PFAS

The forever chemicals

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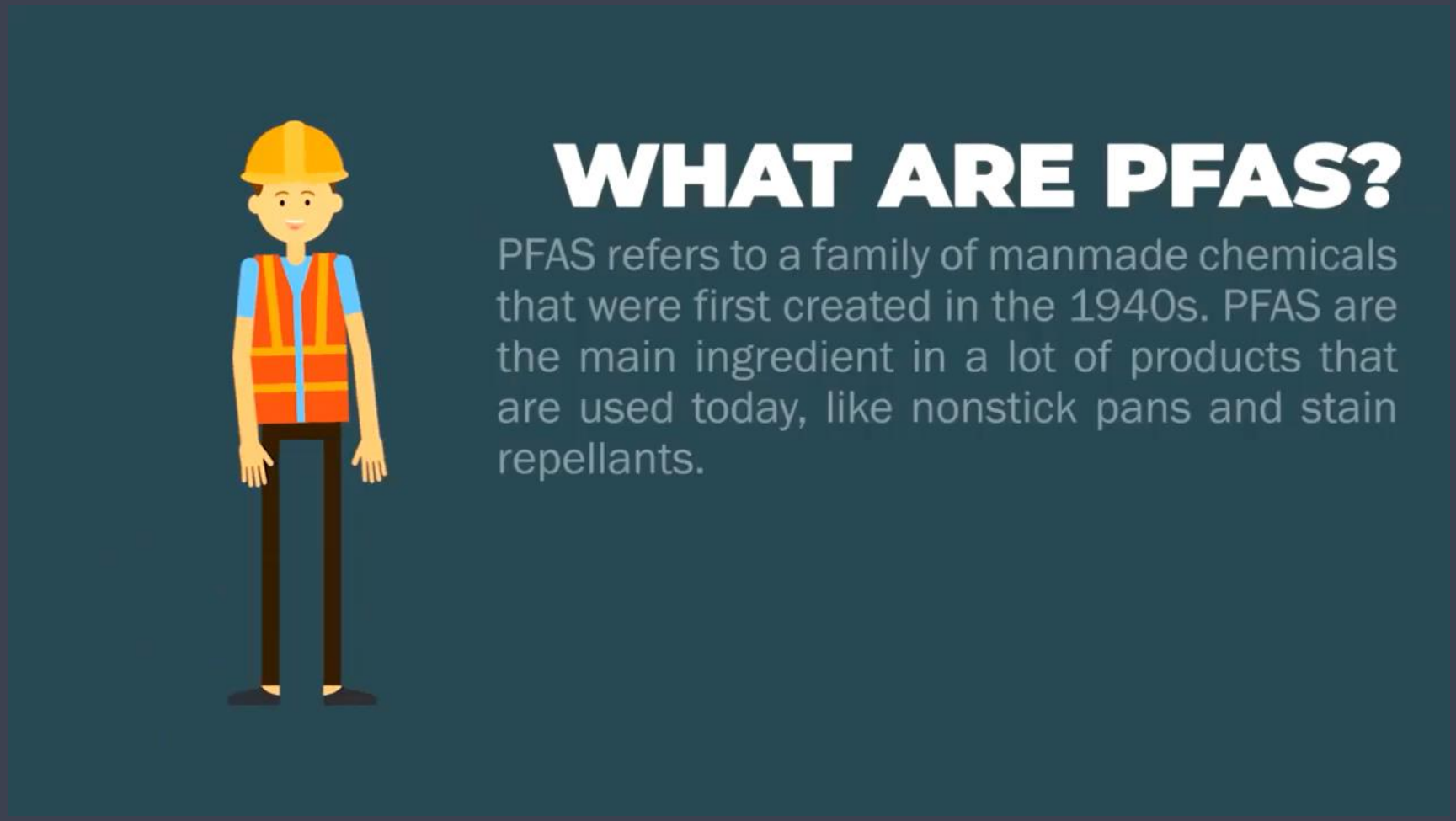
The #1 emerging risk?

According to the CDC*, over 98% of the US population has PFAS in their blood!

*Centers for Disease Control and Prevention

What are PFSA?



