

WELCOME!

Outdoor Industry PFAS Workshop

Moving to PFAS-free gear while maintaining function & pricing



November 30, 2022
David Brower Center, Berkeley, CA

Outdoor Industry PFAS Workshop Objectives

1. Learn about impacts of the class of PFAS chemicals
2. Challenges in moving away from their use
3. Solutions towards stopping the use of PFAS

Introductions

(30 seconds each)

- Name
- Where you work & your position
- What brings you here?

Framing the Problem: Science & Regulation



PFAS 101: Introduction to Forever Chemicals

Arlene Blum, PhD

Green Science Policy Institute
University of California, Berkeley



DENALI
DAMSELS
1970

Brominated Tris Flame Retardant

Tris (2,3-dibromopropyl) phosphate

- In children's sleepwear 1975 to 1977
- Up to 10% of the weight of fabric
- In children's urine
- Mutagen and possible carcinogen















THE
MUTANTS

Science, January 7, 1977

Flame-Retardant Additives as Possible Cancer Hazards

**The main flame retardant in children's pajamas is a
mutagen and should not be used.**

Arlene Blum and Bruce N. Ames



U.S. Consumer Product
Safety Commission

Tris-Treated Children's Garments Banned

April 7, 1977

Chlorinated Tris replaced Brominated Tris

- Removed from pajamas in 1978
- Used in furniture until 2012

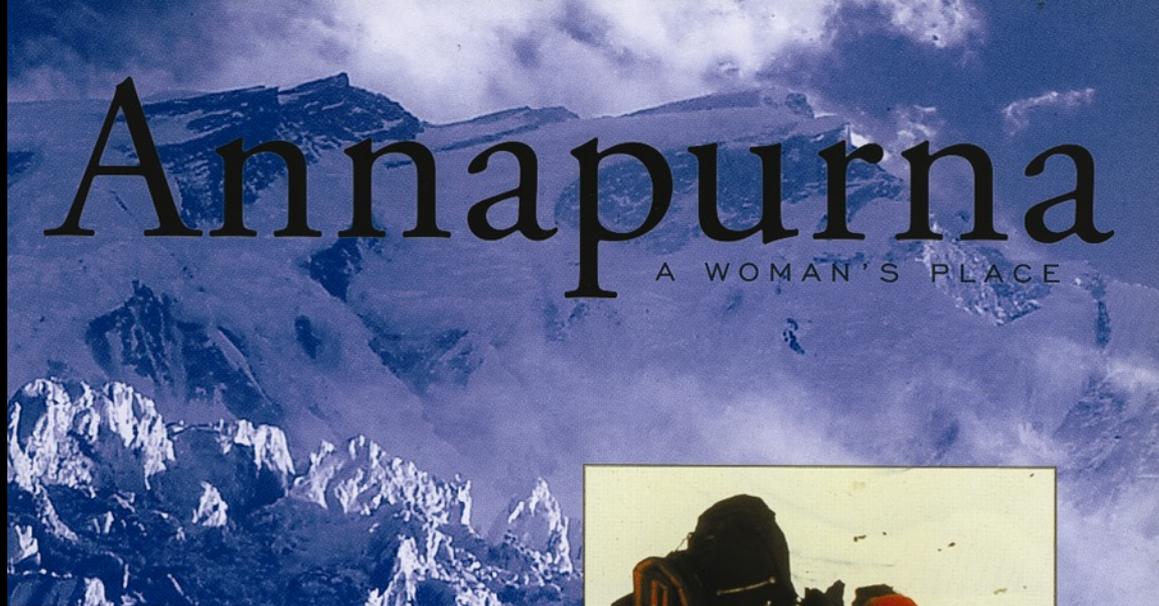






Annapurna

A WOMAN'S PLACE



The dramatic
story of the first
American ascent of
one of the world's
highest peaks



ARLENE BLUM

20TH ANNIVERSARY EDITION

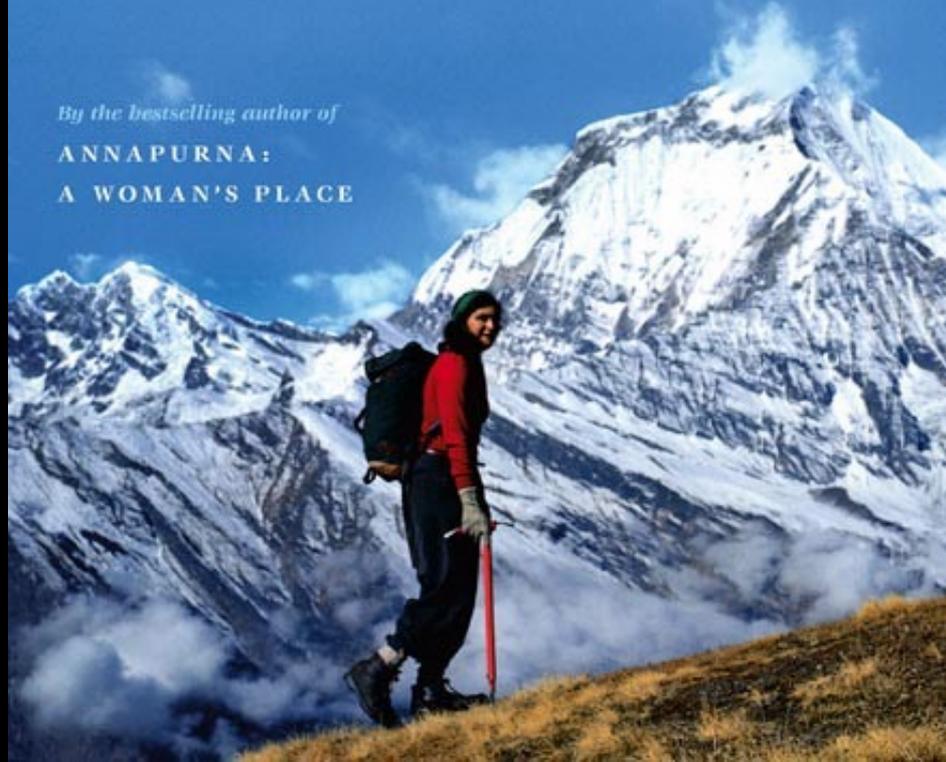
With a new Preface and Afterword by the author

Arlene Blum

BREAKING TRAIL

A Climbing Life

By the bestselling author of
**ANNAPURNA:
A WOMAN'S PLACE**





GREEN SCIENCE POLICY INSTITUTE

ENVIRONMENTAL Science & Technology LETTERS

Novel and High Volume Use Flame Retardants in US Couches
 Heather M. Thomas F.
 P. Lee Ferguson,¹ Michelle Gabriel¹

Fluorine in U.S. Fast Food Packaging
 David Q. Andrews,¹ Mark J. Strynar,² Nicholas S. ...
 David Q. Andrews,¹ Mark J. Strynar,² Nicholas S. ...

