

# **the Forever Pollution Project**

**13 countries | 23 February 2023**



Le Monde

Süddeutsche Zeitung | NDR® WDR®

France

Germany

RADAR le Scienze

Italy

THE INVESTIGATIVE DESK nrc>

The Netherlands

Knack

Deník Referendum

DR

POLITIKEN

yle

Belgium

Czechia

Denmark

Finland

REPORTERS UNITED



Latvian  
Radio

DATADISTA

Greece

Latvia

Spain

SRF

WATERSHED

The  
Guardian

Switzerland

United Kingdom

Work grants



Map design

Le Monde

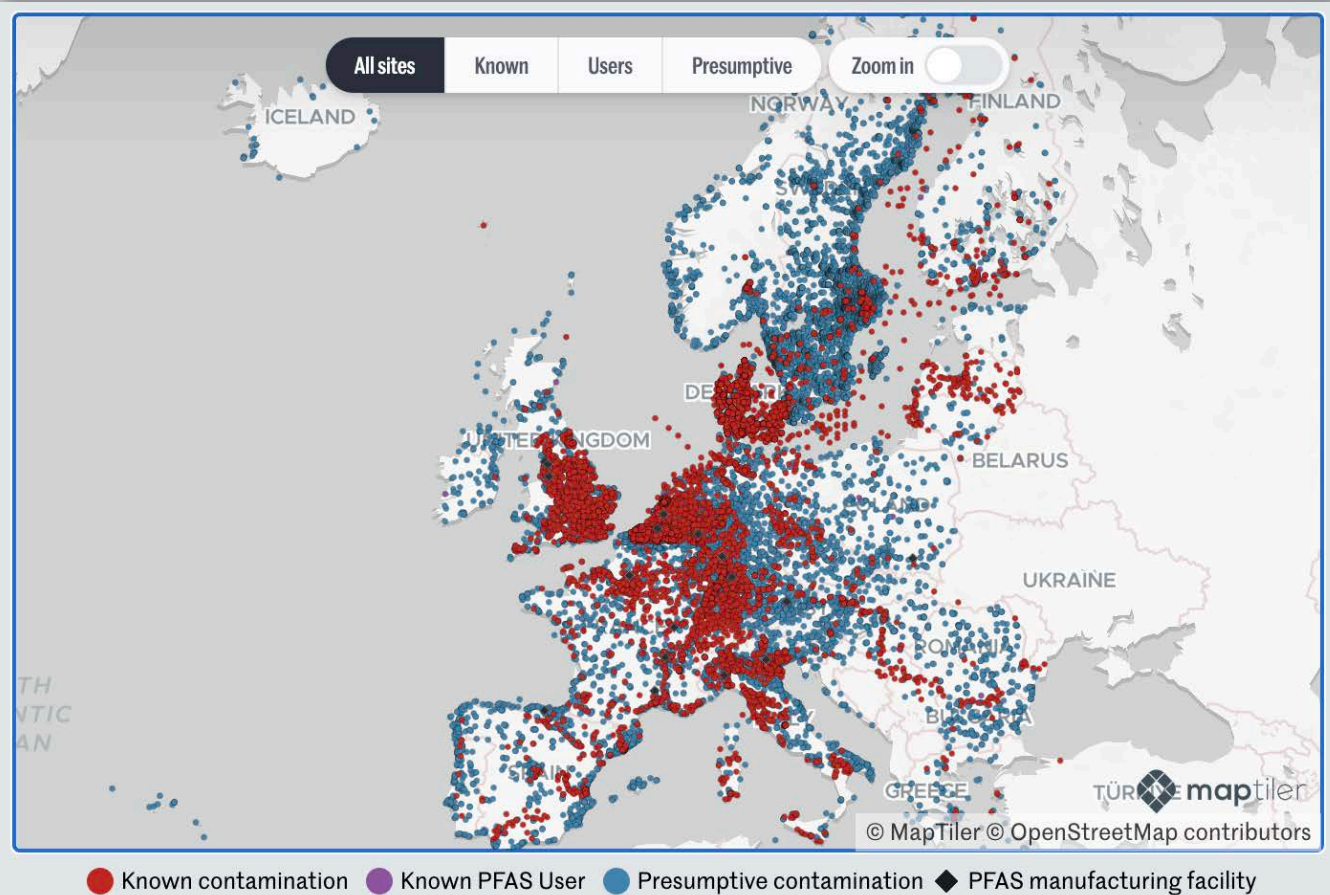
Coordination