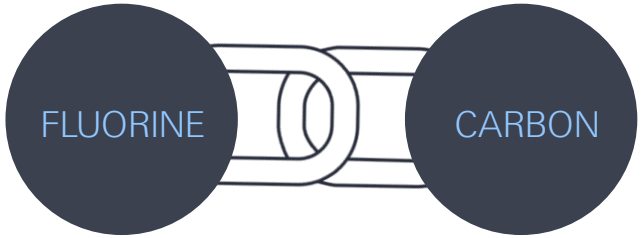
EGLE Classroom - Introduction to PFAS (youtube.com)

Fluorine + Carbon = PFAS

(Per- and polyfluoroalkyl substances)

- PFAS is an umbrella term to indicate a family of man-made organic compounds characterized by the presence of fluorine and carbon atoms with a strong bond. PFAS group includes thousands of compounds with very different chemical and physical properties

- Long chain vs. Short chain
- Perfluoroalkyl vs. Polyfluoroalkyl
- Focus on *Non-polymers* compounds



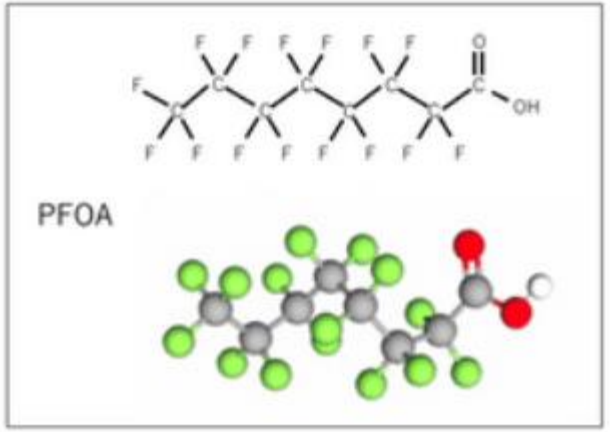
= Carbon

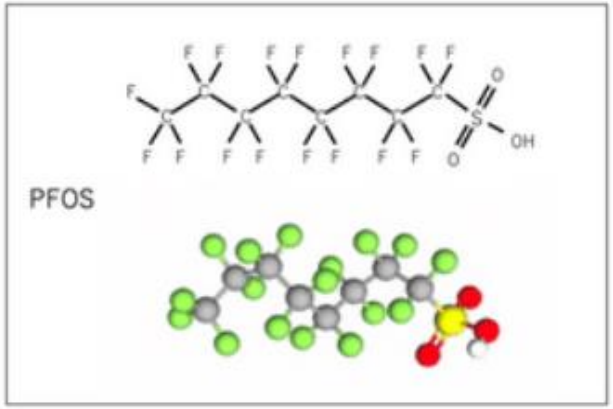
= Fluorine

= Oxygen

= Hydrogen

= Sulphur





How to define the PFAS family?

Buck et Al. – 2011

PFAS are defined as "the highly fluorinated aliphatic substances that contain 1 or more C atoms on which all the H substituents (present in the non fluorinated analogues from which they are notionally derived) have been replaced by F atoms, in such a manner that they contain the perfluoroalkyl moiety CnF2n+1–"

OECD – December 2021

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 (–CF3) or a perfluorinated methylene group (–CF2–) is a PFAS.

EPA – Beg. 2023

PFAS or per- and poly-fluoroalkyl substance means a chemical substance that contains at least one of these 3 structures:

a. R–(CF2)–CF(R')R", where both the CF2 and CF moieties are saturated carbons;

b. R–CF2OCF2–R', where R and R' can either be F, O, or saturated carbons; or

c. CF3C(CF3)R'R", where R' and R" can either be F or saturated carbons.

Quiz 1

PFAS are added to a wide range of products. What is a common function?

2. To impart non-stick properties

PFAS make products non-stick: grease proof, waterproof and stain resistant

Where are PFAS used?

- **Stain resistant and water proofing treatments** on carpets, textiles, furniture…
- **Food contact surfaces** such as cookware, pizza boxes, fast food wrappers, popcorn bags, etc.
- **Additives** in polishes, waxes, paints and cleaning products
- **Protective coatings and sealants**, additives to hydraulic fluids and lubricants
- **Medical** and **personal care products**
- **Pesticides, Refrigerant gases**
- **Aqueous Film Forming Foams** ("AFFF")

EPA Announces Lower Health Advisory Levels for Drinking Water for PFOA, GenX, PFAS, and other Forever Chemicals (knowyourh2o.com)

Why everywhere and forever?

