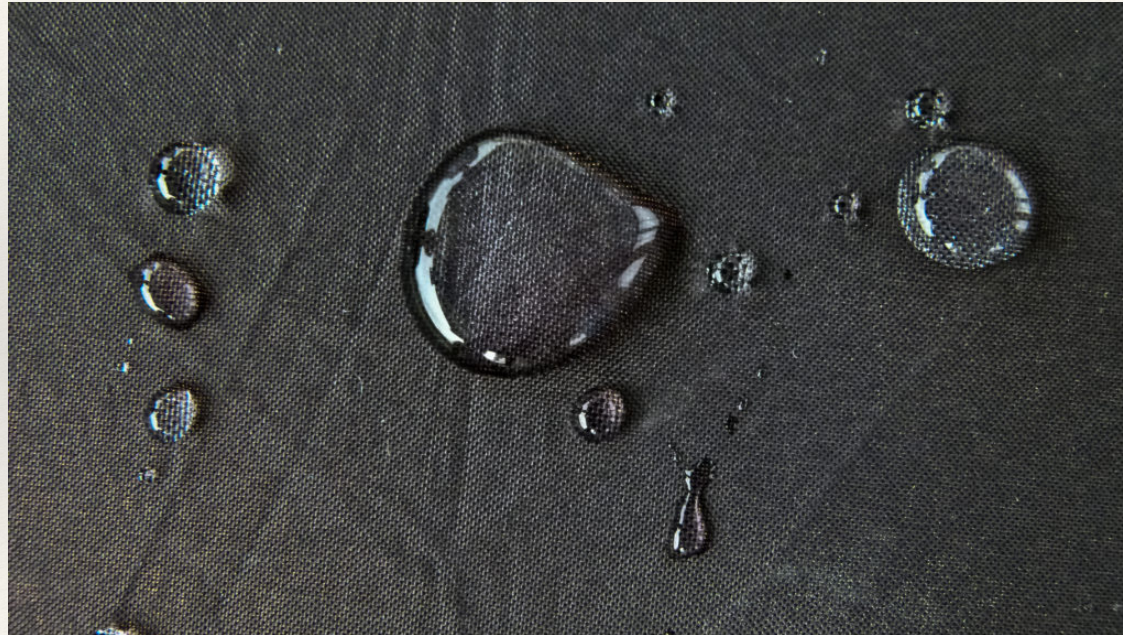


Fluorotelomer sulfonates (FTS)

Per- and polyfluoro ether
(GenX)



What are PFAS?





PFAS in the News

PFAS is contaminating our drinking water and harming our health. Please pass H 4486, "An act to protect public health from PFAS," filed by Sen. Cyr and Rep. Hogan

EDITORIAL **The Boston Globe**
Massachusetts should ban PFAS in consumer products

wbur LOCAL COVERAGE
Soaring PFAS levels force a reckoning for worried Hyannis residents

MASS LIVE
'It's completely man's fault'; here are the hotspots of PFAS contamination in the Pioneer Valley

Sentinel & Enterprise
Editorial: Removing forever chemicals' toxic grip must be a priority

CAI
More Cape Cod wells shut down over PFAS, water quality concerns

CAPE COD TIMES

Nemasket Week Today
'The word is scary.' Hyannis residents learning of prior PFAS exposure from blood tests
PFAS levels make fish in Long Pond unsafe to eat

The Guardian
PFAS increase likelihood of death by cardiovascular disease, study shows

MASS LIVE
Thousands are suing PFAS manufacturers, including the Massachusetts AG and the city of Westfield

CommonWealth BEACON
Firefighters sound the alarm on PFAS chemicals

MEDICAL NEWS TODAY
High seafood diets linked to exposure to 'forever chemicals,' study finds

THE HILL
The impacts of toxic 'forever chemicals' aren't the same for women, men

wbur LOCAL COVERAGE
New Englanders, with their love of seafood, may be at higher risk for PFAS exposure

BOSTON .COM
DPH warns against drinking bottled water from Mass. company due to PFAS contamination
"Consumers are urged not to consume any Simpson Spring products until further notice."

WESTERN MASS NEWS 3 FOX 6
Officials issue fish consumption advisory after PFAS found at 2 local state parks

METROWEST DAILY NEWS
Wayland is latest municipality to file federal lawsuit over PFAS in groundwater

The Boston Globe
When organic is toxic: How a composting facility likely spread massive amounts of 'forever chemicals' across one town in Massachusetts

The Guardian
Toxic PFAS absorbed through skin at levels higher than previously thought

PFAS: history

A BRIEF HISTORY OF TEFLON

➤ As the brand name for a versatile chemical called PTFE, Teflon has found its way into countless products and made its mark on our culture.



1938

DuPont researcher **Roy J. Plunkett** discovers a new product while experimenting with refrigerants. Polytetrafluoroethylene, or PTFE, is heat-resistant with low surface friction.

1941

Plunkett receives **patent** No. 2230654.



1943

PTFE is used as a sealant in the gaseous diffusion process of uranium enrichment on the Manhattan Project, enabling the construction of the **atomic bombs** dropped on Japan.

1946

DuPont reveals Teflon's existence to the general public at an American Chemical Society meeting. Teflon is already being used in jet engines.

1954

French engineer Mark Gregoire introduces the Tefal brand of Teflon-coated **aluminum frying pans**. A revolution in cooking is launched.

1961

Entrepreneur Marion Trozzolo starts selling nonstick Happy Pans to U.S. consumers.