Detection of Poly- and Perfluoroalkyl Substances (PFAS) in U.S. Drinking Water Linked to Industrial Sites, Military Fire Training Areas, and Wastewater Treatment Plants
 Kindi C. Hu,^{1,2,3} David Q. Andrews,³ Andrew B. Lindstrom,⁴ Thomas A. Bruton,⁵ Laurel A. Schaefer,⁶ Philippe Grandjean,⁷ Rainer Lohmann,⁸ Courtney C. Cargnan,⁹ Arlene Blum,¹⁰ Simona A. Balan,¹¹ Christopher P. Higgins,¹² and Elsie M. Sunderland^{1,2,7}

Supporting Information

ABSTRACT: Drinking water contamination with poly- and perfluoroalkyl substances (PFAS) poses risks to the developmental, immune, metabolic, and endocrine health of consumers. We present a spatial analysis of 2013–2015 national drinking water PFAS concentrations from the U.S. Environmental Protection Agency's (USEPA) third Unregulated Contaminant Monitoring Rule (UCMR3) program. The number of industrial sites that manufacture or use these compounds, the number of military fire training areas, and the number of wastewater treatment plants are all significant



Bring decision makers together

Scientific Research

Chicago Tribune
 CHICAGO TRIBUNE CALL 1-800-TRIBUNE
 SUNDAY, MAY 6, 2012
 DEALING NEWS AT CHICAGOTRIBUNE.COM

TRIBUNE WATCHDOG

Playing with fire

A deceptive campaign by industry brought toxic flame retardants into our homes and into our bodies. And the chemicals don't even work as promised.

By PATRICIA CALABIAN and SAN ROE

Da David Hirschbach knows how to sell a story. Before California lawmakers last year, the noted burn surgeon drew grief from the crowd as he described a 2-year-old baby girl who was burned in a fire started by a candle while she lay on a pillow that had flame-retardant chemicals.

"Now this is a very little person, no larger than my Italian professor at USC," said Hirschbach, gesturing to approximate the baby's size. "Half of her body was severely burned. She ultimately died after about seven months of pain and misery in the hospital."

Hirschbach's passionate testimony about the baby's death made the legislators' health committee about flame retardants voted by doctors, environmentalists and even firefighters sound abstract and vague.

But there was a problem with his testimony: It wasn't true. Records show there was no dangerous pillow or candle fire. The baby had a medical alert tag.

Neither did the two-week-old patient who Hirschbach told used bedsheet exposures and more California legislators cited as a candle fire in 2010. Her dad said that spent more than a 6-week-old patient who he told Alaska lawmakers was fatally burned last year in 2010.

Hirschbach has had physicians come from hundreds of miles away to hear Hirschbach's story. But he has a star witness for the manufacturers of flame retardants.

He said he had a conversation with the public's fear of the fire and helped expose and expose the manufacturers of the flame-retardant chemicals. He said that spent more than a 6-week-old patient who he told Alaska lawmakers was fatally burned last year in 2010.

Hirschbach has had physicians come from hundreds of miles away to hear Hirschbach's story. But he has a star witness for the manufacturers of flame retardants.

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 6, 2012

NATIONAL GEOGRAPHIC

Communicate

Policy & Purchasing Change



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



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



Six Classes Videos

1

PFAS

2

Anti-
microbials

3

Flame
Retardants

4

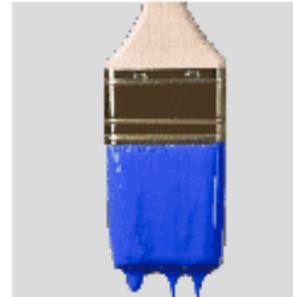
Bisphenols
+
Phthalates

5

Some
Solvents

6

Certain
Metals



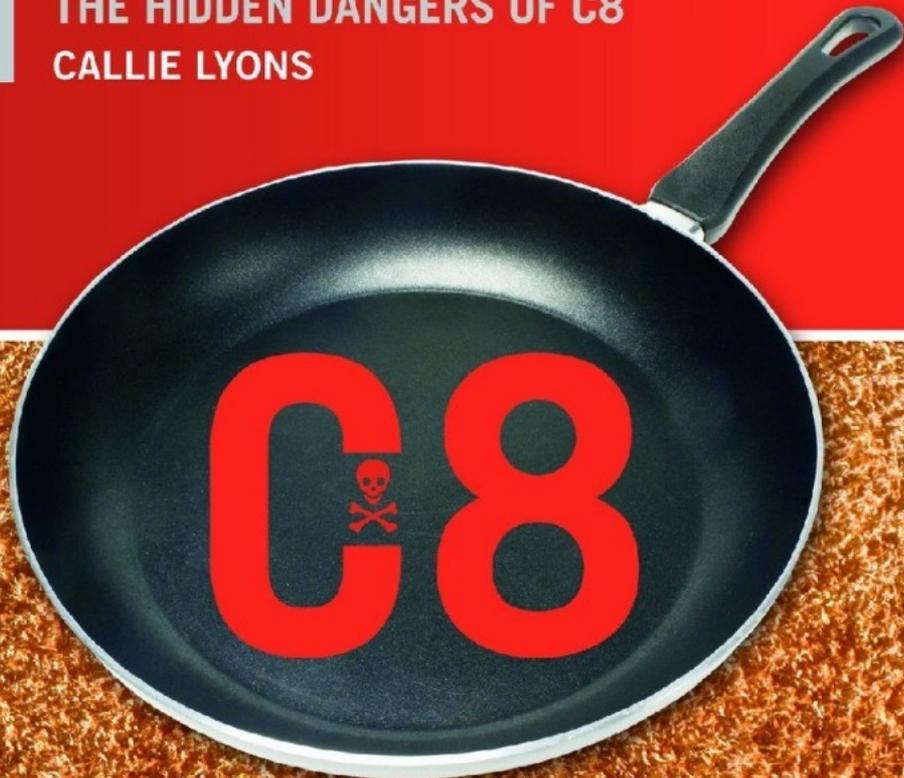
www.SixClasses.org

Healthier products, healthier people in four minutes!