PFAS are:

- Persistent, remain intact for exceptionally long periods of time (many years)
- Mobile, becoming widely distributed throughout the environment as a result of natural processes involving soil, water and air;
- Bio-accumulative, in the fatty tissue of living organisms including humans, entering the food chain
- Toxic, to both humans and wildlife

Everywhere
&
Forever

PFAS Cycle

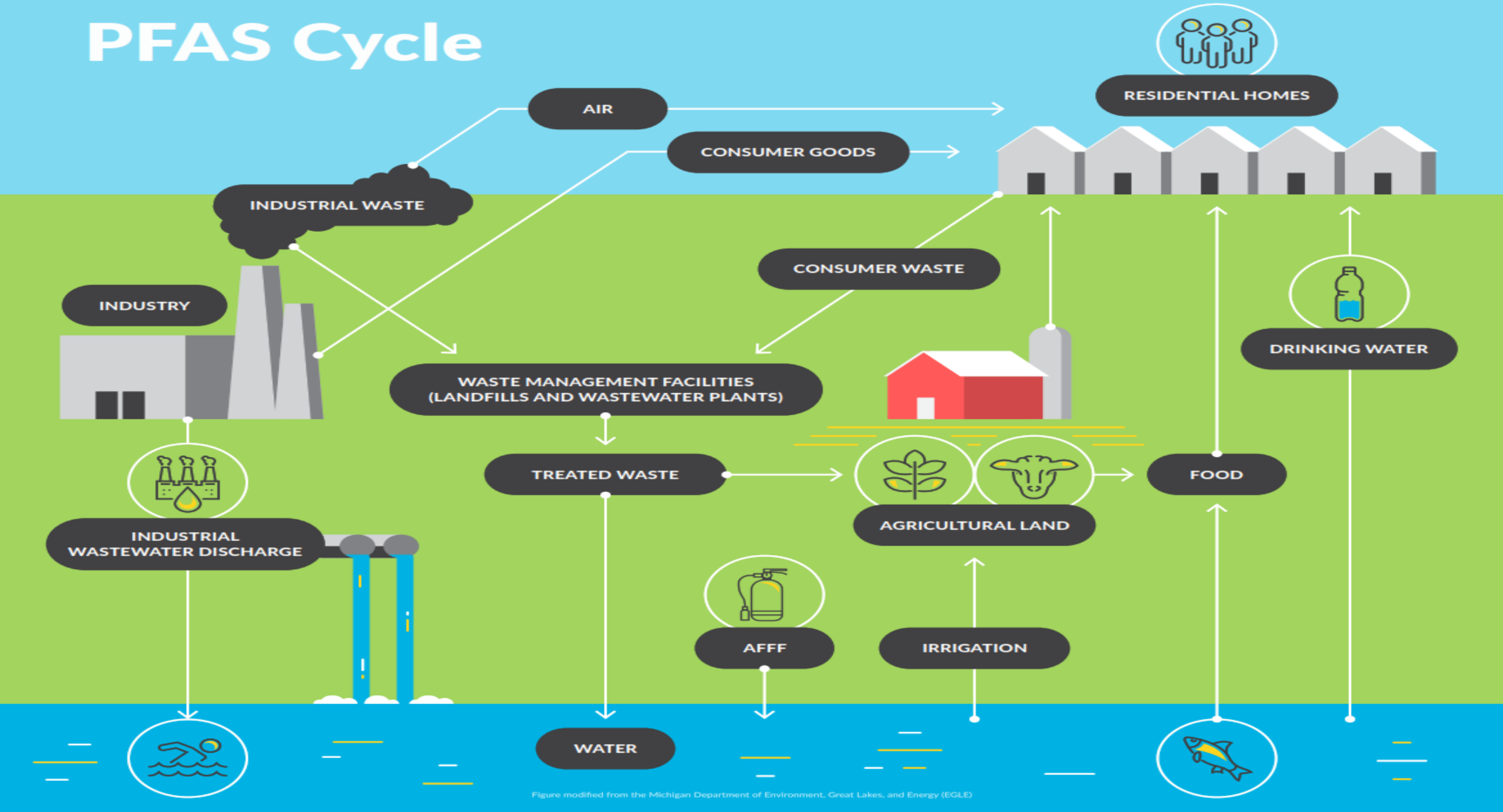
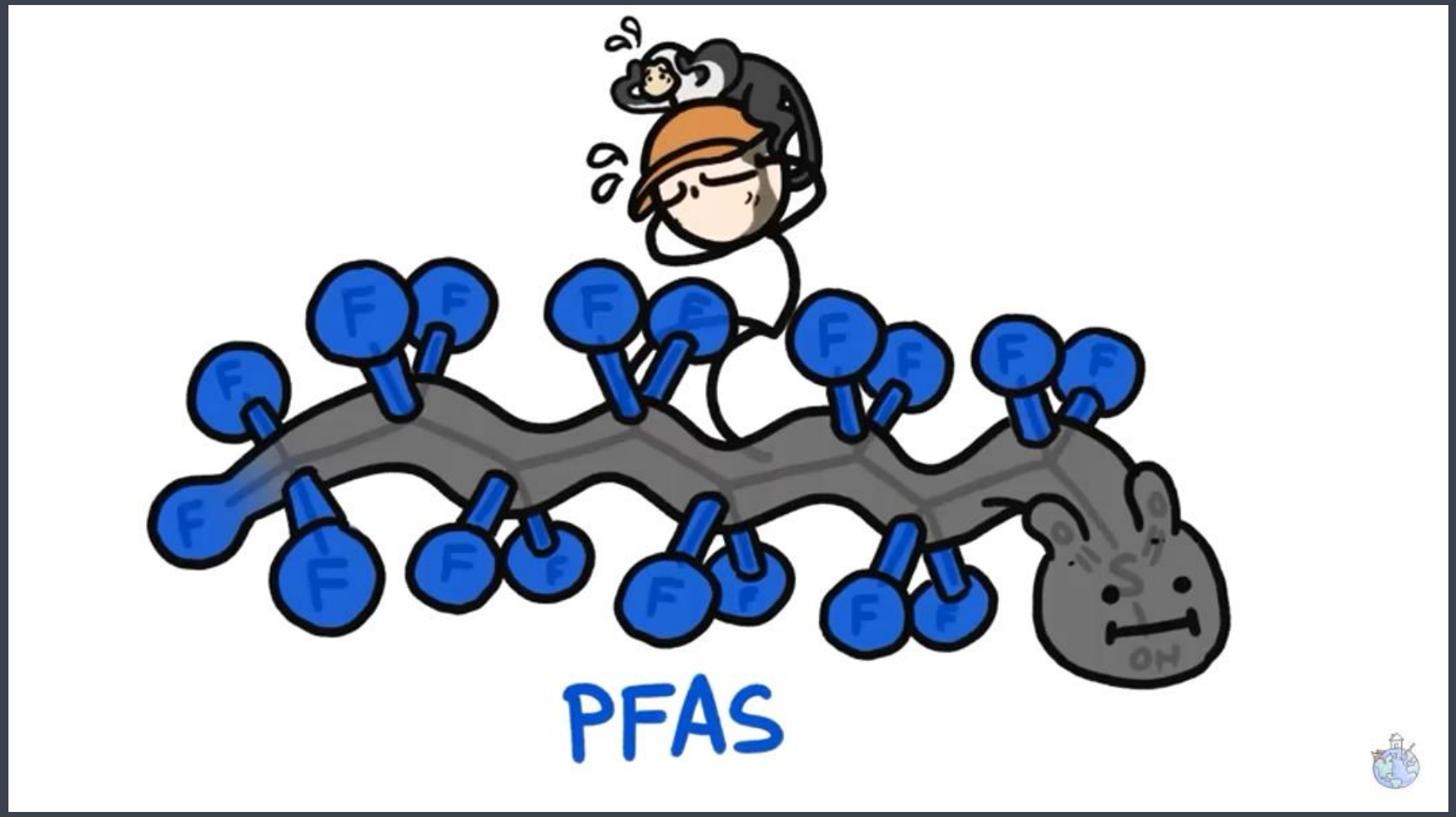


Figure modified from the Michigan Department of Environment, Great Lakes, and Energy (EGLE)

This chemical does nothing, but it’s still bad for you



This Chemical Does Nothing, But It's Still Bad For You (youtube.com)