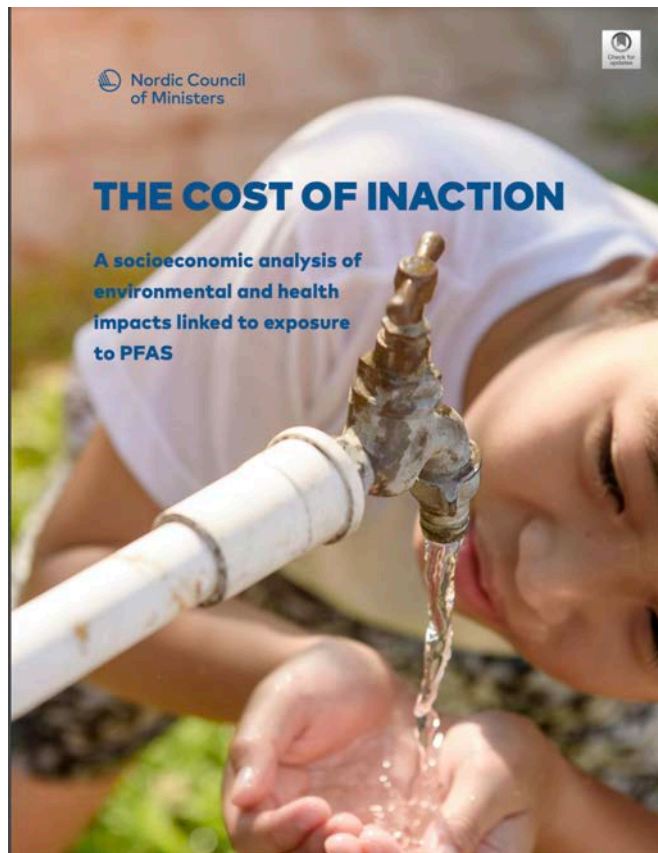
Mapping partner



# The Map of Forever Pollution in Europe



# How it started



**Table 10: List of manufacturers of fluorochemicals and/or fluoropolymers**

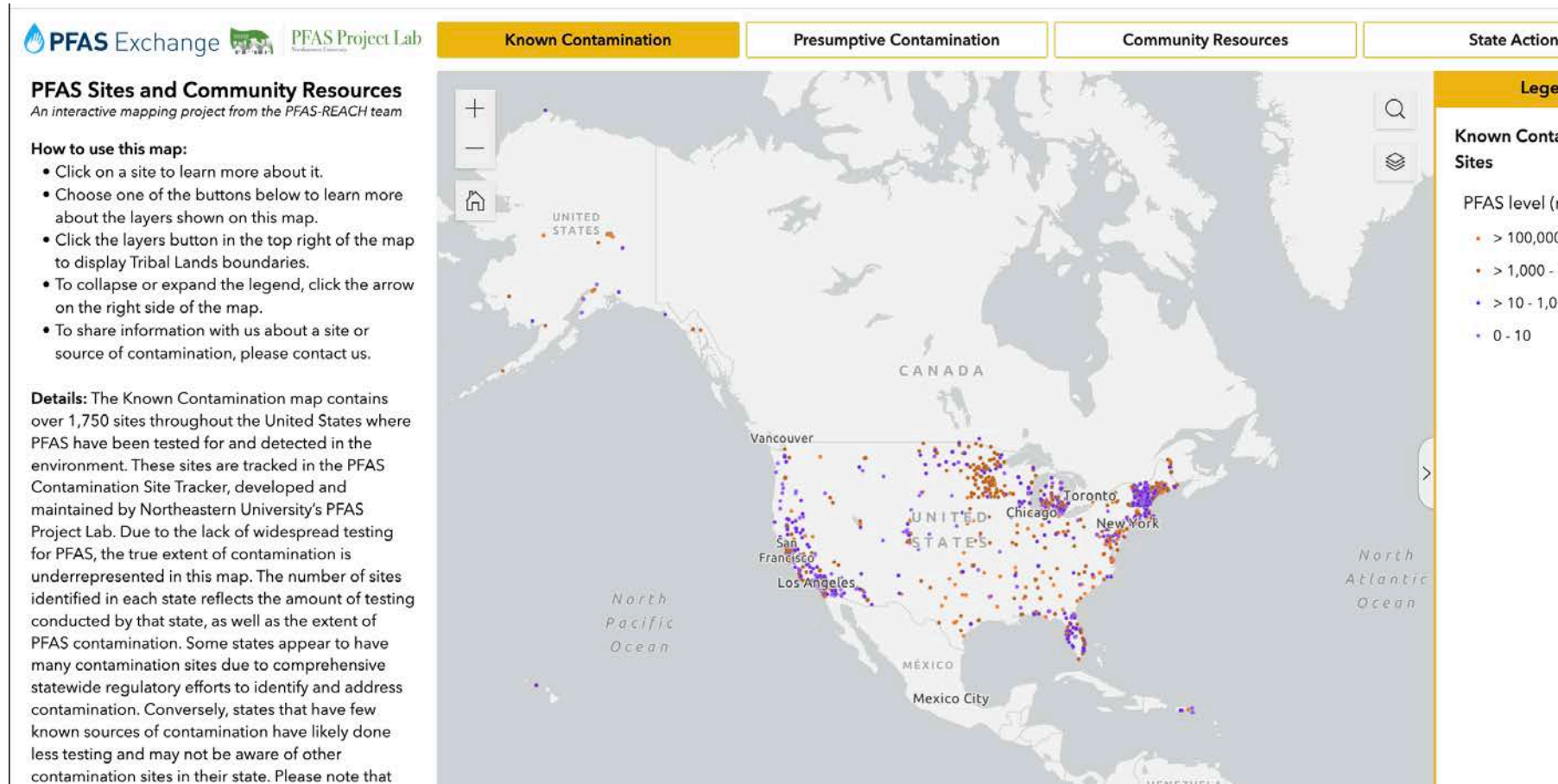
Country	Company and site of plant	What is being produced
Belgium	3M (Zwijndorf)	Fluorochemicals
France	Arkema (Pierre-Bénite)	Fluoropolymers (PVDF)
	Solvay Solexis (Tavaux)	Fluoropolymers (PVDF)
	Daikin Chemical France S.A.S. <sup>1</sup>	Fluorochemicals
Germany	Dyneon (Gendorf)	Fluorochemicals, fluoropolymers (PTFE, FEP, PFA, THV)
	BASF (Ludwigshafen)	n.a.
Italy	Solvay Solexis (Spinetta-Argeno)	Fluoropolymers ) – PTFE, MFA
	Heroflon S.p.A. (Collebeato)	Fluoropolymers (PTFE compounds and micropowders)
	Miteni (Trissino) <sup>2</sup>	Fluorinated intermediates; performance fluorinated products
Netherlands	Chemours (Dordrecht)	Fluoropolymers (PTFE, FEP)
	Daikin Chemical Netherlands (Oss) – Pre-compounding of fluoroelastomers	Fluorochemicals
United Kingdom	AGC (Blackpool)	Fluoropolymers – PTFE, PFA