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

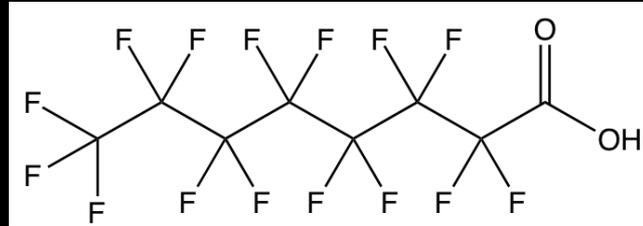
THE HIDDEN DANGERS OF C8
CALLIE LYONS



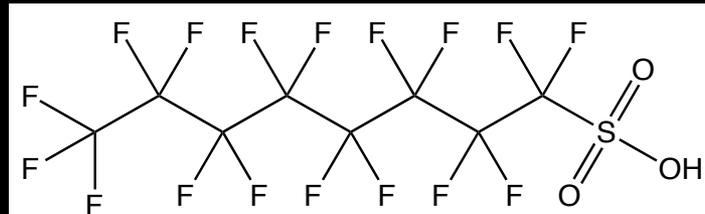
PFAS

(Per- and PolyFluoroalkyl Substances)

PFOA
(C8)



PFOS
(C8)



Carbon-Fluorine bond strength:

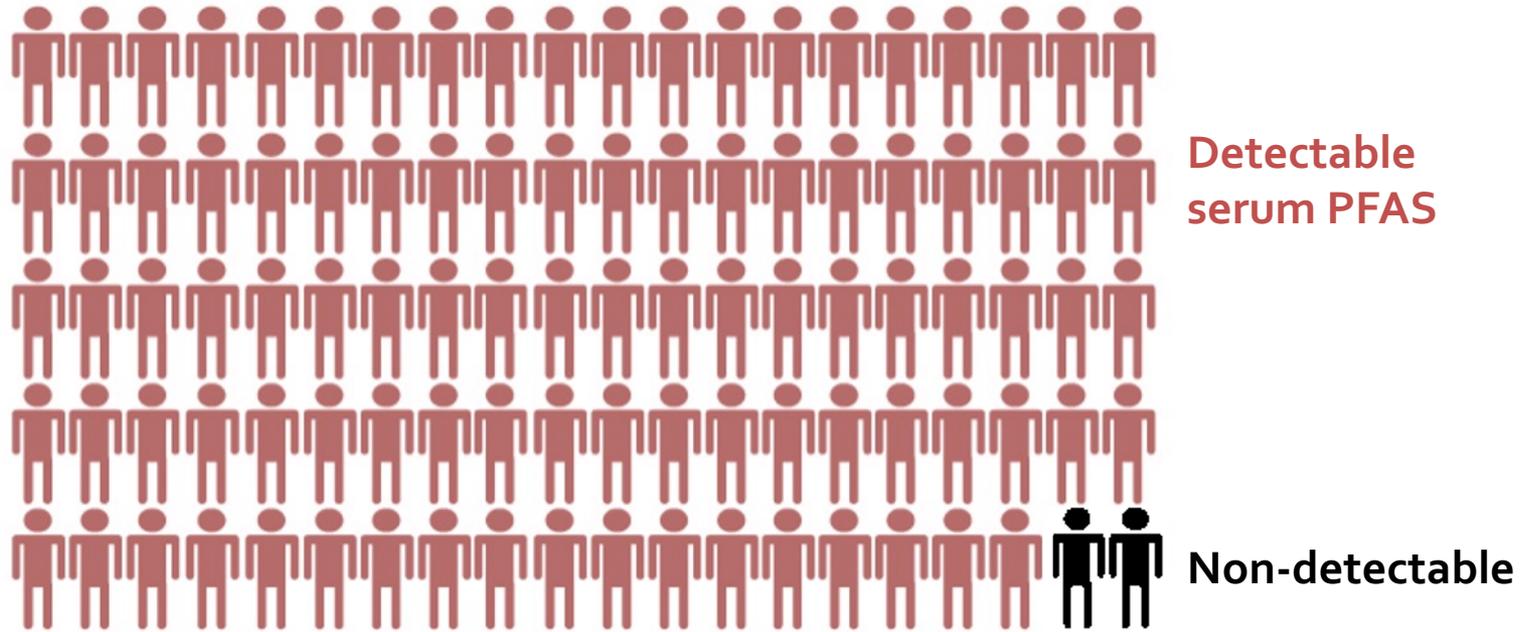
- Leads to oil and water repellency
- “Forever chemicals” — last for geologic time!

Watch the film *Dark Waters*

- The story of attorney Rob Bilott, who uncovered massive PFOA contamination in Ohio & West Virginia from a DuPont factory