Litigation Landscape in US

Water contamination by industrial sites

- Remediation and clen-up costs
- Focus on PFAS manufacturers and large users
- Multibillion settlements
- 3M and Dupont

Water contamination by AFFF

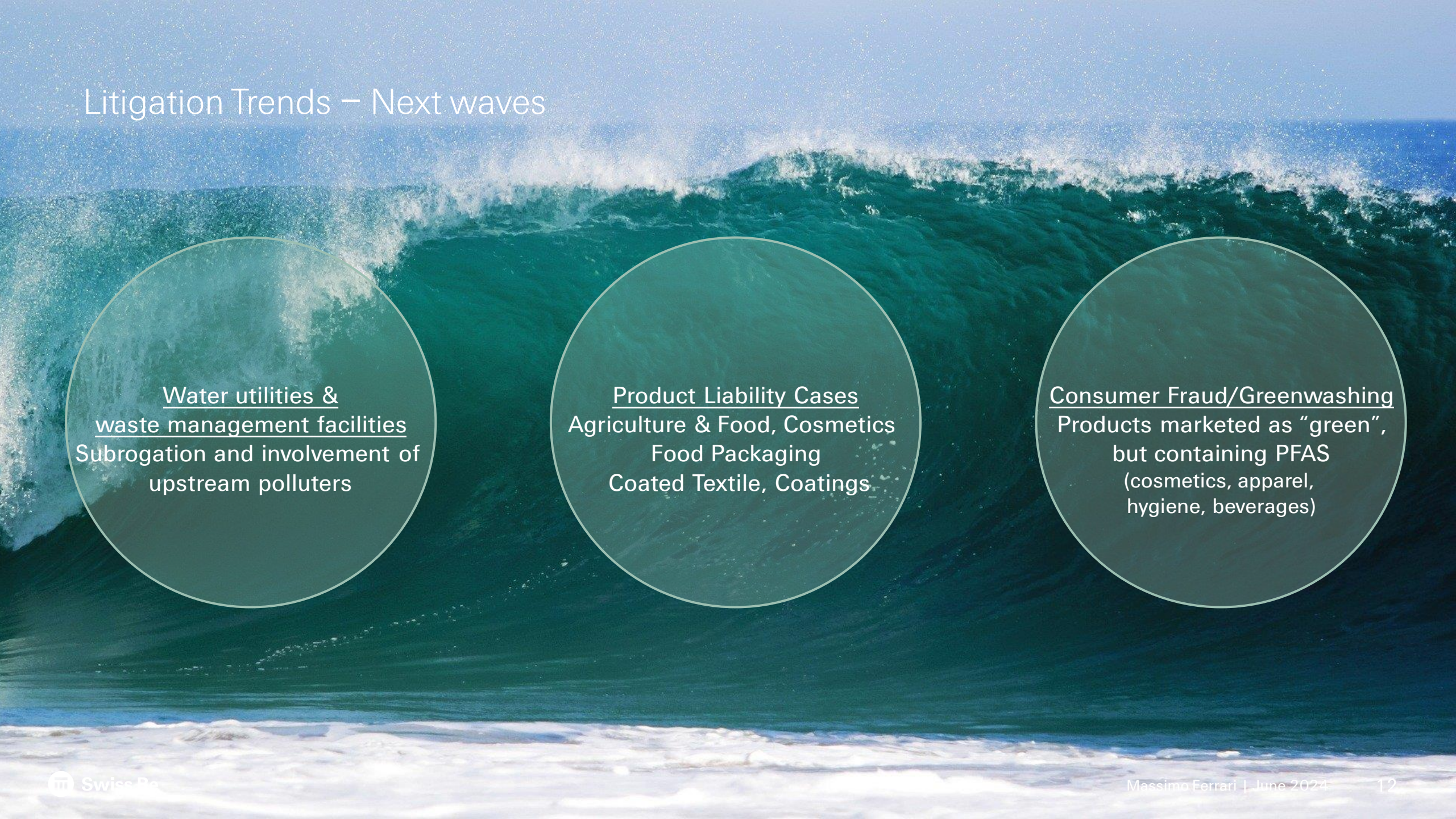
- Product liability
- Historical large uses of AFFF (airports, military bases, FF camps)
- S&A: large fires from hydrocarbons (tank farms, refineries, ...)