Source: 1) Daikin Europe, manufacturing of fluoroelastomer base polymer and polymer processing aids.

2) Miteni files bankruptcy in October 2018.



# Mapping PFAS contamination



# Transposing and adapting



pubs.acs.org/journal/estlc

## Presumptive Contamination: A New Approach to PFAS Contamination Based on Likely Sources

Derrick Salvatore, Kira Mok, Kimberly K. Garrett, Grace Poudrier, Phil Brown, Linda S. Birnbaum, Gretta Goldenman, Mark F. Miller, Sharyle Patton, Maddy Poehlein, Julia Varshavsky, and Alissa Cordner\*

Cite This: *Environ. Sci. Technol. Lett.* 2022, 9, 983–990

Read Online

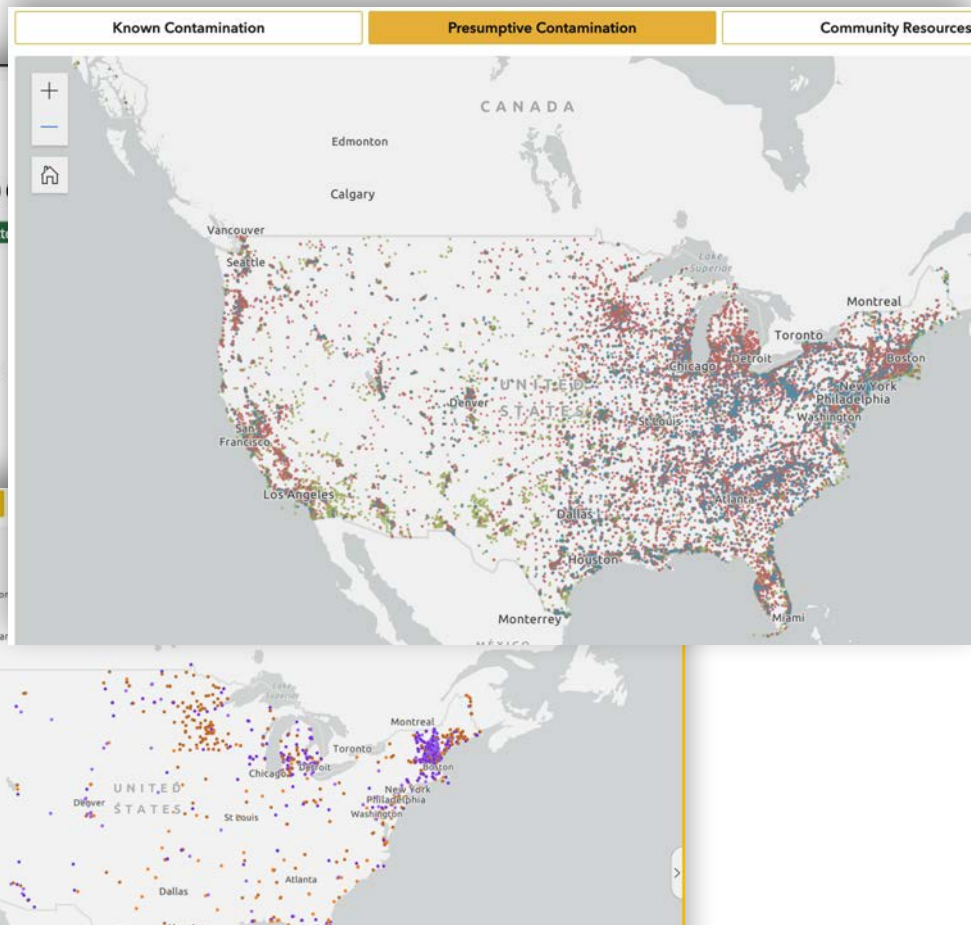
ACCESS |

Metrics & More

Article Recommendations

**ABSTRACT:** While research and regulatory attention to per- and polyfluoroalkyl substances (PFAS) has increased exponentially in recent years, data are uneven and incomplete about the scale, scope, and severity of PFAS releases and resulting contamination in the United States. This paper argues that in the absence of high-quality testing data, PFAS contamination can be presumed around three types of facilities: (1) fluorinated aqueous film-forming foam (AFFF) discharge sites, (2) certain industrial facilities, and (3) sites related to PFAS-containing waste. While data are incomplete on all three types of presumptive PFAS contamination sites, we integrate available geocoded, nationwide data sets into a single map of presumptive contamination sites in the United States, identifying 57,412 sites of presumptive PFAS contamination: 49,145 industrial facilities, 4,255 wastewater treatment plants, 3,493 current or former military sites, and 519 major airports. This conceptual approach allows governments, industries, and communities to rapidly and systematically identify potential exposure sources.

**KEYWORDS:** per- and polyfluoroalkyl substances (PFAS), presumptive contamination, PFAS waste and disposal



# Methodology | The Map of Forever Pollution

## The Forever Pollution Project

### 1. Geographic scope of the research

PFAS contamination sites were researched in the 27 Member States of the European Union (EU)<sup>3</sup>, in the United Kingdom (UK), and countries of the European Economic Area (EEA) and the European Free Trade Association (EFTA): Norway, Iceland, Liechtenstein, Switzerland. The Eurostat Country codes were used to identify the countries.<sup>4</sup>

### 2. PFAS contamination sites

The Map of Forever Pollution includes three categories of sites which are clearly distinguished:

- "known contamination sites"
- "presumed contamination sites"
- "known PFAS users".

This categorisation is largely based on the peer-reviewed methodology of the PFAS project Lab map<sup>5</sup>.

#### 2.1 Known contamination sites

Known PFAS contamination sites are:

- Sites where PFAS have been detected with water and/or solids testing
- PFAS chemical production facilities even if no publicly available testing data exist, as it is assumed that they are, and they were, emitting PFAS.<sup>6</sup>

A colour code on the map distinguishes their levels of contamination.

##### 2.1.1 Sites where PFAS have been detected

Known contamination sites and hotspots are locations where environmental monitoring was performed by authorities or scientists, and where PFAS were detected.