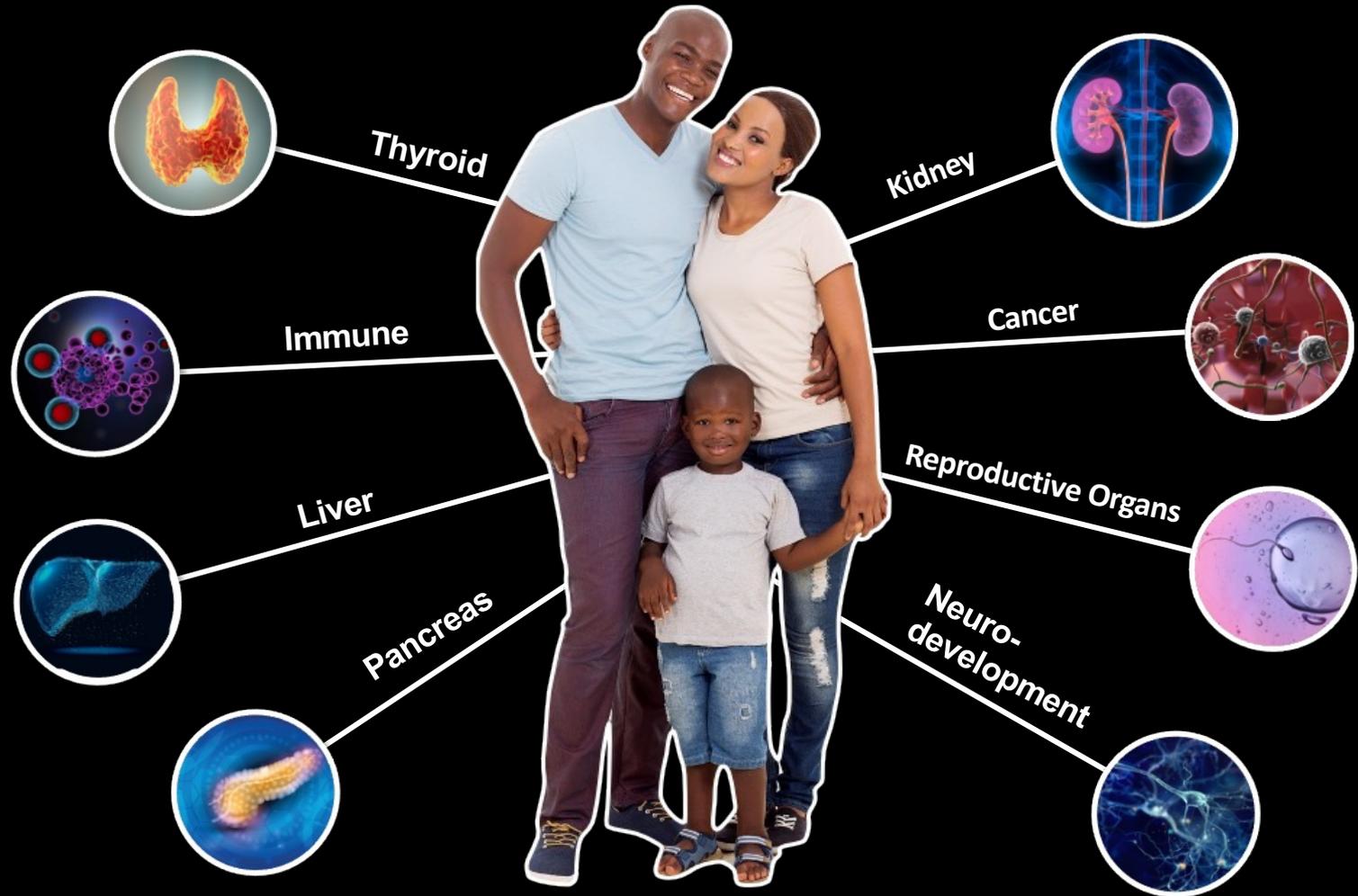
PFAS are in us



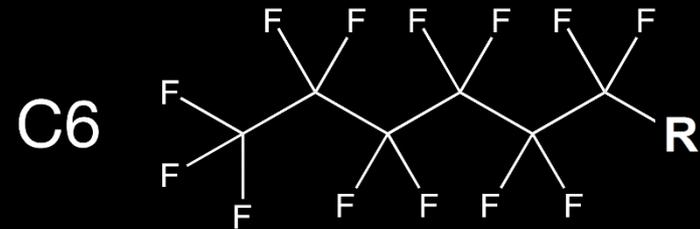
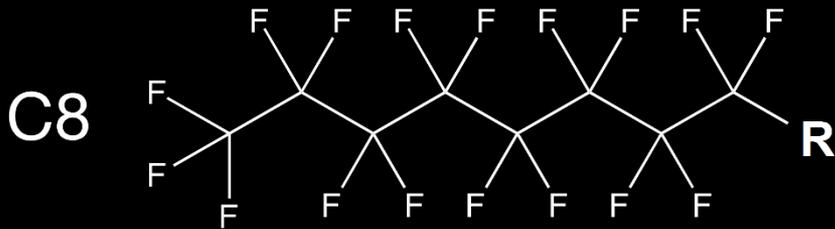
PFAS exposure linked to health risks:

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

PFAS: Multi-System Toxicants



Is C6 a safer substitute for C8?



Long chain:

- Extreme persistence
- Bioaccumulation
- Toxicity

Short chain:

- Extreme persistence
- Less bioaccumulation in humans
- Build-up in plants
- Toxicity
- More mobile
- Remediation more difficult

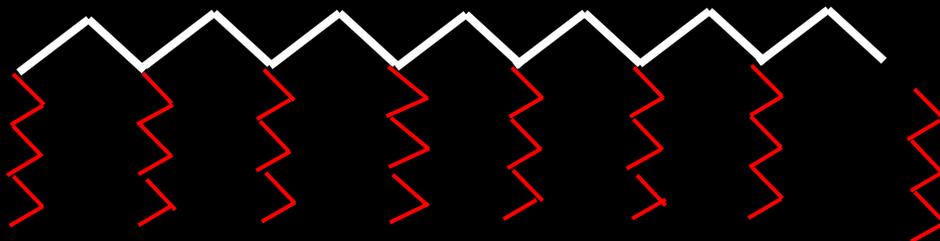
Polymer Problems

1. Polymer production (Teflon, GORE-TEX, etc.) is the major source of air & water contamination.



- A majority of PFAS in the environment are from fluoropolymer manufacturing and use
- Worker exposure concerns

2. Side chain polymers can break off & then cause harm.



PFAS Polymers Breakdown

ENVIRONMENTAL
Science & Technology

Article

pubs.acs.org/est

Abiotic Hydrolysis of Fluorotelomer-Based Polymers as a Source of Perfluorocarboxylates at the Global Scale

John W. Washington^{*,†} and Thomas M. Jenkins[‡]

[†]USEPA, National Exposure Research Laboratory, 960 College Station Road, Athens, Georgia 30605-2700, United States

[‡]USEPA, Senior Environmental Employment Program, Athens, Georgia 30605-2700, United States