Origins and uses of PFAS

Some well-known uses of PFAS:

- ❖ 3M – Scotchgard
- ❖ Dupont – Teflon
- ❖ U.S. Navy - Fire-fighting foam for oil-based fires



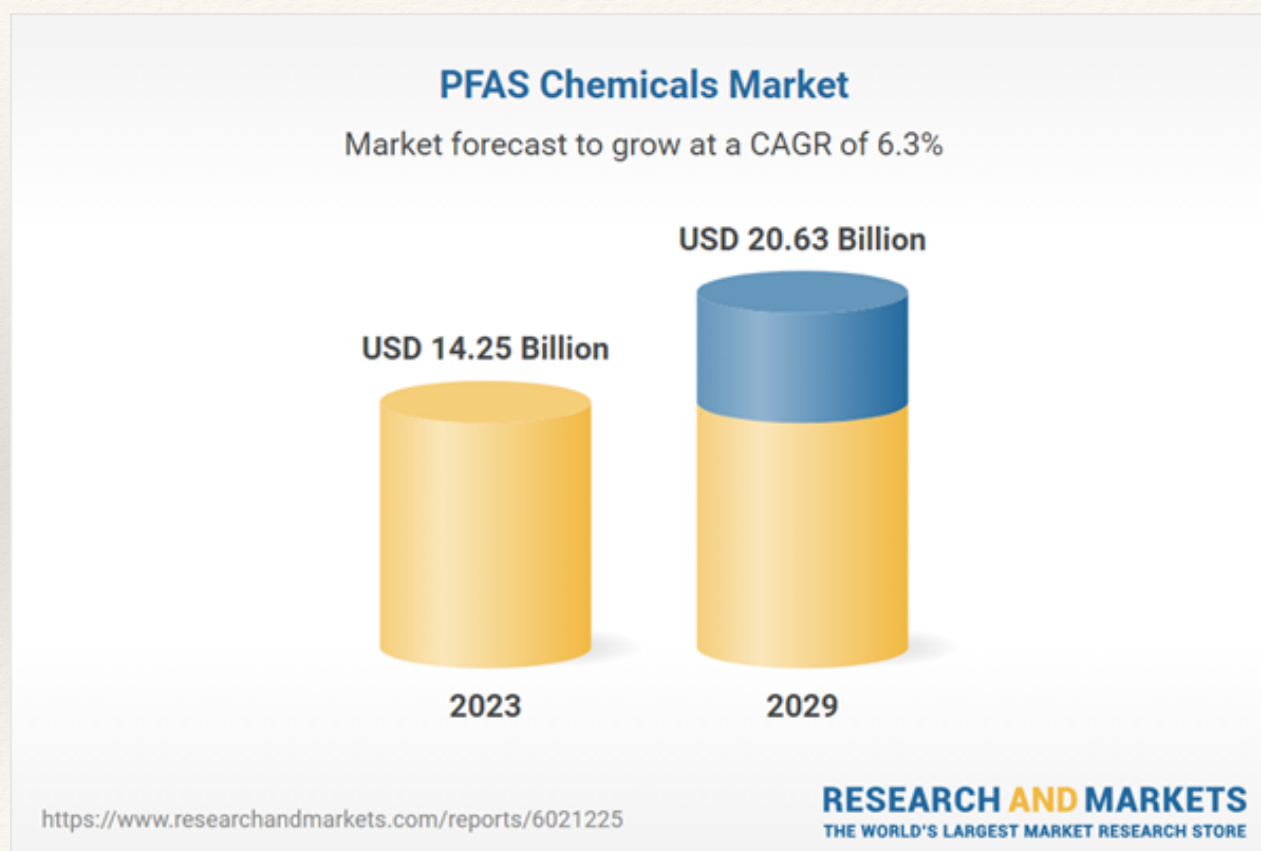
Origins and uses of PFAS



PFAS production and profits



PFAS production and profits



PFAS and pollution

Why are PFAS different from other pollutants:

1

**Do not easily
degrade
(commonly known
as “forever
chemicals”)**

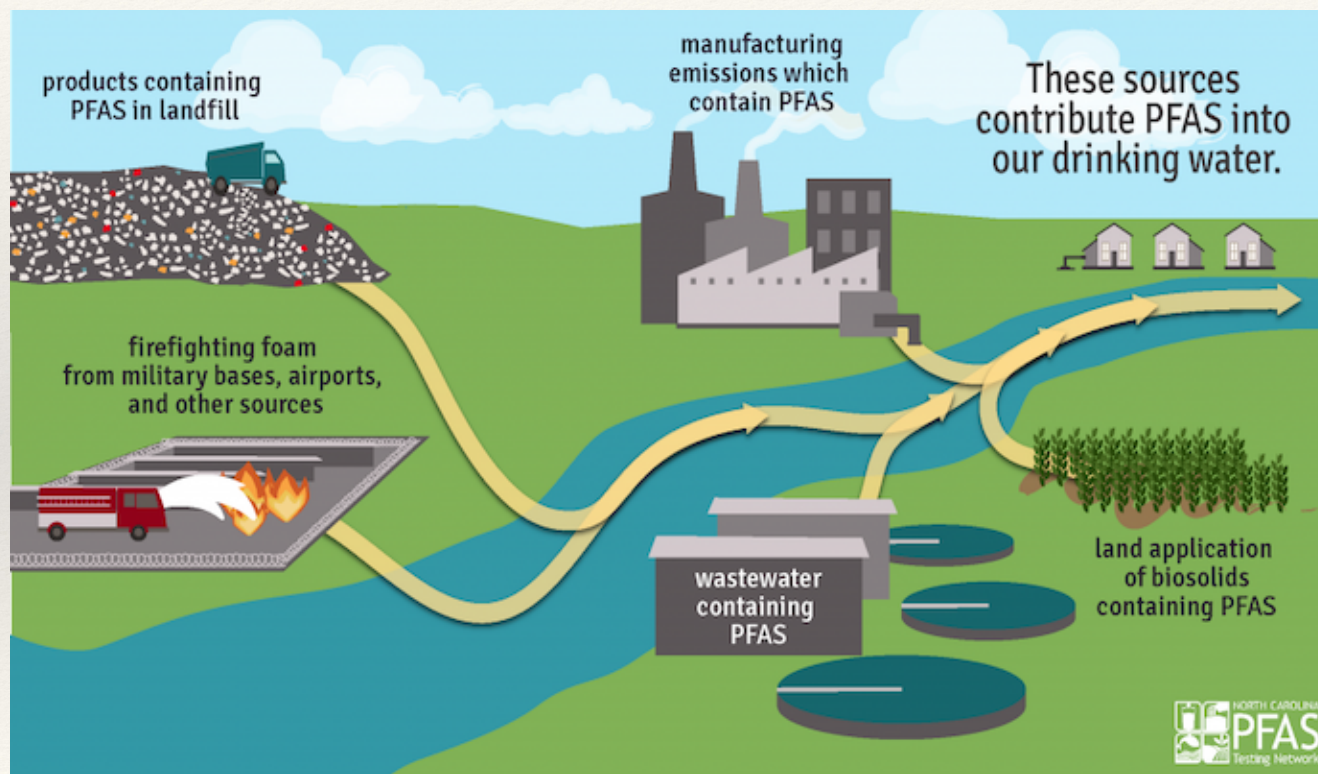
2

**Accumulate over
time**

3

**Dispersion can be
wide**

PFAS: pollution



PFAS: pollution



Drinking Water

An important potential source of PFAS exposure.



Waste Sites

Soil and water at or near landfills, disposal sites, and hazardous waste sites.



Fire Extinguishing Foam

Used in training and emergency response events at airports and firefighting training facilities.



Facilities

Chrome plating, electronics, and certain textile and paper manufacturers that produce or use PFAS.



Consumer Products

Stain- or water-repellent, or non-stick products, paints, sealants, and some personal care products.



Food Packaging

Grease-resistant paper, microwave popcorn bags, pizza boxes, and candy wrappers.



Biosolids

Fertilizer from wastewater treatment plants used on agricultural lands can affect ground and surface water.

