



GREEN SCIENCE
POLICY INSTITUTE

Global Perspectives on Reducing Harm from PFAS

[REDACTED]
Green Science Policy Institute &
Biology, University of California, Berkeley

24 March 2022



**GREEN SCIENCE
POLICY INSTITUTE**



Convene business,
govenrment, NGO,
academic scientists



These Chemicals in Pizza Boxes and Carpeting Last Forever

More than 200 scientists around the world document the threats of perfluorinated compounds and call for more government control.

By **Lindsey Konkel**, National Geographic
PUBLISHED MAY 01, 2015

 NATIONAL GEOGRAPHIC

Communicate

Scientific Research

Government Policy & Business Purchasing Change



**EVALUATING TENS OF THOUSANDS OF
INDIVIDUAL CHEMICALS IS UNWORKABLE**



BUT ADDRESSING **SIX GROUPS** OF
CHEMICALS OF CONCERN IS MANAGEABLE



Six Classes Videos



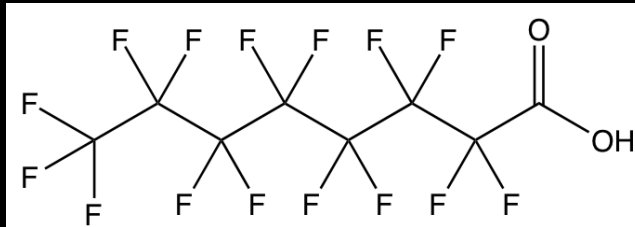
www.SixClasses.org

Healthier products, healthier people in four minutes!

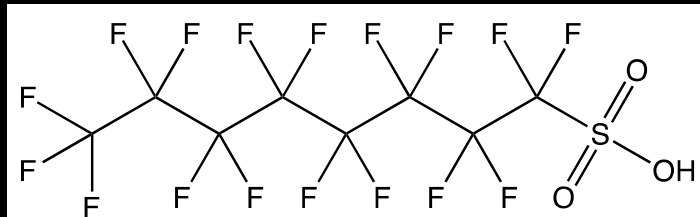
Class 1 PFAS

(Per- and polyfluoroalkyl substances)

PFOA
(C8)



PFOS
(C8)