## 7 Peer-reviewers

**Alissa Cordner** (Whitman College, Walla Walla, USA),

**Derrick Salvatore** (Massachusetts Department of Environmental Protection, USA)

**Phil Brown** (Northeastern University, Boston, USA)

**Kimberly K. Garrett** (Northeastern University, Boston, USA)

**Ian Cousins** (Stockholm University, Sweden)

**Gretta Goldenman** (Global PFAS Science Panel, Brussels)

**Martin Scheringer** (ETH Zürich, Switzerland).



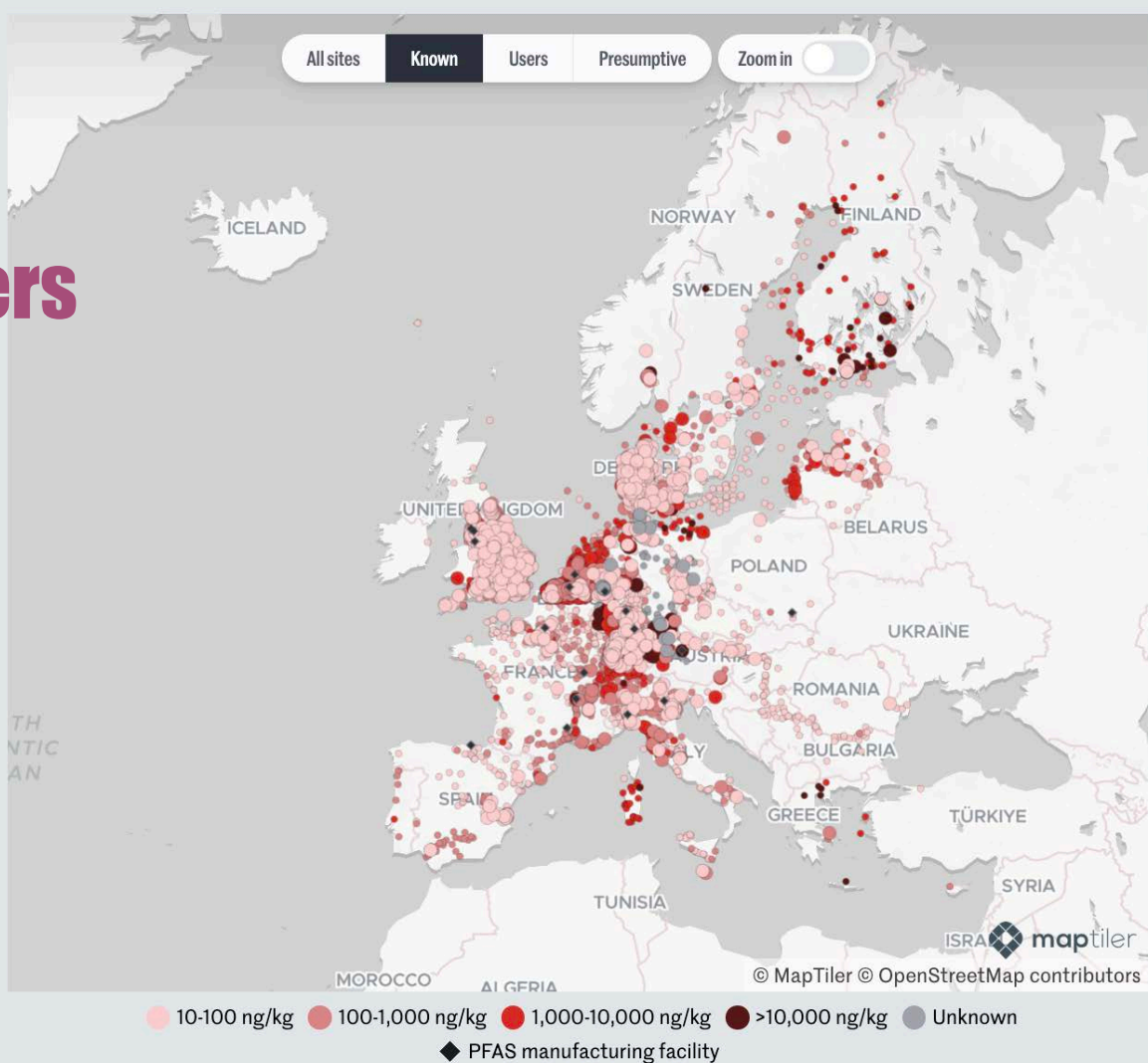
# 20 PFAS producing facilities



Name	Town	Country	Active as of 2023
Dyneon / 3M	Gendorf	DE	X
Solvay	Bad Wimpfen	DE	X
Archroma	Gendorf	DE	X
Gore	Gendorf	DE	X
Daikin refrigerants	Frankfurt am Main	DE	X
Lanxess	Leverkusen	DE	X
Arkema	Pierre-Bénite	FR	X
Daikin	Pierre-Bénite	FR	X
Solvay	Tavaux	FR	X
Solvay	Salindres	FR	X
Chemours	Villers Saint-Paul	FR	X
Miteni	Trissino	IT	
Solvay	Spinetta-Marengo	IT	X
AGC	Thornton-Cleveleys	UK	X
F2	Preston	UK	X
Mexichem/Koura	Runcorn	UK	X
3M	Zwijndrecht	BE	X
Chemours	Dordrecht	NL	X
Grupa Azoty	Tarnów	PL	
Arkema	Zaramillo	ES	