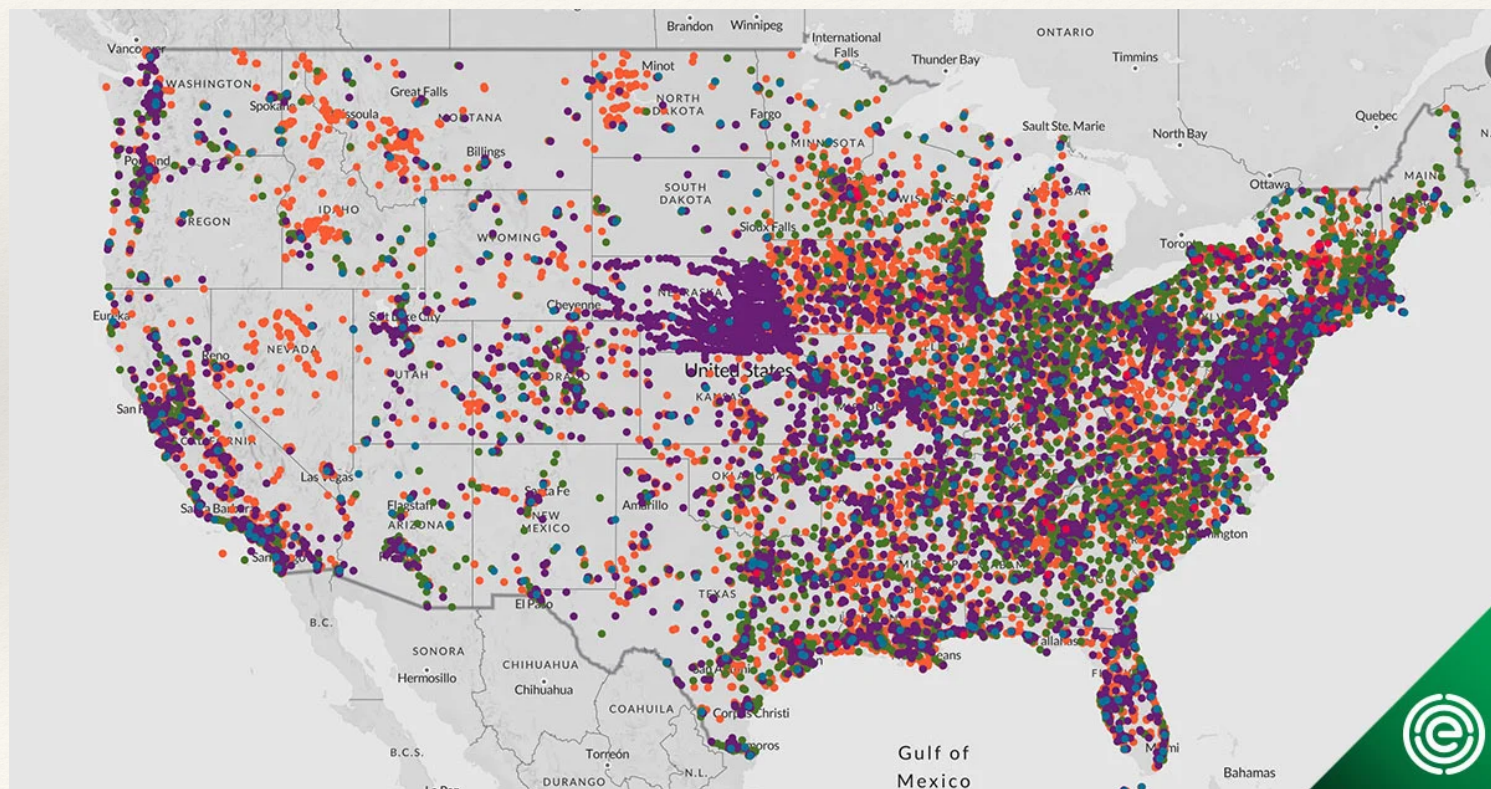


Food

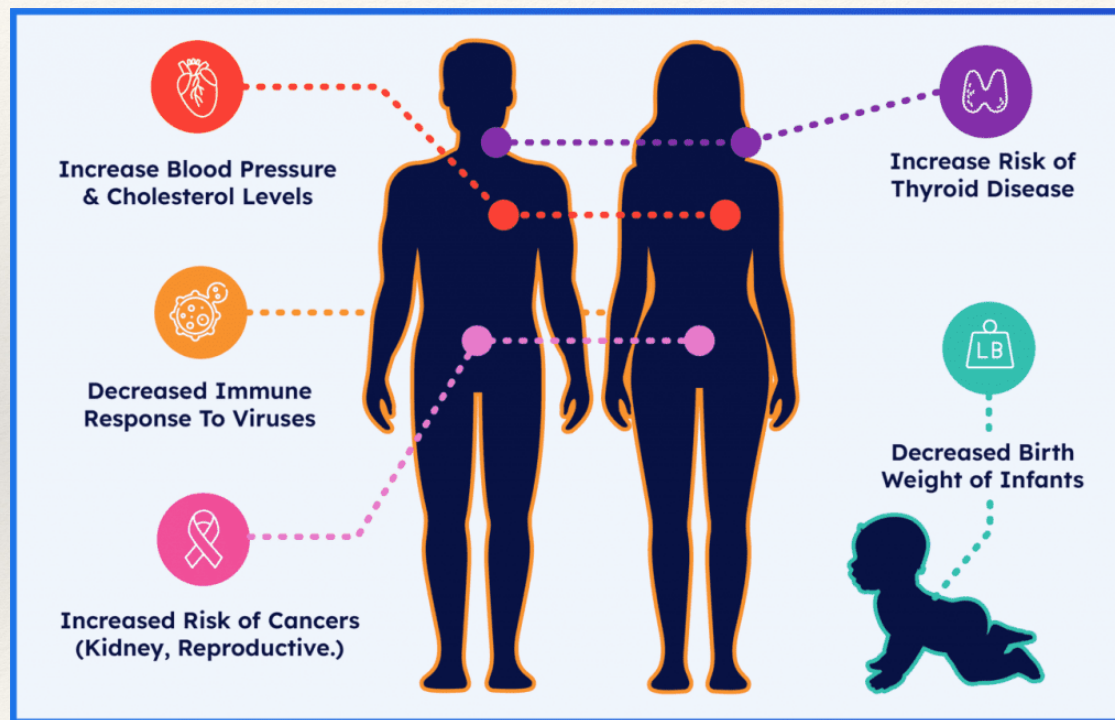
Fish caught from water contaminated by PFAS and dairy