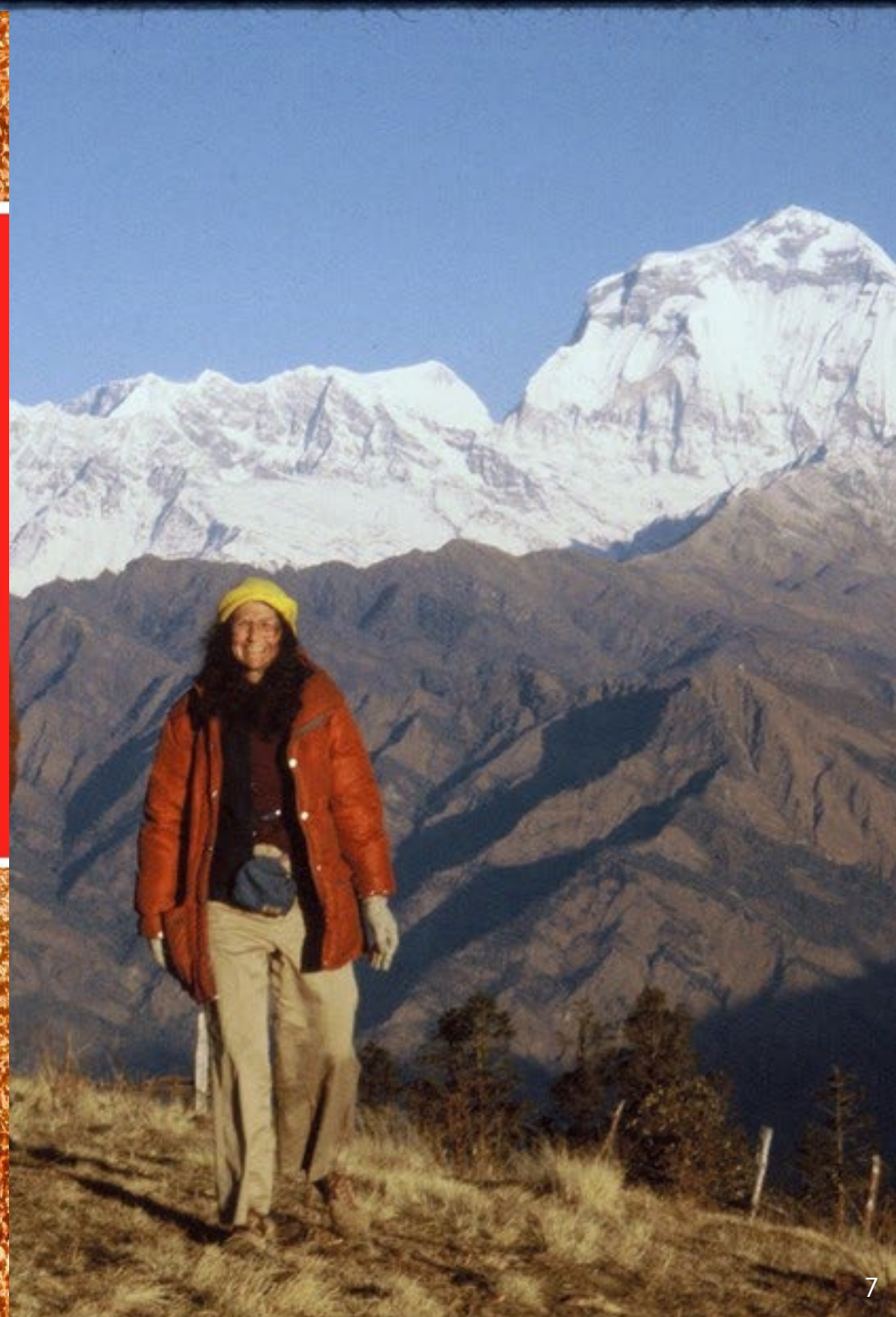
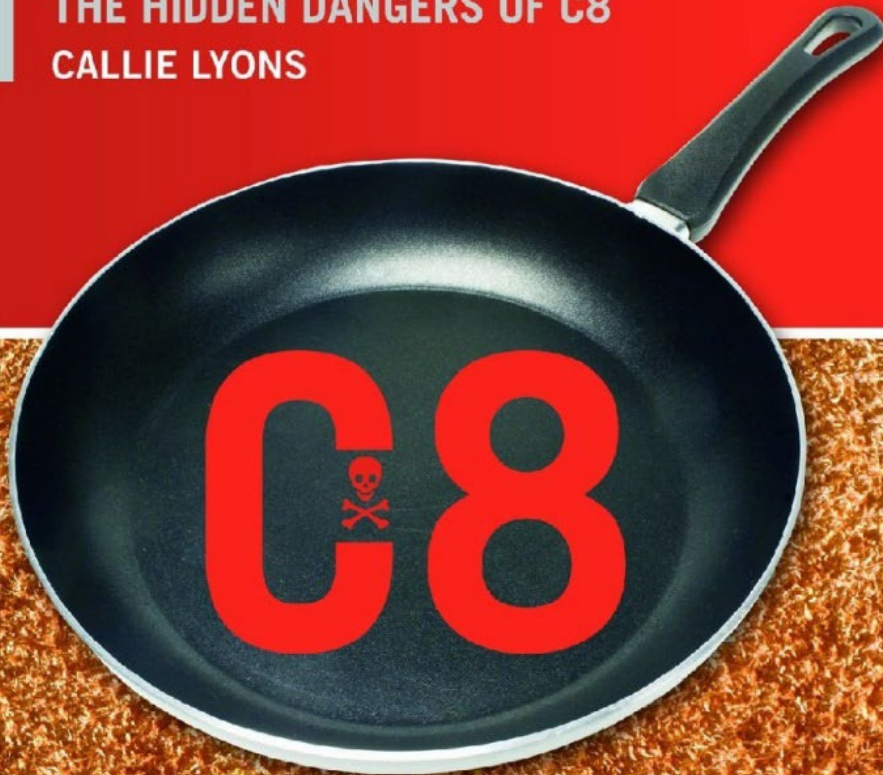


Carbon-Fluorine bond strength:

- Leads to oil and water repellency
- “Forever chemicals” -- last for geologic time!

**STAIN-RESISTANT,
NONSTICK, WATERPROOF,
AND LETHAL**

**THE HIDDEN DANGERS OF C8
CALLIE LYONS**



PFAS exposure is a health concern



Exposure linked to health risks:

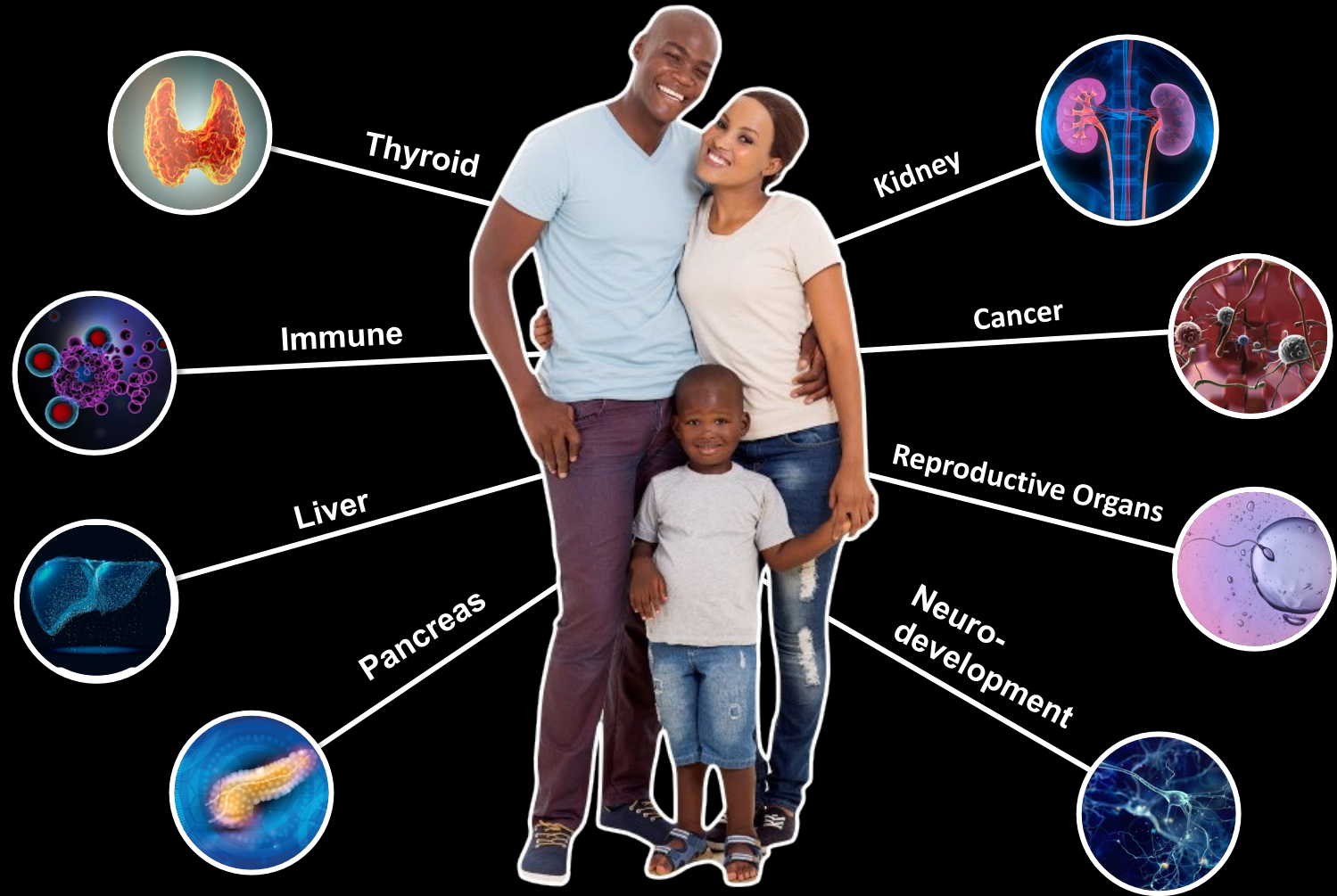
Cancer, elevated cholesterol, obesity, immune suppression, and endocrine disruption

Courtesy,

Harvard University

(Ref: Lewis et al., 2015; Grandjean et al., 2012; Braun et al., 2016; Barry et al., 2013)

PFAS: Multi-System Toxicants



2015 Madrid Statement on Highly Fluorinated Chemicals



“We call on the international community to cooperate in limiting the production and use of PFAS and in developing safer non-fluorinated alternatives.”

Signed by 230 scientists from 40 countries

2015: Environmental Health Perspectives

2015-16

The Opinion Pages | OP-ED COLUMNIST

The New York Times

Chemicals in Your Popcorn?

JUNE 4, 2015



Nicholas Kristof

What do a pizza box, a polar bear and you have in common?

All carry a kind of industrial toxicant called poly- and perfluoroalkyl substances, or PFASs, that do two things: They make life convenient, and they also appear to increase the risk of cancer.

These Chemicals in Pizza Boxes and Carpeting Last Forever

More than 200 scientists around the world document the threats of perfluorinated compounds and call for more government control.

By **Lindsey Konkel**, National Geographic
PUBLISHED MAY 01, 2015



NATIONAL GEOGRAPHIC

The Intercept

THE TEFLON TOXIN

DuPont and the Chemistry of Deception



Sharon Lerner

Aug. 11 2015, 3:35 p.m.



133

Home

The New York Times Magazine

The Lawyer Who Became DuPont's Worst Nightmare

Rob Bilott was a corporate defense attorney for eight years. Then he took on an environmental suit that would upend his entire career — and expose a brazen, decades-long history of chemical pollution.