Recent developments

- +350% class actions (excluding AFFF)
- Land contamination, property devaluation, nuisance, emotional distress
- Rise of medical monitoring claims brought by citizens

The regulatory landscape will have huge impact on the number of future litigations

Litigation Trends – Next waves



Water utilities & waste management facilities
Subrogation and involvement of upstream polluters

Product Liability Cases
Agriculture & Food, Cosmetics
Food Packaging
Coated Textile, Coatings

Consumer Fraud/Greenwashing
Products marketed as "green", but containing PFAS
(cosmetics, apparel, hygiene, beverages)

What does the situation look like in Europe?

Water contamination

- PFAS **water pollution** detected across Europe.
- **Contaminated drinking water** around factories in Belgium, Italy and the Netherlands, and around airports and military bases in Germany, Sweden and the UK.
- The Forever Pollution Project

Regulation

- Proposal to ban PFAS in AFFF firefighting foams
- **REACH**: various PFAS classified as "**SVHC**"
- Feb 2023: ECHA published proposal for **full ban** of production and import of the family of **PFAS** with time-limited derogations for specific uses.

Litigation

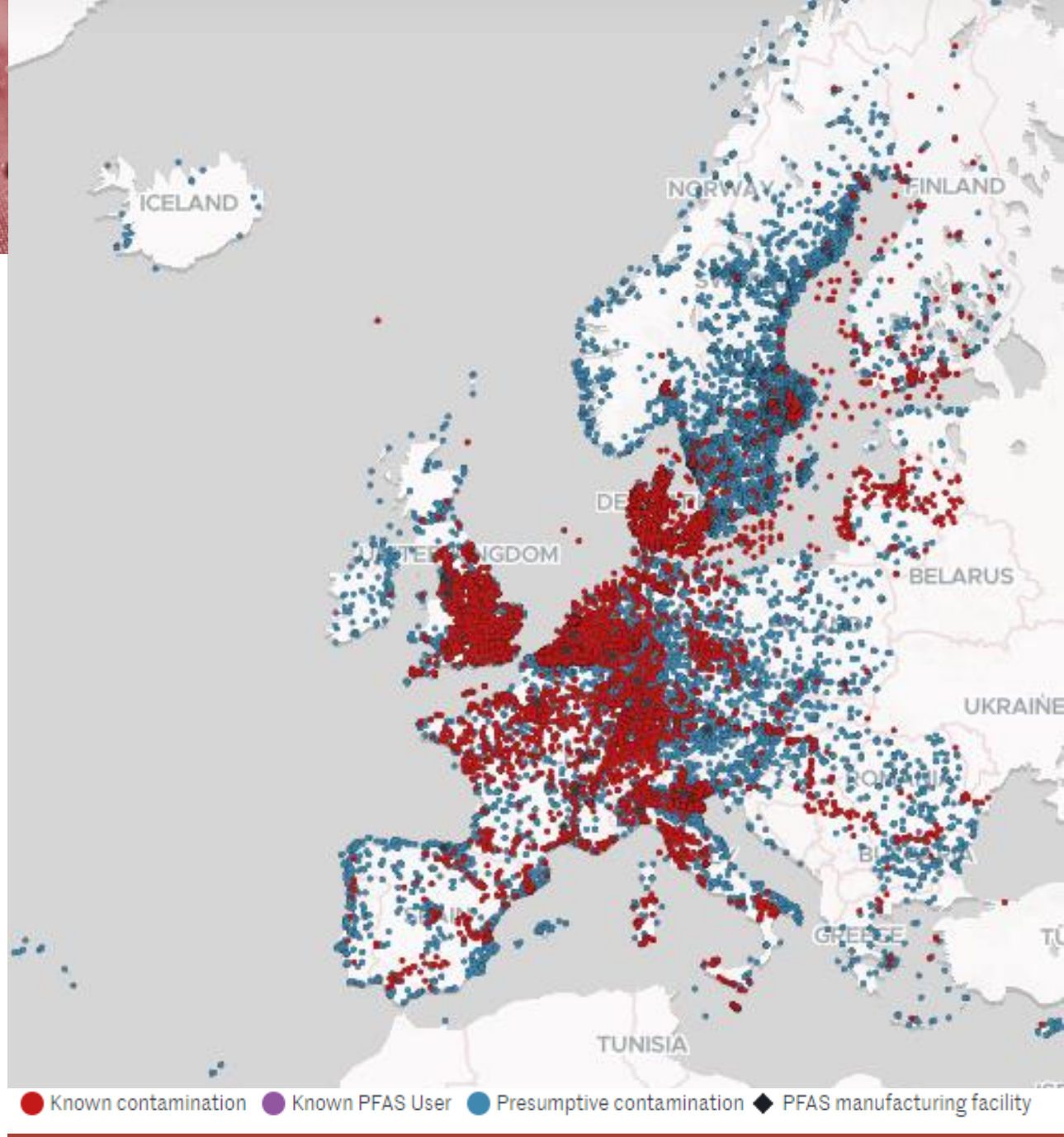
- **Limited litigation** so far
- $581m **settlement** between **3M** and the **Flemish Government** in Belgium in July 2022
- **EU Representative (Class) Actions Directive** could increase the appetite for group actions
- **Swedish supreme court judgement**