products from livestock exposed to PFAS.

PFAS and pollution

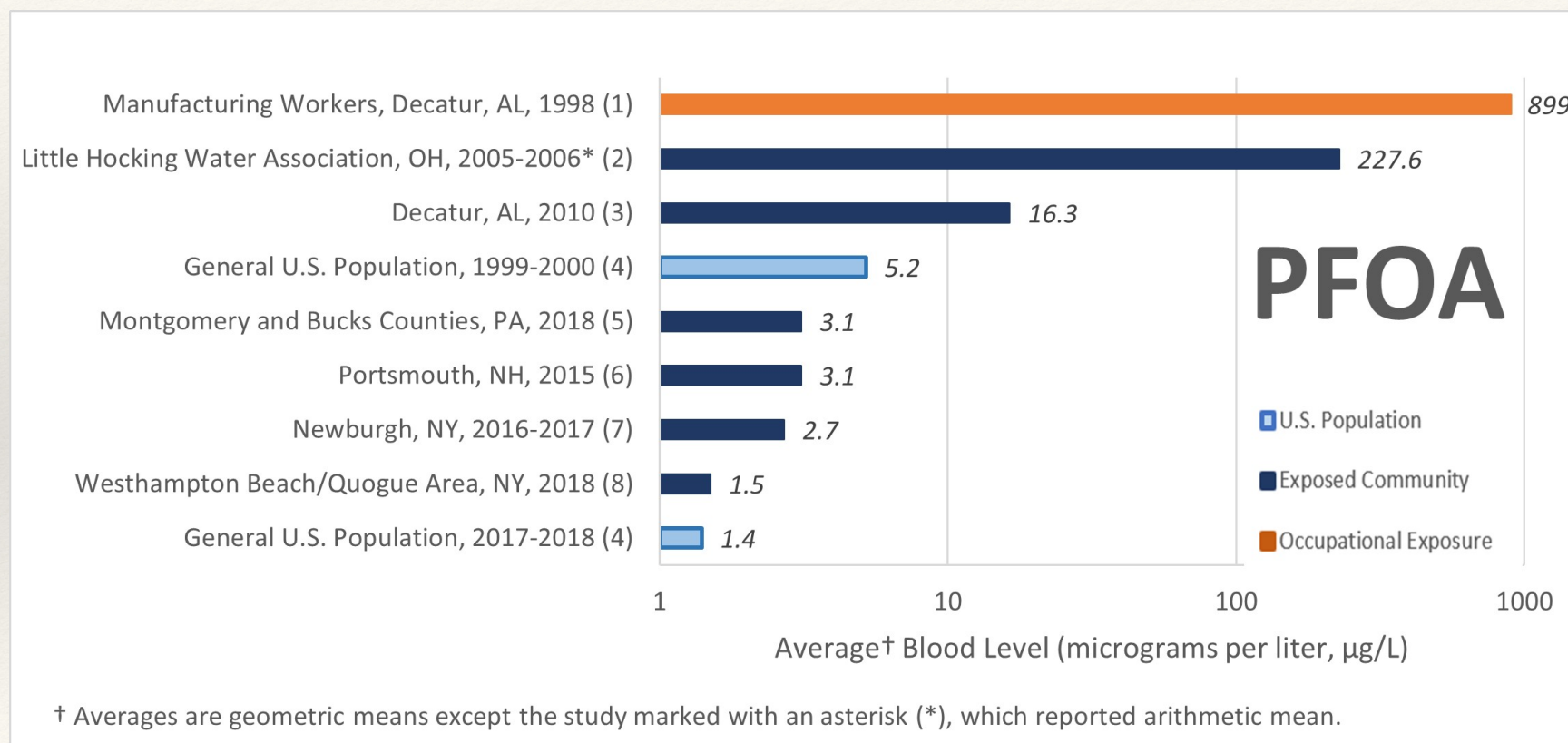
Suspected industrial discharge of PFAS:



PFAS and Health

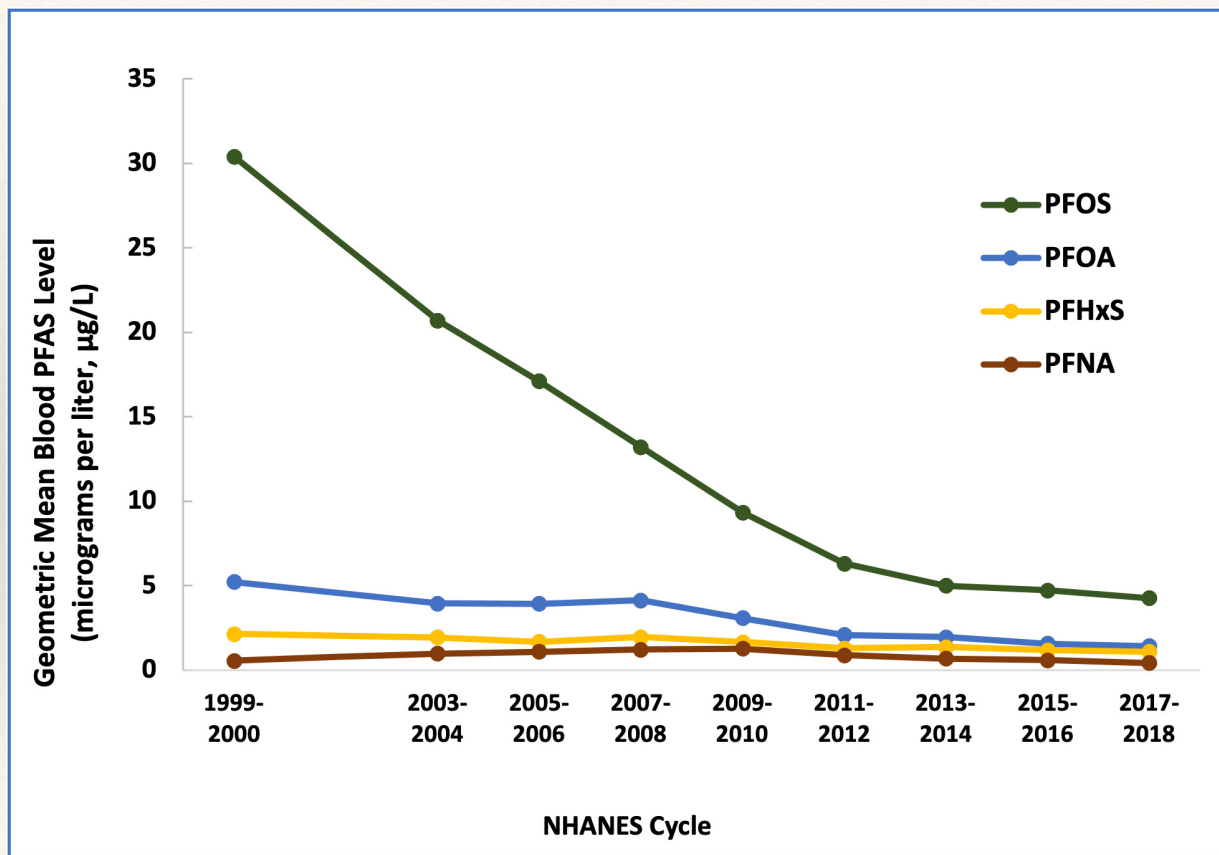


PFAS and Health



Plot from the Center of Disease Control

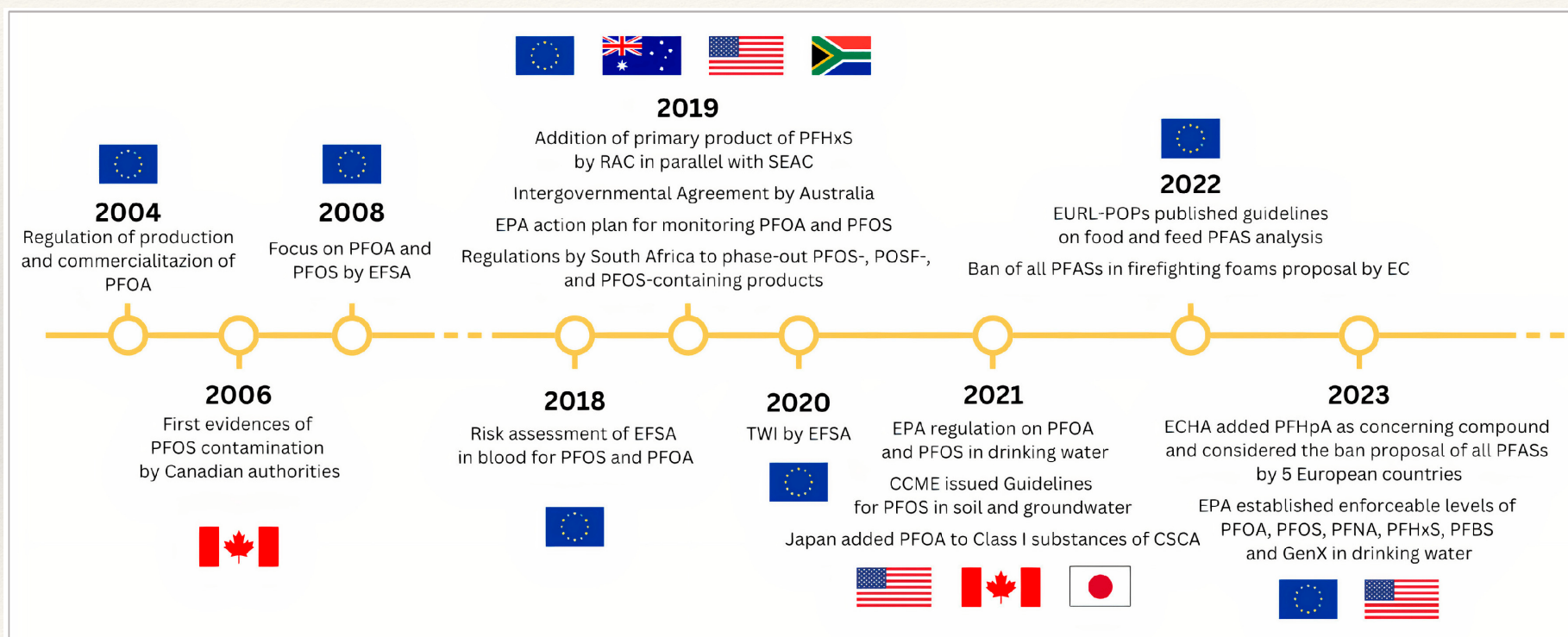
PFAS and Health



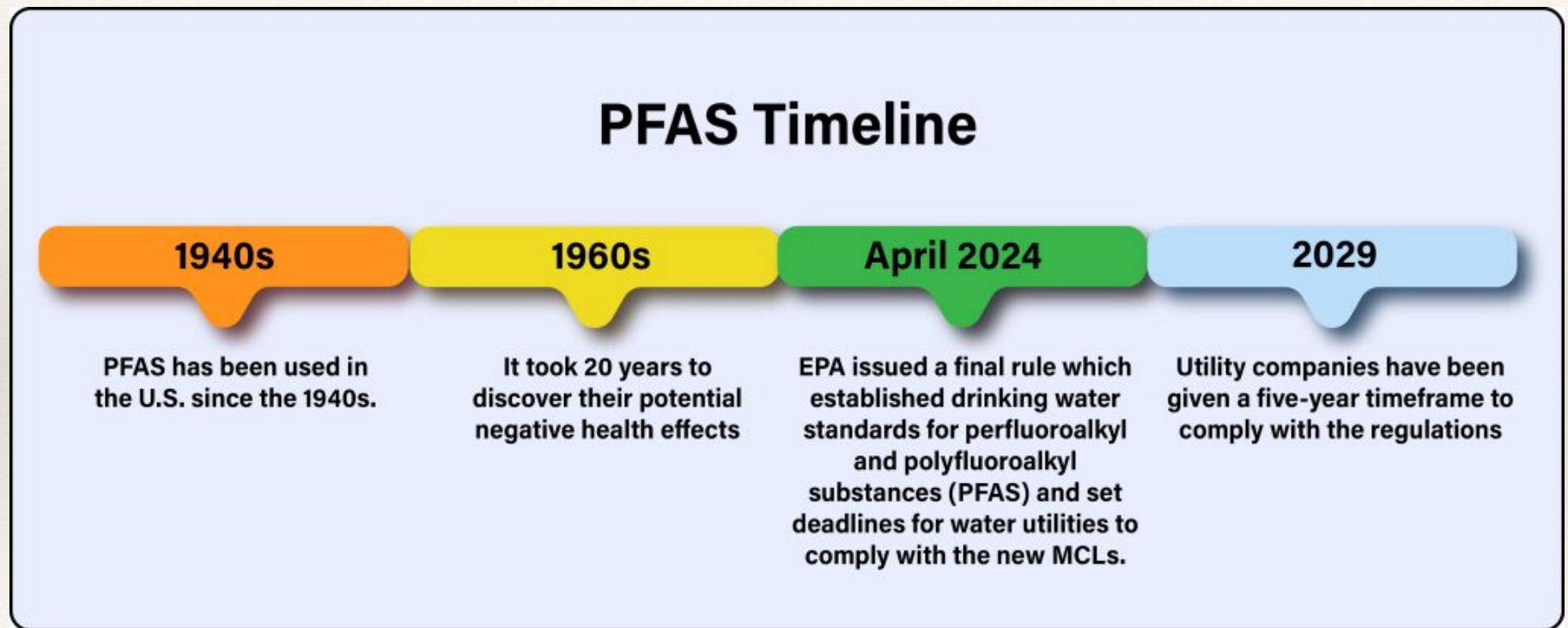
*NHANES: monitoring
cycles from the CDC*