By **NATHANIEL RICH** JAN. 6, 2016

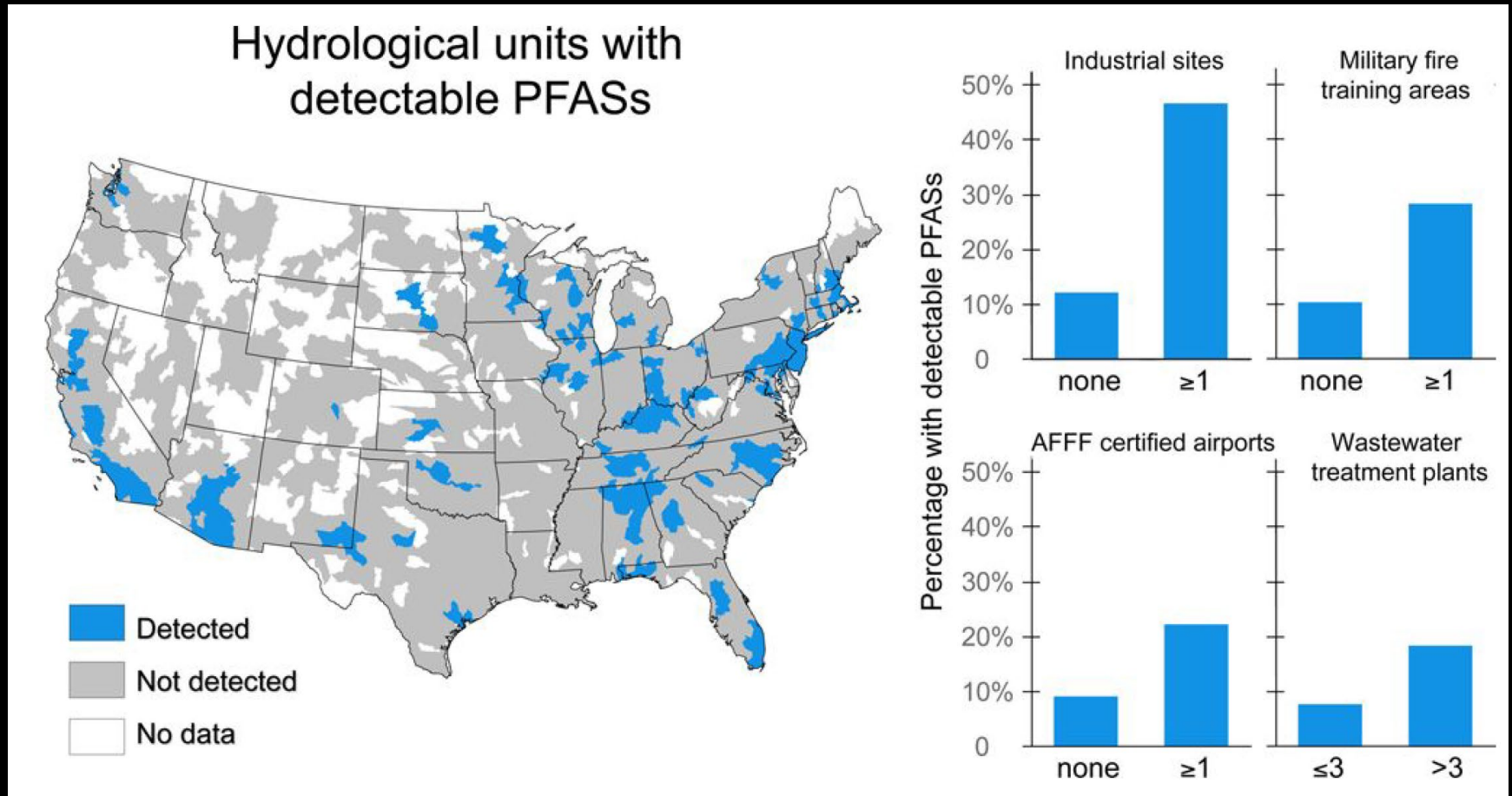


Watch Dark Waters film

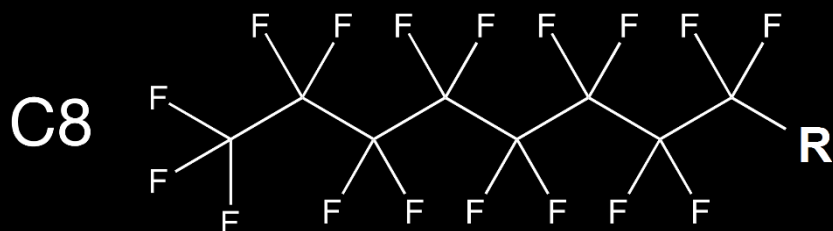
- The story of attorney Rob Bilott, who uncovered massive PFOA contamination from a DuPont factory in WV