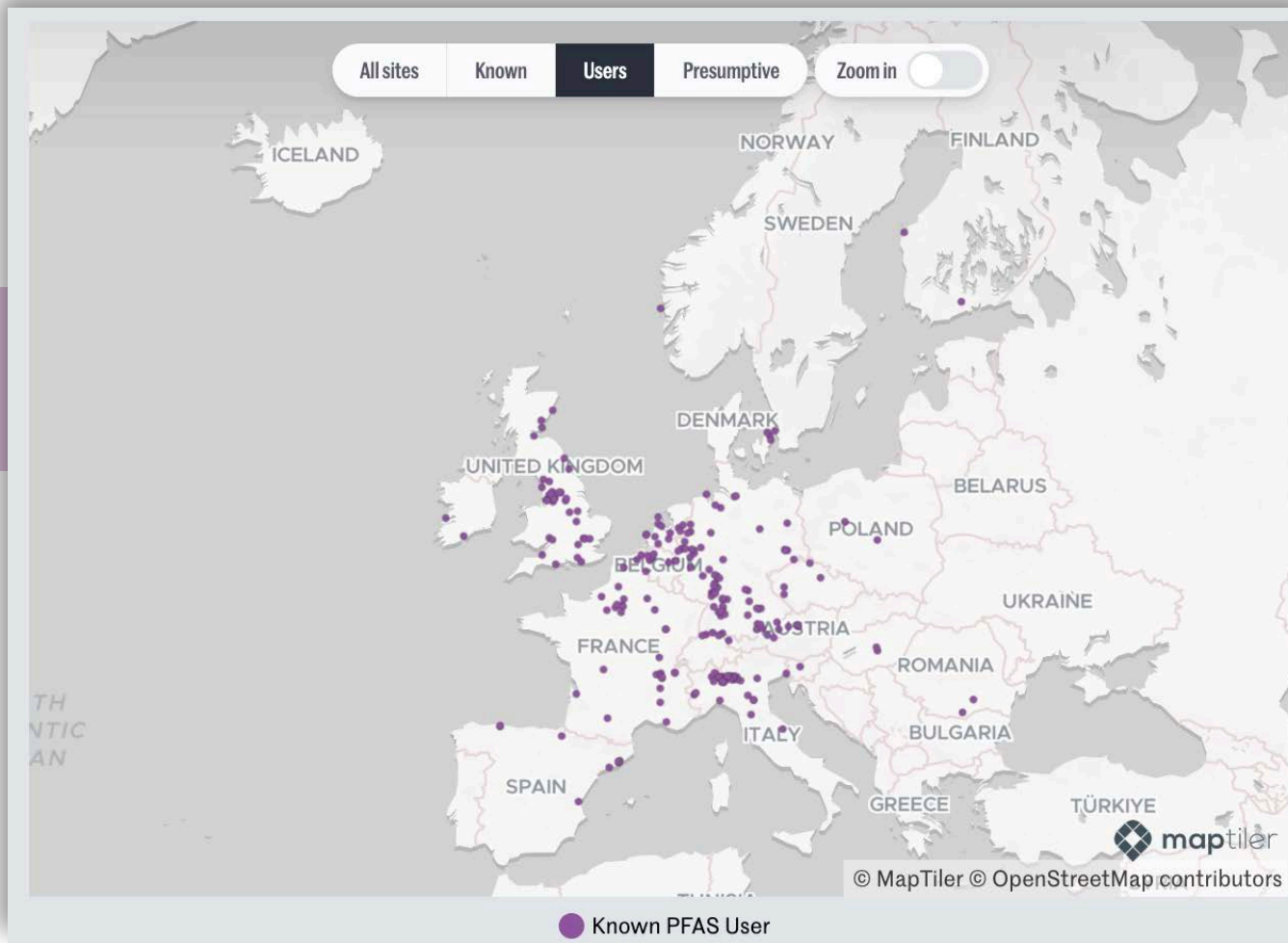
**>17,000 known  
contamination sites**  
**>2,100 hotspot clusters**

Clusters were computed to aggregate the neighboring sampling locations. Each circle includes all sampling locations for one cluster