Plot from the Center of Disease Control

PFAS regulations



PFAS timeline

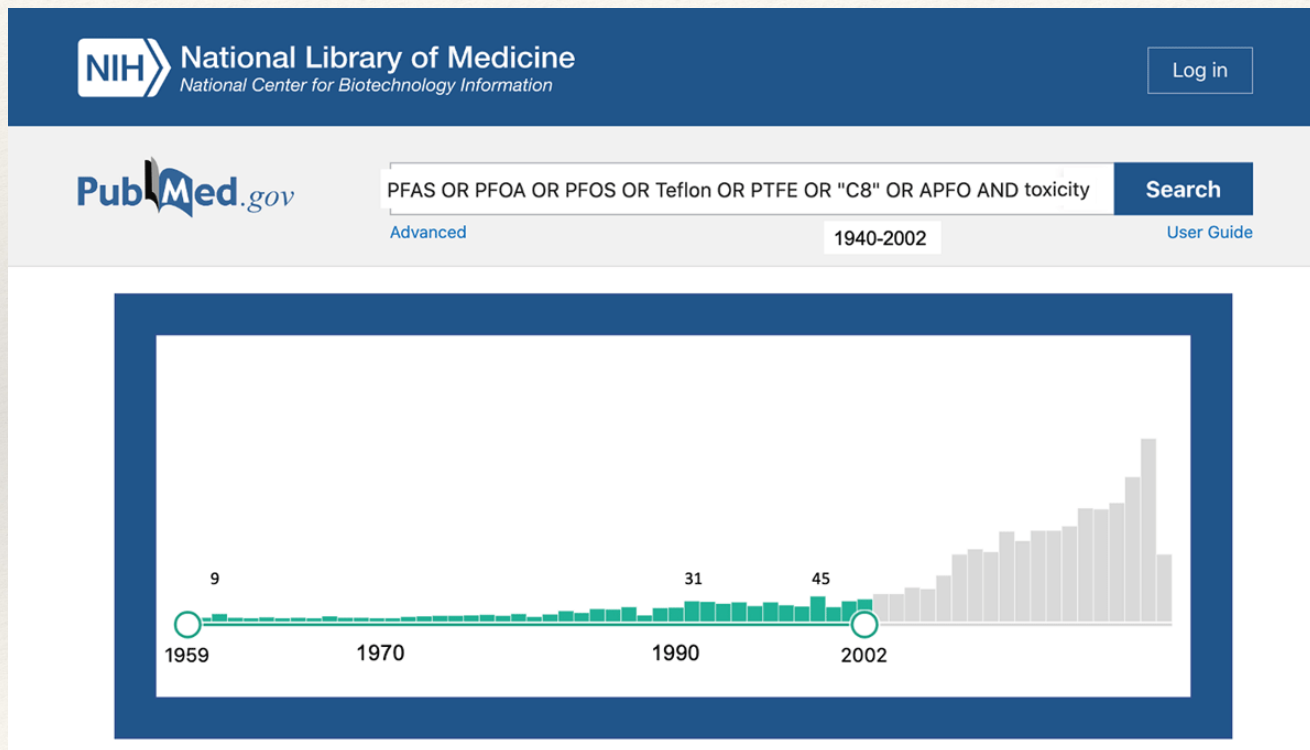


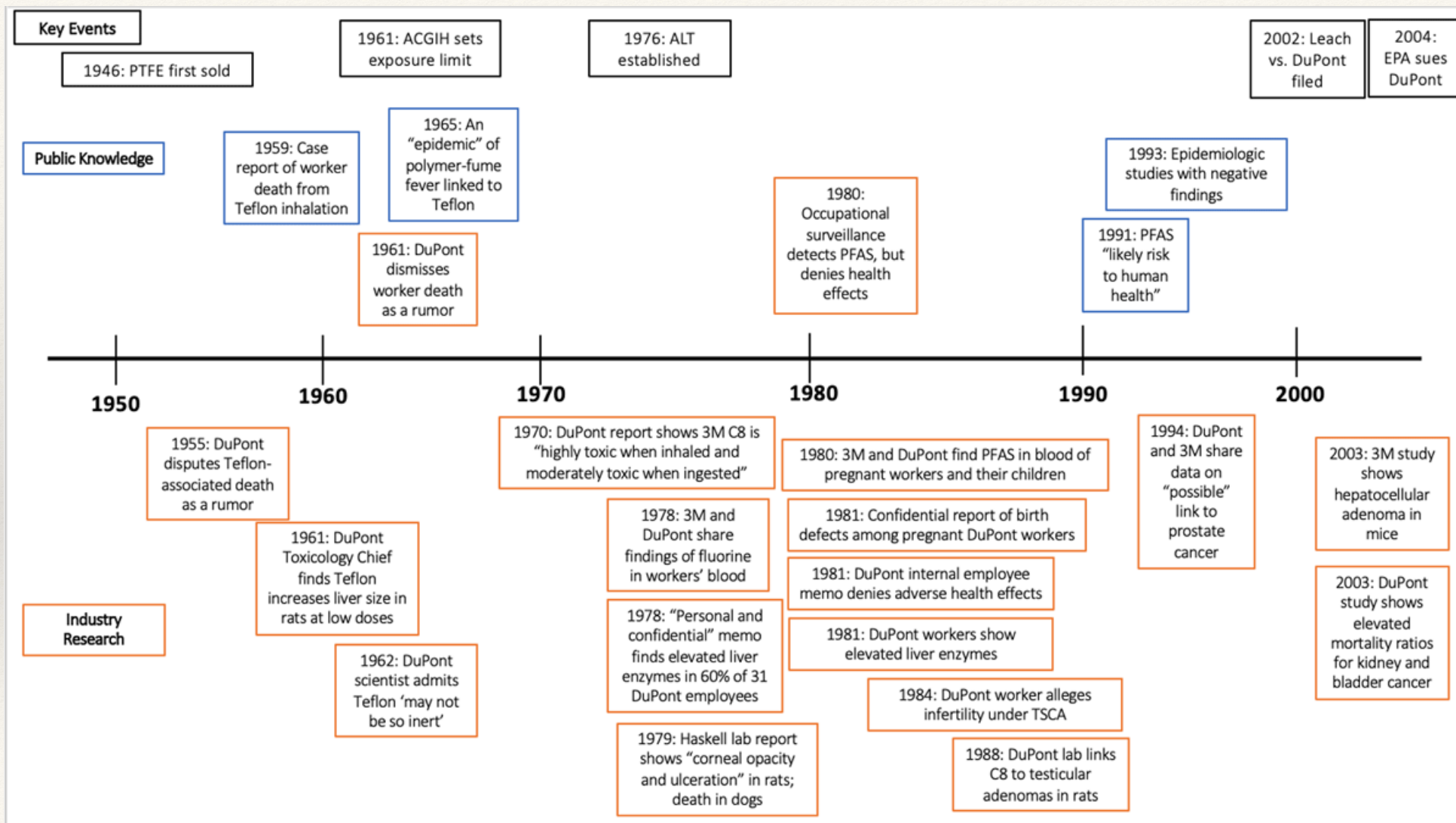
The cost of PFAS



<https://chemsec.org/reports/the-top-12-pfas-producers-in-the-world-and-the-staggering-societal-costs-of-pfas-pollution/>

They knew what they were doing...





They knew what they were doing...

Chemical manufacturers knew that PFAS (per- and polyfluoroalkyl substances) were dangerous to human health for decades, but they hid that information from the public and regulators:

- ❖ *Early research*

As early as the 1950s, 3M studied the toxic effects of PFAS in mice, and Stanford researchers found that fluorinated chemicals could build up in blood.

- ❖ *Industry documents*

A 2023 paper in *Annals of Global Health* analyzed documents from DuPont and 3M, the largest manufacturers of PFAS. The paper found that the industry used tactics to delay public awareness of PFAS toxicity, including:

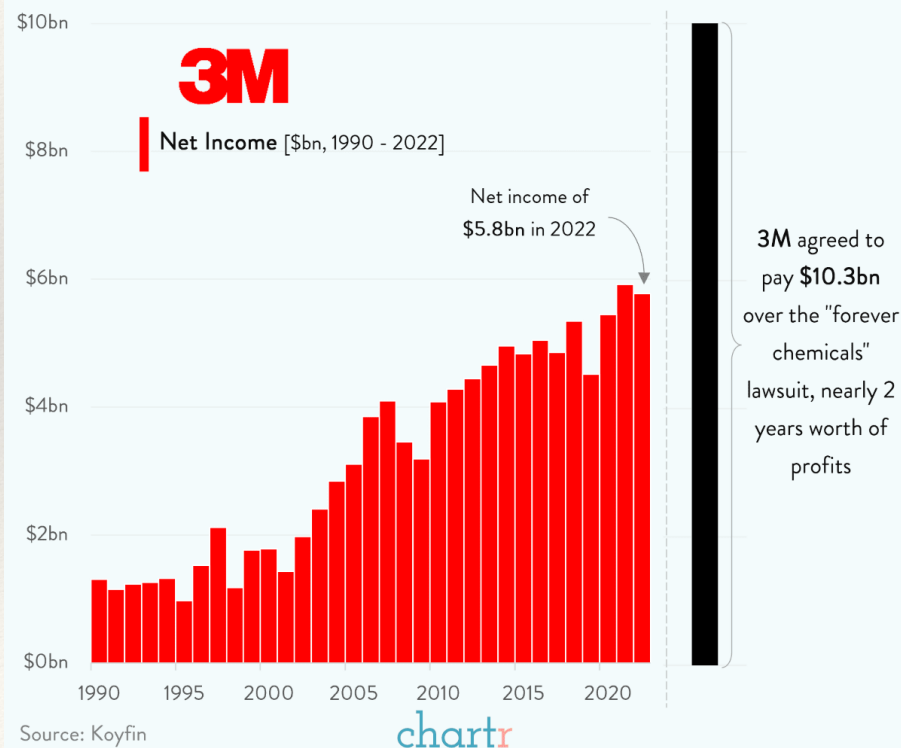
- ❖ Suppressing unfavorable research
- ❖ Distorting public discourse
- ❖ Failing to let employees know the risks

- ❖ *Industry actions*

DuPont knew that PFOA was escaping its plant, contaminating drinking water, and harming animals in its labs. The company paid more than \$1 billion in class-action litigation and faced public outrage over its actions

The cost of PFAS

Industry Giant 3M Is Paying Nearly Two Years Of Profits To Settle Lawsuit



The corporation

*In a corporation, the board of directors has a fiduciary duty to the shareholders, requiring the board to make decisions **in the best interest of shareholders**.*

❖ **Definition**

A **fiduciary duty** is a legal obligation to act in the best interests of another party. In the context of a company, this means that directors and officers have a legal responsibility to act in the interests of the company's shareholders.

❖ **Purpose**

Fiduciary duties are a key part of corporate governance and investment law. They help to maintain ethical standards, protect shareholders' rights, and ensure fair business practices.

The corporation

I asked CLAUDE if fiduciary duties to shareholders are associated with profit:

Key points about fiduciary duties to shareholders:

❖ **Focus on conduct, not results:**

Fiduciary duties primarily require directors to act in good faith, with due diligence, and avoid conflicts of interest, *not necessarily guaranteeing a specific level of profit.*

❖ **Duty of care and loyalty:**

Directors must exercise reasonable care when making decisions and prioritize the company's interests over their own personal gain.

❖ **Not a guarantee of profit:**

While maximizing shareholder value is generally the goal, a board can make decisions that may not lead to *immediate high profits* if they believe it is in the long-term best interest of the company.