EPA Lifetime Health Advisory Level: 70 ng/L PFOA + PFOS

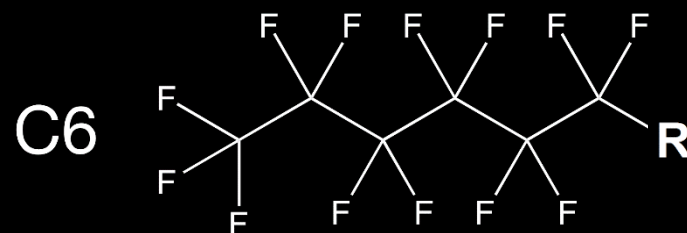


“Regrettable” Substitution?



Long chain:

- Extreme persistence
- Bioaccumulation
- Toxicity



Short chain:

- Extreme persistence
- Less bioaccumulation in humans
- Build-up in plants
- Suspected toxicity
- More mobile
- Clean up more difficult
- Harder to measure & monitor

Scientific Basis for Managing PFAS as a Chemical Class

Carol F. Kwiatkowski,* David Q. Andrews, Linda S. Birnbaum, Thomas A. Bruton, Jamie C. DeWitt, Detlef R. U. Knappe, Maricel V. Maffini, Mark F. Miller, Katherine E. Pelch, Anna Reade, Anna Soehl, Xenia Trier, Marta Venier, Charlotte C. Wagner, Zhanyun Wang, and Arlene Blum



Cite This: <https://dx.doi.org/10.1021/acs.estlett.0c00255>



Read Online

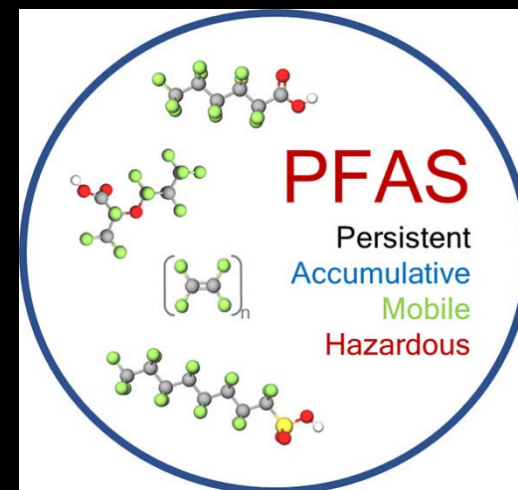
Persistent & potentially toxic
Not enough time to study
them all

Short video

<https://www.youtube.com/watch?v=EBjQYUjEUb4>

Last Week Tonight

<https://youtu.be/gW74aeuqsiU>



The Netherlands



- Chemours fluoropolymer production plant in Dordrecht
- Surface water, groundwater, & vegetation conc. exceeded health risk limits for PFOA & GenX
- PFOA blood conc. exceeded safety levels
- 750,000 people affected
- The Netherlands supports restricting PFAS in products



Chemours™

Gebbink et al. 2020 16

Belgium



- 3M fluorochemical plant in Antwerp
 - Advisory against consuming local vegetables & eggs in the Flemish Region, population 6.5 million
 - PFOS and PFOA blood conc. exceeded safe levels in 77% of 201 adults tested
 - Some of the highest reported PFOS levels in wildlife
- Flemish regional government ordered 3M to halt production of PFAS



Italy



- Miteni Ltd. a manufacturer of PFAS
 - Waste buried and wastewater released without pretreatment
 - PFAS contamination of drinking and irrigation water
 - 350,000 people affected
- Over EUR 6 million spent by the government on drinking water treatment & health surveillance
- A government lawsuit



China



- One of the largest manufacturers and consumers of PFAS in the world
- Drinking water in many cities in China exceeds 20 ng/L
 - Nearly 100 million people affected
 - PFOA conc. are much higher in cities where fluoropolymers such as PTFE are produced



Australia



- PFAS contamination near defense bases
 - AU\$55 million for safe drinking water
 - AU\$212 million spent by the federal government on class action settlements
- Most Australian fire brigades & airports transitioned to PFAS-free foam