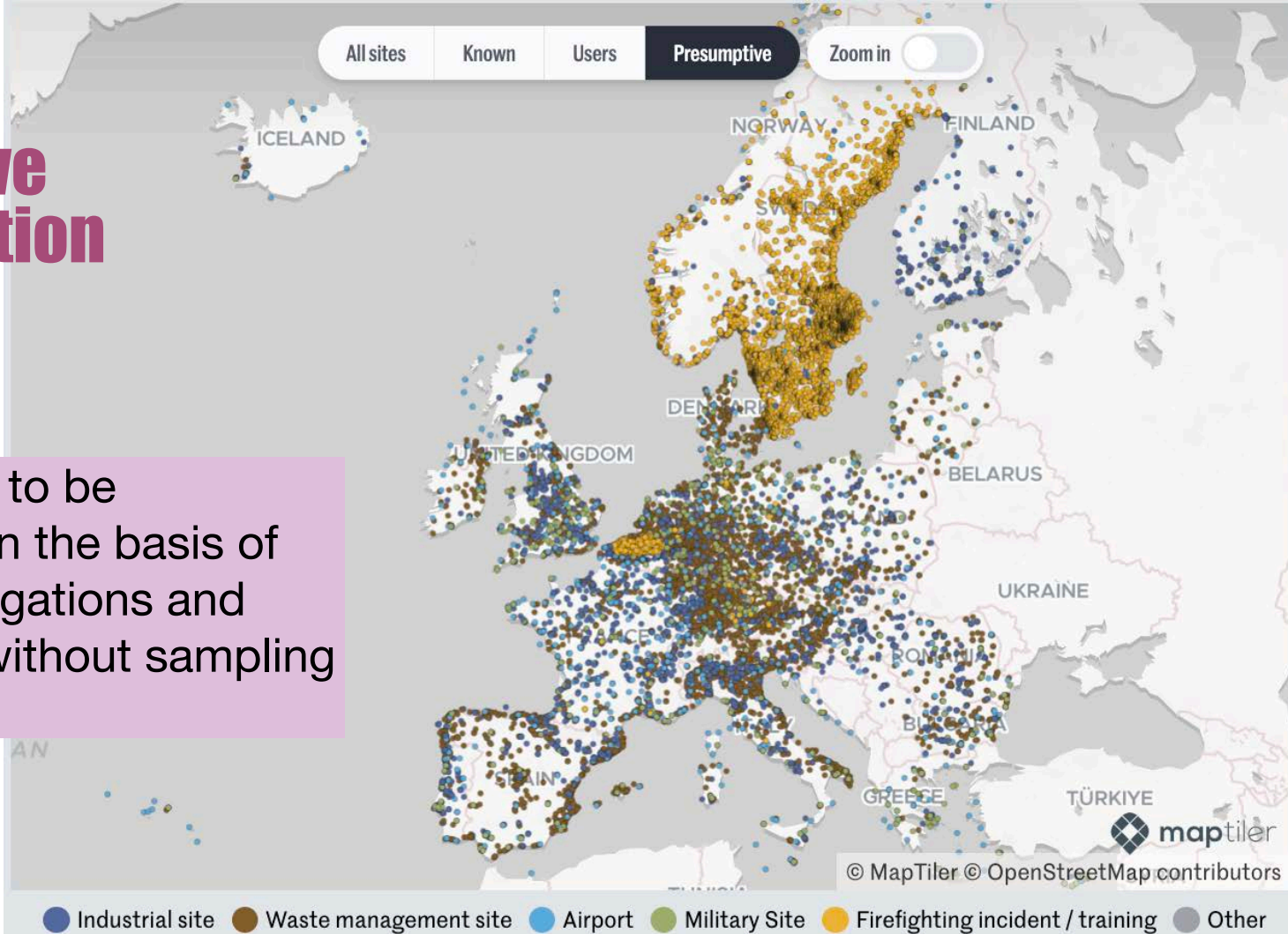
# 232 PFAS users

Sites where there is evidence of PFAS use.  
(New category)



# 21,000+ presumptive contamination sites

Sites presumed to be contaminated on the basis of scientific investigations and expert advice, without sampling data.