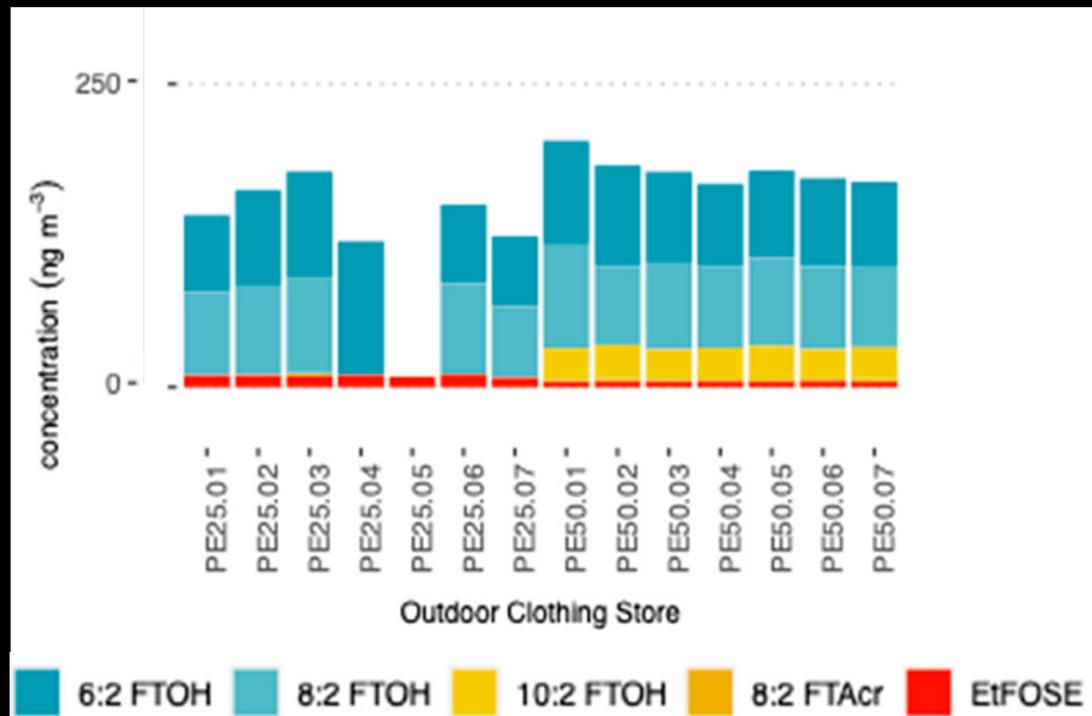
S Supporting Information

Fluoropolymer breakdown leads to PFAS in the environment.

Polymer Problems

3. Unreacted small molecules are allowed up to 2% in textiles & have been detected at up to 5%.
4. PFAS polymer production emits HFC gases which are very potent greenhouse gases.
5. At their end-of-life, PFAS can leach into groundwater or, upon incineration, release harmful emissions.

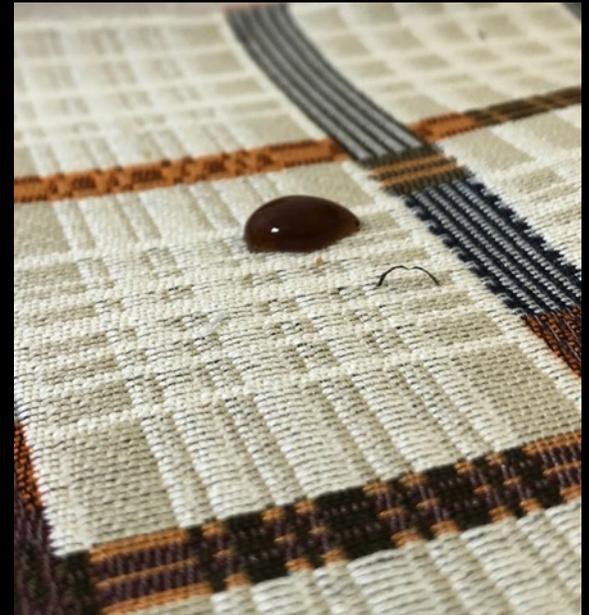
PFAS detected in the air of outdoor gear closets



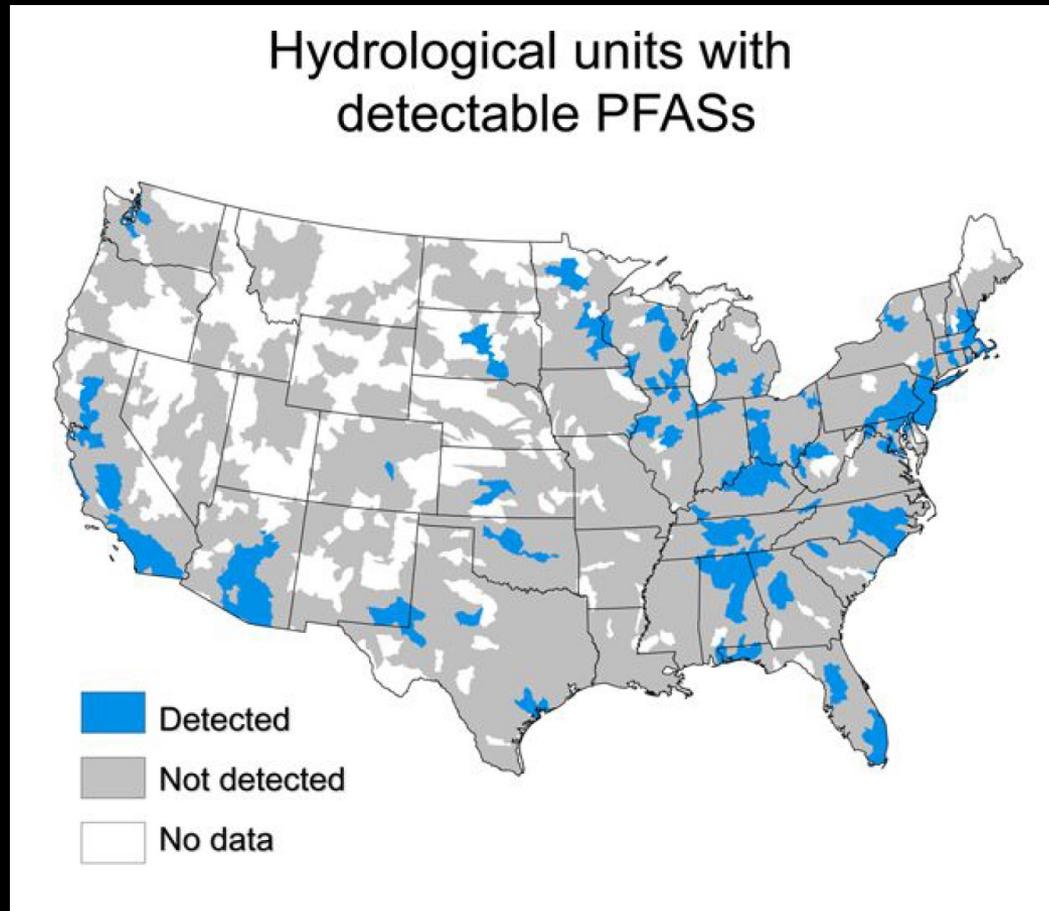
- Some PFAS are volatile and can evaporate from textiles
- Air inhalation a major exposure pathway for some PFAS