<https://defence.gov.au/Environment/PFAS/>

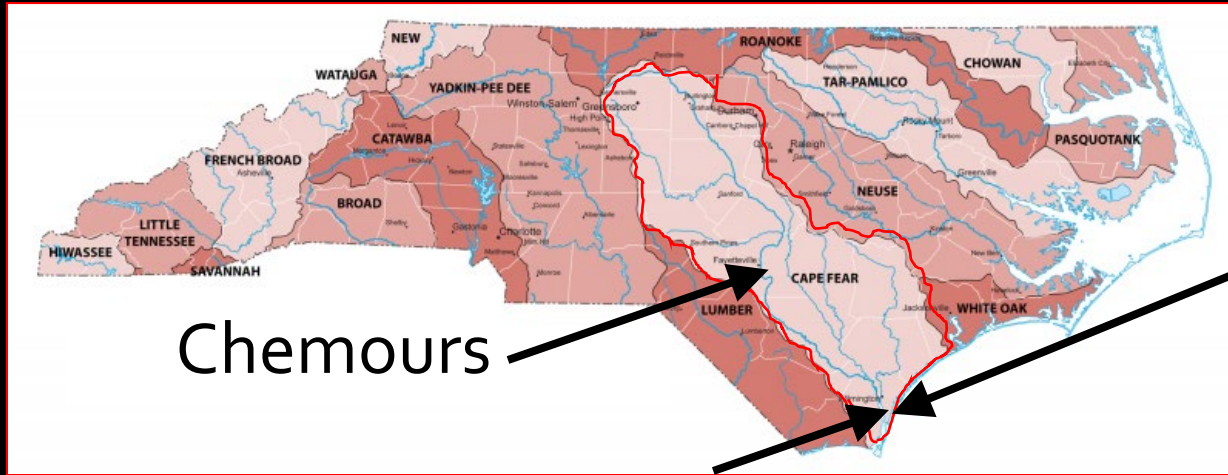


Michigan -- USA

- Wolverine treated leather with Scotchguard (PFOS)
 - Leather scrap dumped
 - Sludge applied to fields
- PFOA + PFOS up to 58,000 ppt
842 times US EPA health advisory level!
- Wolverine pays Michigan \$69.5 million
- 3M pays Wolverine \$55 million



Water Treatment Costs: North Carolina



Chemours

Brunswick County:
reverse osmosis
filtration for 25,000
customers:

-\$99M to build

-\$2.9M to operate

Cape Fear Public Utility Authority activated
carbon filtration plant:

-\$46M to build

-\$2.7M to operate each year

Wilmington Star News,
May 9th and 10th, 2018

PFAS are Problematic
& Difficult to Clean Up

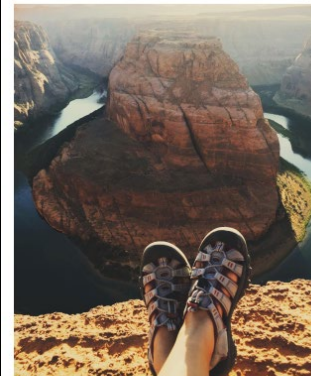
Prevention is Preferable!

Keen's PFAS-Free Journey

- PFAS found to 101 places in Keen shoes
- 70 place PFAS were not necessary and removed
- Years of work to find replacements for other 31
- Success!



Do we need it?



67% REDUCTION
Precautionary Principle



Fluorinated Compounds in U.S. Fast Food Packaging

Laurel A. Schaider,^{*,†,Ⓜ} Simona A. Balan,[‡] Arlene Blum,^{§,||} David Q. Andrews,[⊥] Mark J. Strynar,^{#,Ⓜ} Margaret E. Dickinson,[▽] David M. Lunderberg,[▽] Johnsie R. Lang,[○] and Graham F. Peaslee[@]

[†]Silent Spring Institute, Newton, Massachusetts 02460, United States

[‡]California Department of Toxic Substances Control, Sacramento, California 95814, United States

[§]Green Science Policy Institute, Berkeley, California 94709, United States

^{||}Department of Chemistry, University of California at Berkeley, Berkeley, California 94720, United States

[⊥]Environmental Working Group, Washington, D.C. 20009, United States

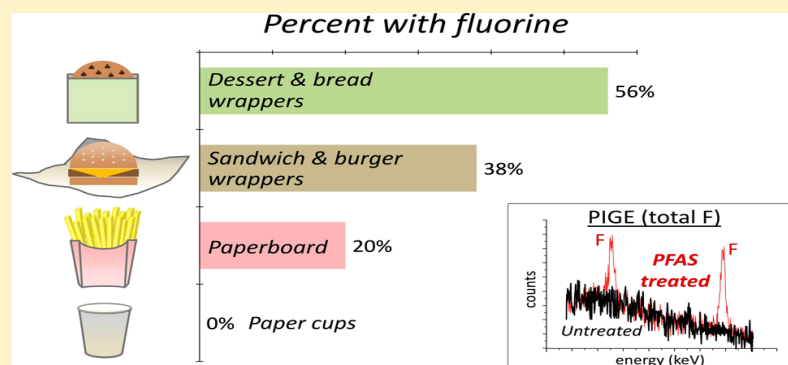
[#]National Exposure Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, United States