The Forever Pollution Project

Journalists tracking PFAS across Europe

What the “Map of Forever Pollution” shows

- **20 PFAS producers**: chemical plants synthesizing these substances
- **232 industrial sites use PFAS** to manufacture "high-performance" plastics, paints and varnishes, pesticides, waterproof textiles, other chemicals, etc.
- **Over 23,000 sites** where **PFAS contamination** has been detected: PFAS at levels equal to or greater than 10 nanograms per liter (ng/L). Each site sampled for water, soil or living organism between 2003 and 2023
- Over **21,500 presumptive contamination** sites. While contamination of these sites is likely (due to their present or past activities), no environmental sampling has been conducted to confirm this

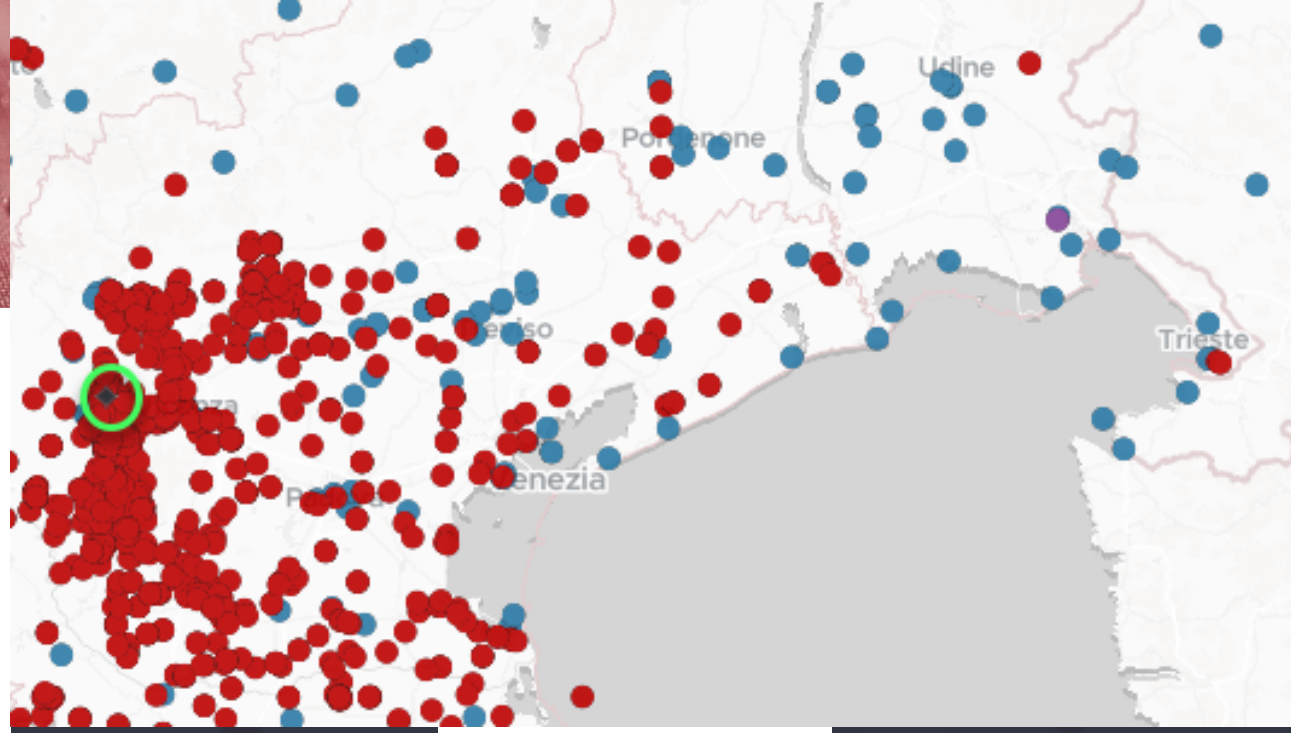


Source: 'Forever pollution': Explore the map of Europe's PFAS contamination (lemonde.fr)