PFAS stain repellency finishes are often not effective

- 3 materials, each untreated, dip finished, or foam finished
- Stained with coffee or balsamic vinaigrette
- Fabric choice made the most difference to stain performance
- PFAS helped for *some* oil-based stains (non-abraded surface, quickly cleaned)



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

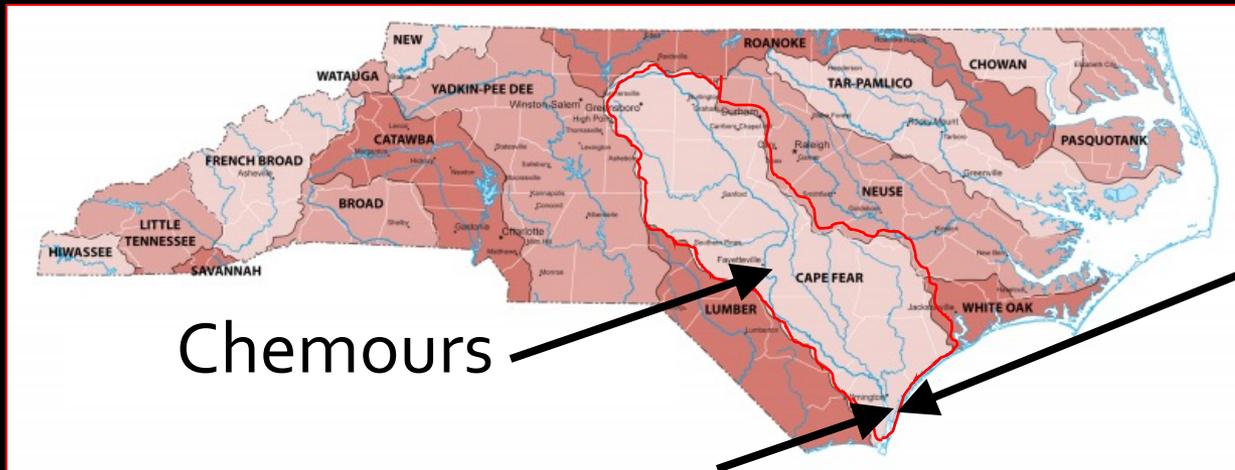


Expensive contamination in Michigan

- 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

PFAS are Problematic
& Difficult to Clean Up

Prevention is Preferable!

PFAS and Carpet

- PFAS-treated carpet linked to high PFAS blood levels

ENVIRONMENTAL
Science & Technology

Article

pubs.acs.org/est

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

 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](#).

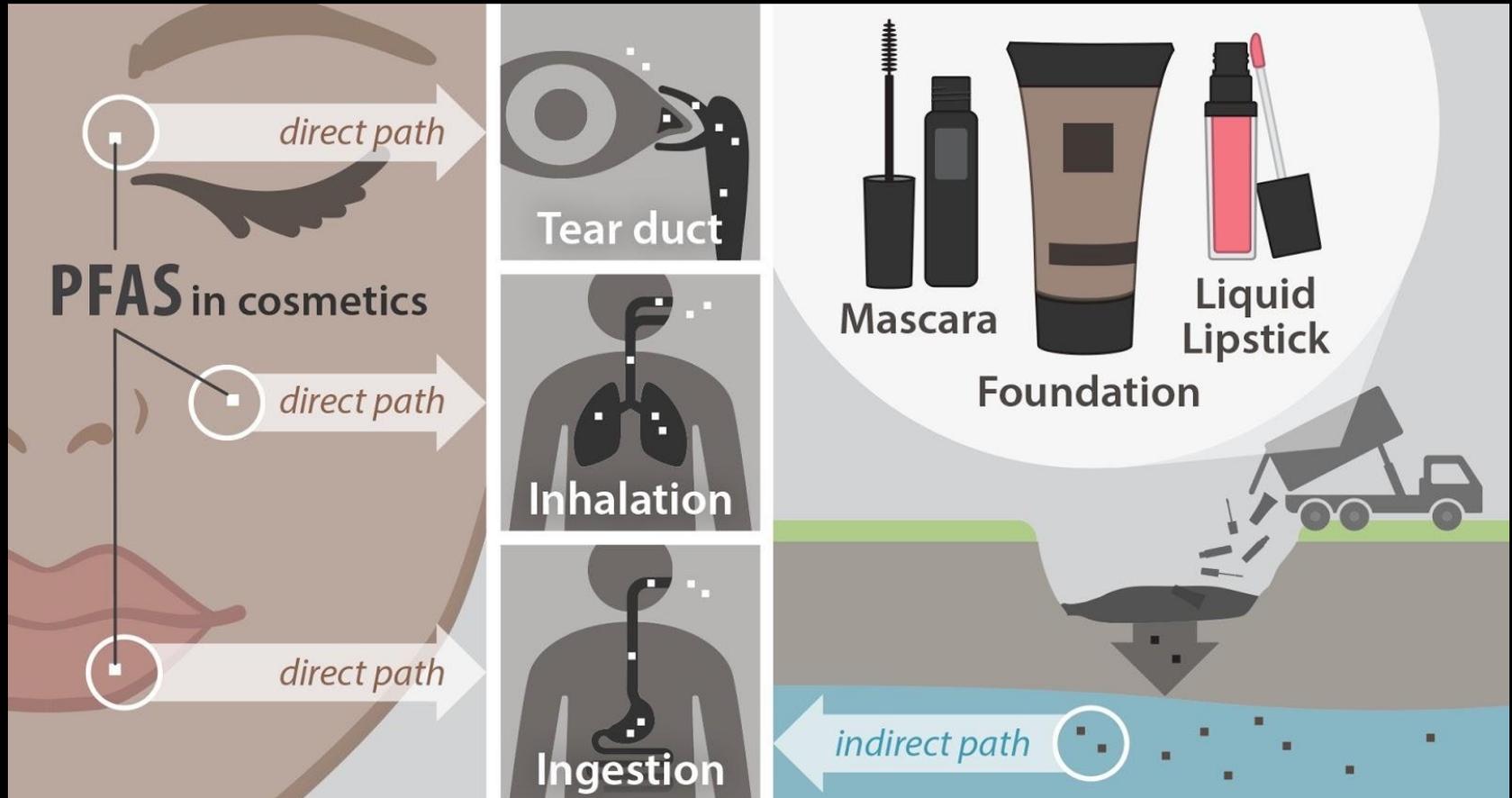
"Excluding PFAS from the carpets and rugs we sell is another example of our shared commitment to building a better future for our customers and the planet,"

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

June 15, 2021, *ES&T Letters*



The PFAS-Free Cosmetics Act

September 30, 2022

Bans all PFAS from being intentionally added to beauty & personal care products sold in California.