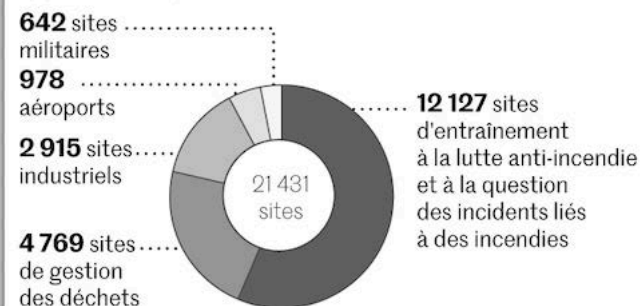


Sources: a: Facilities that reported PFAS to the TRI, b: [Eastern Research Group 2019](#), c: [Hu et al. 2016](#), d: [Schulz et al. 2021](#), e: [ASDWA 2020](#), f: [Kansas Department of Health and Environment 2019](#), g: [Massachusetts Science Advisory Board 2021](#), h: [Minnesota Pollution Control Agency 2020](#), i: [Utah Department of Environmental Quality 2020](#), j: [Environmental Protection Agency 2019](#), k: [Environmental Protection Agency 2021](#)

In total, **2,915** industrial sites were identified:

Industrial activity	Sites
Manufacture of pulp, paper and paperboard	1,121
Treatment and coating of metals	680
Manufacture of articles of paper and paperboard	304
Manufacture of plastics in primary forms	221
Manufacture of refined petroleum products	213
Manufacture of other fabricated metal products n.e.c.	132
Finishing of textiles	126
Manufacture of other organic basic chemicals	45
nan	45
Manufacture of rubber and plastic products	16
Tanning and dressing of leather; dressing and dyeing of fur	11
Treatment and disposal of hazardous waste	1
<b>Total</b>	<b>2,915</b>

#### Types de sites présumés contaminés



#### Principaux secteurs d'activité des sites industriels présumés contaminés, en nombre de sites identifiés

Fabrication de pâte à papier, de papier et de carton

1 121

Traitement et revêtement des métaux

680

Fabrication d'articles en papier ou en carton

304

Fabrication de matières plastiques de base

221

Raffinage du pétrole

213



FRANÇAIS ENGLISH

# Le Monde

ACTUALITÉS ÉCONOMIE VIDÉOS DÉBATS CULTURE LE GOÛT DU MONDE

08:08 **Alerte**  
Révélation sur la contamination massive de l'Europe par les PFAS


08:07 **LIVE**  
Guerre en Ukraine : suivez notre direct

08:00  
La place de Parcoursup entre parents et enfants

08:00  
Climat : BNP Paribas assigné en justice

05:30  
Floride : lors d'un

## ■ Révélation sur la contamination massive de l'Europe par les PFAS, ces polluants éternels



Présents dans une multitude d'objets, des poêles antiadhésives aux implants médicaux, les PFAS sont des substances chimiques toxiques et quasi indestructibles. « Le Monde » dévoile l'existence de milliers de

Diary Referendum Dr No oligarchs. No

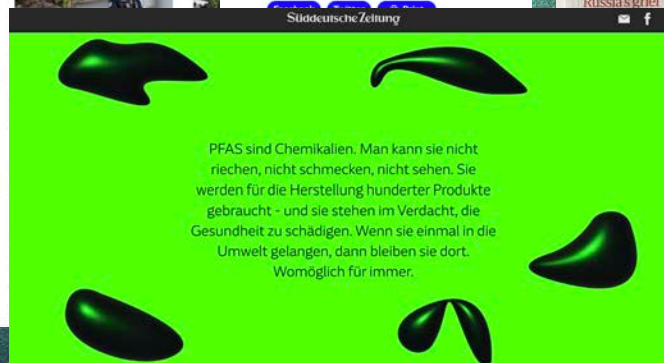
Home World Opinions Reporter

### Perfluorinated substances: a hitherto unknown cause of poisoning and death

[Zuzana Vlasatá](#)

In a unique international investigation by the European media, we reveal the hitherto overlooked cause of damage to the health of Europeans. The project was coordinated by Le Monde, and the Guardian is among the participants. Denik Referendum is the Czech partner of the project.

Süddeutsche Zeitung



PFAS sind Chemikalien. Man kann sie nicht riechen, nicht schmecken, nicht sehen. Sie werden für die Herstellung hunderter Produkte gebraucht - und sie stehen im Verdacht, die Gesundheit zu schädigen. Wenn sie einmal in die Umwelt gelangen, dann bleiben sie dort. Womöglich für immer.

Want olive oil with that? Trying out the newest trend in coffee

I don't shy away from the villainy Tracy-Ann Oberman plays Shylock

# The Guardian

January 2023

## Alarm over rising tide of toxic 'forever chemicals'

Golden Years  
Bowie archive donated to V&A to inspire new generation



Women 'work for free' for 54 days a year

Russia's grief