[▽]Chemistry Department, Hope College, Holland, Michigan 49423, United States

[○]Oak Ridge Institute for Science and Education, Oak Ridge, Tennessee 37831, United States

[@]Department of Physics, University of Notre Dame, Notre Dame, Indiana 46556, United States

S Supporting Information





United States Senate WASHINGTON, DC 20510

March 9, 2017

Mr. Daniel S. Schwartz
Chief Executive Officer
Restaurant Brands International Inc.
226 Wyecroft Road,
Oakville, Ontario L6K 3X7,
Canada

Dear Mr. Schwartz:

We write to inquire about Burger King's use of potentially harmful fluorinated chemicals in food wrappers, bags, boxes, or other kinds of food packaging. Per and polyfluoroalkyl substances (PFASs) represent a class of chemicals sometimes used in fast food packaging to prevent grease and sauces from seeping through packaging. These chemical compounds have been

Food Packaging: Policy & Regulation

Bans:

- 2018 - Washington state
- 2019 – Maine
- 2020 – San Francisco
- 2020 – US Congress: no PFAS in military meals-ready-to-eat (MREs)



2019 Denmark bans all PFAS in paper food packaging

- “I do not want to accept the risk of harmful [PFAS] migrating from the packaging and into our food. ”

- Danish Food Minister [REDACTED]



<https://www.cnn.com/2019/09/04/health/denmark-pfas-food-packaging-ban-intl/index.html>

PFAS and Carpet

- PFAS-treated carpet linked to high PFAS blood levels

Exceptionally High Serum Concentrations of Perfluorohexanesulfonate in a Canadian Family are Linked to Home Carpet Treatment Applications

Sanjay Beesoon,[†] Stephen J. Genuis,[‡] Jonathan P. Benskin,^{†,§} and Jonathan W. Martin^{*,†}

[†]Division of Analytical and Environmental Toxicology, Department of Laboratory Medicine and Pathology, University of Alberta, Edmonton, AB, Canada

[‡]Department of Medicine, University of Alberta, Edmonton, AB, Canada

S Supporting Information

Major manufacturers phase out PFAS from carpets & rugs by January 1, 2020

Home Depot plans to phase out selling rugs and carpets containing PFAS

By VIRGINIA GORDAN • SEP 17, 2019



Share



Tweet



Email



CREDIT ANDREI / ADOBE STOCK

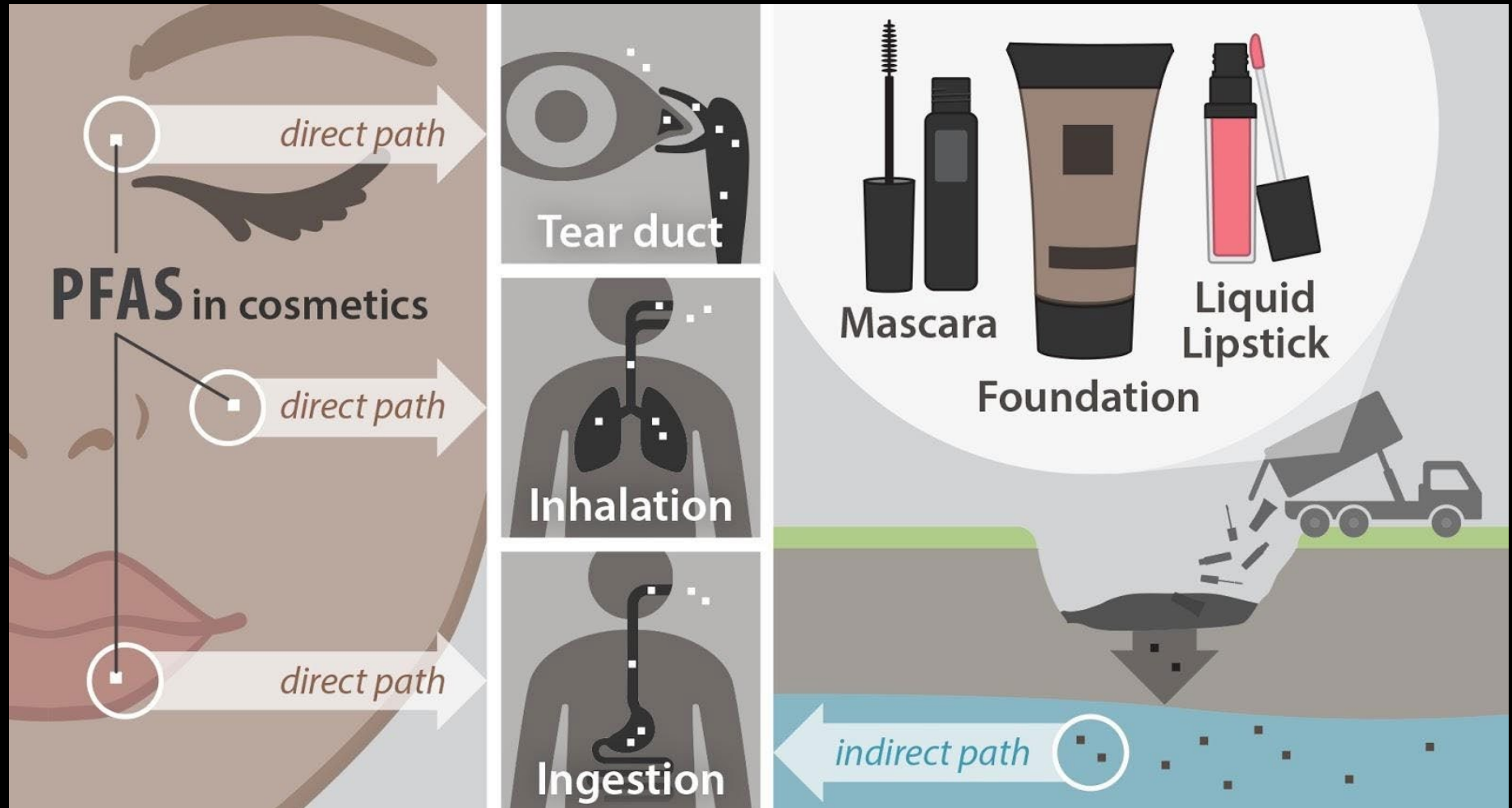
The Home Depot announced Tuesday that it will stop buying from its suppliers any rugs and carpets that contain [PFAS chemicals](#).