Likely to be followed across the US & Canada



Per- and Polyfluoroalkyl Substances in North American School Uniforms

September 21, 2022, *ES&T*



Found high levels of PFAS in all stain-resistant uniforms tested.

PFAS Banned in California Textiles

September 30, 2022



Will help protect children's health from PFAS in school uniforms & other clothing.

Keen's PFAS-Free Journey

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





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



Outdoor Gear:

- Deuter (all products, [policy](#))
- Didriksons (all products, [policy](#))¹
- Black Diamond (select products with GTT DWR, [policy](#))
- Endura (select products, [policy](#))
- Houdini (all products, [policy](#))
- Jack Wolfskin (all products, [policy](#))
- Mammut (select products, [policy](#))²
- Marmot (EvoDry rainwear products, [policy](#))
- Nau (PFC-Free DWR Collection, [policy](#))
- Onrunning (select products, [policy](#))
- Ornot (select products, [policy](#))
- Páramo (all products, [policy](#))
- prAna (select products, [policy](#))³
- Vaude (all apparel products, [policy](#))

PFAS-FREE



Outdoor Gear:

- Deuter (all products, [policy](#))
- Didriksons (all products, [policy](#))
- Black Diamond (select products, [policy](#))
- Endura (select products, [policy](#))
- Houdini (all products, [policy](#))
- Jack Wolfskin (select products, [policy](#))
- Mammut (select products, [policy](#))
- Marmot (Evo line, [policy](#))
- Nau (PFC-Free line, [policy](#))
- Onrunning (select products, [policy](#))
- Ornot (select products, [policy](#))
- Páramo (all products, [policy](#))
- prAna (select products, [policy](#))³
- Vaude (all apparel products, [policy](#))

Contact Lydia
if you'd like to
be added to
this page.

Just say NO to PFAS

Ideas from Matthias Foessel, Beyond Surface Technologies

- Design the best gear you can without PFAS – with new legislation the playing field is level.
- Giving up PFAS could be a small, temporary step backward for some of your products but a big step forward for the health of our population and planet
- Erase C6 from your brain so that true innovation can occur, and build the best products you can without PFAS



GREEN SCIENCE
POLICY INSTITUTE

Learn More:

[GreenSciencePolicy.org](https://www.GreenSciencePolicy.org)

[PFASCentral.org](https://www.PFASCentral.org)

[SixClasses.org](https://www.SixClasses.org)

Sign up for our monthly e-newsletter



Lauren Zeise

CA Office of Environmental Health
Hazard Assessment



OEHHA PFAS Activities

Reasons for concern

- Extremely strong carbon–fluorine bonds—the defining characteristic of PFAS
- Highly persistent in the environment and in the body
- Highly mobile in the environment
- Widespread human exposure
- Evidence of toxicity continues to mount

Activities at OEHHA

- Drinking-water and air toxics advisory levels
- Biomonitoring studies (with DTSC and CDPH)
- Proposition 65 listings
- Computational toxicology to group PFASs and evaluate biological activity

PFASs Cause Multiple Adverse Effects



Immune toxicity
PFOA, PFOS

Liver toxicity
PFOA, PFOS
PFHxS
PFBS

Cancer
PFOA, PFOS, its salts,
and its transformation and
degradation precursors

Developmental toxicity
PFOA, PFOS
PFHxS
PFBS



Thyroid toxicity
PFOA, PFOS
PFHxS
PFBS

Cardiovascular toxicity
PFOA

Kidney toxicity
PFOA
PFBS

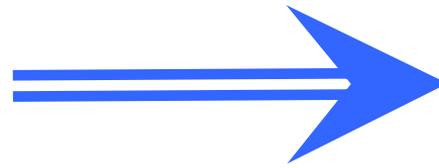
Reproductive toxicity
PFOA, PFOS
PFNA and salts
PFBS

Listed under Proposition 65

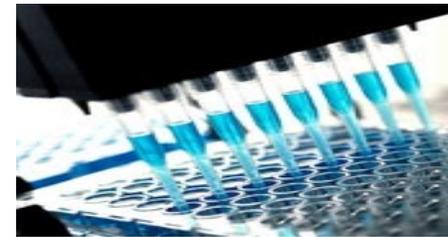
- All PFAS are listed as *priority chemicals* to be measured in biomonitoring studies
- 11 studies, 2010–2020
- ~3600 participants
- Widespread exposure, even with phase out of long chains

	Detections in people	Half-life in humans
PFOA	> 95%	2-4 years
PFOS	> 95%	3-5 years
PFHxS	> 98%	5-16 years
PFNA	>90%	1-3 years
PFDeA	50-100%	7 years
PFUA	50-100%	4 years
PFBA	>60%	7-38 hours
Me-PFOSA-AcOH	66-100%	---

Most PFAS Do Not Have Standard Data Sets— What can new approaches tell us?