The Forever Pollution Project

Journalists tracking PFAS across Europe

- **Over 2,300 hotspots**: the term "hotspot" is used when the concentration of PFAS detected at a site reaches a level that experts consider hazardous for health (100 ng/L). The problem is that dozens, sometimes hundreds of samples are taken by the authorities around a location identified as the "epicenter" of contamination – but this does not make each of these points a hotspot in itself.



KNOWN CONTAMINATION SITE

Trissino, Italy

Site name: Miteni

Site type: PFAS manufacturing facility (legacy)

Sample: Unknown

KNOWN CONTAMINATION SITE | HOTSPOT

TRISSINO, Italy

Sample: Groundwater (2021)

PFAS level:	**42,009 ng/L**
PFOS + PFOA:	24,229 ng/L
PFNA:	20 ng/L
PFBS:	1,770 ng/L
PFHxA:	4,310 ng/L
PFHxS:	177 ng/L
Others:	11,503 ng/L

KNOWN CONTAMINATION SITE | HOTSPOT

Italy

Site name: Scarico della Miteni

Sample: Surface water (2011)

PFAS level:	**7,132,440 ng/L**
PFOS + PFOA:	732,000 ng/L
PFNA:	1,080 ng/L
PFBS:	4,834,000 ng/L
PFHxA:	811,000 ng/L
Others:	754,360 ng/L

Source: 'Forever pollution': Explore the map of Europe's PFAS contamination (lemonde.fr)

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Swedish Supreme Court Judgement in respect of PFAS (05.12.2023)

- Defendant: Miljöteknik, owned by the municipality of Ronneby, supplies drinking water (including from the Brantafors waterworks)
- 2013: Brantafors waterworks contained very high levels of PFAS, from fire training area at Blekinge Air Force Base (from the ‘80s)
- PFAS in the blood of the plaintiffs: 600ng/ml as avg. Peak at 1’800ng/ml. Avg. Sweden 10ng/ml.
- The plaintiffs claimed that they had suffered personal injury because the water supplied to them by Miljöteknik had a safety defect in that it was contaminated with PFAS
- Court of Appeal dismissed the action, since none of the plaintiffs had suffered personal injury.

1/2

Swedish Supreme Court Judgement in respect of PFAS (05.12.2023)

- Supreme Court has granted leave to appeal on the basis of the Court of Appeal
- The investigation must be considered to provide sufficient support for the conclusion that the contaminated drinking water has had a significant negative impact on the plaintiffs' bodies
- The increased risk of adverse health effects in the future certainly does not in itself constitute personal injury
- **However, the significant physical deterioration manifested in the high levels of PFAS in the blood of each of the plaintiffs (compared to persons not exposed to PFAS) must be regarded as constituting a physical defect that is a personal injury for the purposes of tort law**

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PDF Document

Insurance considerations: complex problem, in continuous development

Legacy policies: pollution vs. product liability

Trigger: claims made vs. occurrence

Developing science and regulations

No signature disease, but linked to certain health problems

Broad PFAS exclusions and dialog with insureds

Any questions?

Swiss Re

Thank you!

Contact us

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Speaker Biography

- **Massimo Ferrari**
  Senior Casualty Risk Engineer

Massimo Ferrari *is a Senior Casualty Risk Engineer at Swiss Re since 2015. In his role he supports underwriting decision-making and portfolio steering in industries such as mining, metal, oil and gas, chemical, as well as environmental pollution.*
Between 2003 and 2015, Massimo Ferrari held different business development and technical management roles in Italian and Swiss companies operating in chemical and metallurgical fields.
Massimo Ferrari holds a Master Degree in Chemical Engineering, an executive master in Project Management and completed an MBA degree in 2014.
In his freetime he loves to run for long distances

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