"Excluding PFAS from the carpets and rugs we sell is another example of our shared commitment to building a better future for our customers and the planet,"

Ron Jarvis, The Home Depot's vice president for environmental innovation, said in a written statement.

Michigan Radio,
September, 2019

Fluorinated compounds in North American cosmetics



BRANDS ARE ELIMINATING HIGHLY FLUORINATED CHEMICALS

IKEA

H&M

Crate&Barrel

LEVI STRAUSS & CO.

PUMA

benetton

ESPRIT

adidas

MARKS &
SPENCER

MANGO

BURBERRY[®]
LONDON

ZARA

PFAS in Products Worldwide Phase-outs

- Proposal from Sweden, Netherlands, Germany, Denmark to phase out PFAS in Europe by 2025
- Canada is working to address a broad class of PFAS
- US federal government commits not to purchase certain products containing PFAS
- By 2030, Maine will ban all PFAS uses unless "currently unavoidable"
- Proposed legislation for phase out and/or labeling of PFAS in products in six other US states



PFAS Central: sharing notable news, scientific papers & events



NEWS

PFAS Chemicals to be Banned in Firefighting Foam Used on Military Bases

U.S. Senator Kirsten Gillibrand today announced that a provision she cosponsored to prohibit the Department of Defense from procuring firefighting foam that contains per- and polyfluoroalkyl substances (PFAS) passed the Senate Armed Services Committee as part of the annual National Defense Authorization Act (NDAA).

[LEARN MORE](#)



SCIENCE

Larval amphibians rapidly bioaccumulate poly- and perfluoroalkyl substances.

Toxic frogs lead to bioaccumulation in predator species.

[LEARN MORE](#)



POLICY

The Cost of Inaction: A socioeconomic analysis of environmental and health impacts linked to exposure to PFAS

A recent Nordic Council study, The Cost of Inaction: A socioeconomic analysis of environmental and health impacts linked to exposure to PFAS, estimates the very high cost of harm to human health and the environment from PFAS exposure in Europe.

[LEARN MORE](#)

Although useful, PFAS or highly fluorinated chemicals are associated with serious health harm and can remain in the environment forever.

[LEARN MORE](#)

PFAS-FREE

Cosmetics and Personal Care Products



Retailers:

- [Credo](#) (all products, [policy](#))⁷
- [H&M](#) (all store brand products, [policy](#))
- [Sephora](#) (Clean at Sephora products, [policy](#))
- [Whole Foods Market](#) (all products, [policy](#))

Manufacturers:

- [Annmarie Skin Care](#) (all products, [policy](#))
- [California Baby](#) (all products, [policy](#))
- [Hawk Tools](#) (all products, [policy](#))
- [Otter Wax](#) (all body and skincare products, [policy](#))
- [type: A Deodorant](#) (all products, [policy](#))



GREEN SCIENCE
POLICY INSTITUTE

Learn More:

GreenSciencePolicy.org

PFASCentral.org

SixClasses.org

Sign up for our monthly e-newsletter