- Gather information on more chemicals in much less time
- Test how chemicals can perturb normal cell function
- Model biological interactions using supercomputers
- Group chemicals by structural or biological similarity
- Translate results into advisory levels, standards, actions





SAFER
CONSUMER
PRODUCTS

Safer Consumer Products: Advice to Manufacturers and Brands

Tom Bruton, Tom.Bruton@dtsc.ca.gov



California Environmental Protection Agency



Department of Toxic Substances Control

Nov. 30, 2022 • PFAS
Outdoor Industry



DTSC's Safer Consumer Products Program

Created by 2008 Green Chemistry Law (AB 1879)

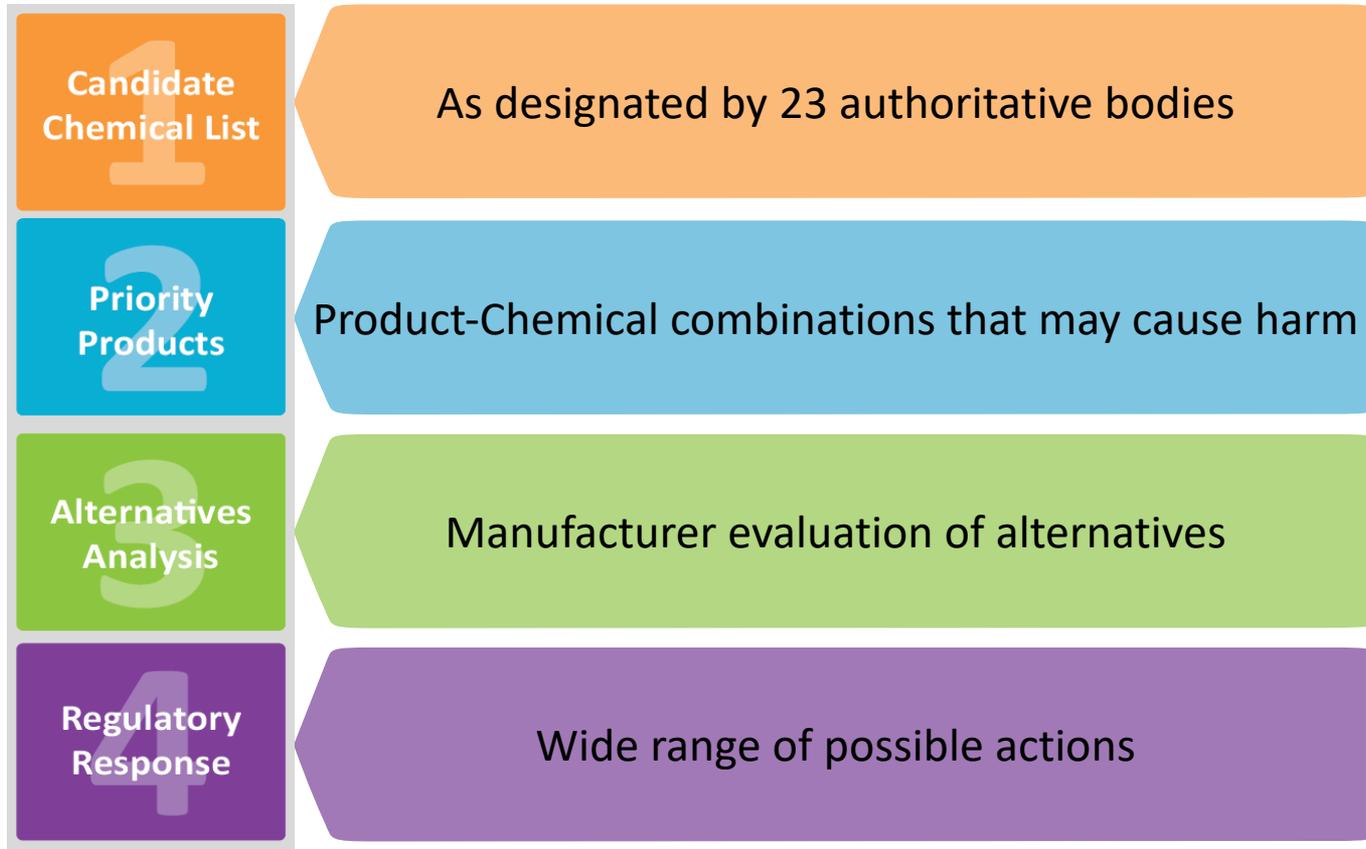
Mission: Advance the design, development, and use of products that are chemically safer for people and the environment

Goals:

- Reduce hazardous chemicals in consumer products
- Increase the adoption of green chemistry principles and safer alternatives to chemicals of concern in consumer products



Safer Consumer Products Framework



What is a Priority Product?

A product-chemical combination that meets these criteria:



There are potential **exposures** to a Candidate Chemical in the product

AND

One or more exposures have the potential to contribute to or cause **significant or widespread adverse impacts**



Why is DTSC concerned?

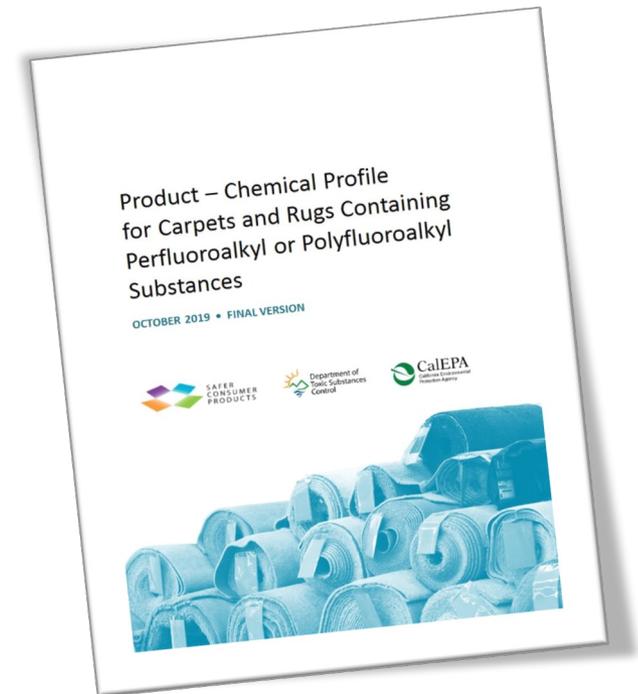
PFAS hazard traits:

- Environmental persistence
- Mobility in the environment
- Bioaccumulation
- Lactational and transplacental transfer
- Carcinogenicity
- Cardiovascular toxicity
- Developmental toxicity
- Endocrine toxicity
- Hepatotoxicity
- Immunotoxicity
- Nephrotoxicity
- Ocular toxicity
- Reproductive toxicity
- Phytotoxicity
- Wildlife developmental, reproductive, and survival impairment



Priority Product: Carpets and rugs containing PFASs

- Regulation effective 7/1/21
- Manufacturers of carpets and rugs containing PFASs were required to notify DTSC by 8/30/21
- No notifications were received
- DTSC initiating compliance testing



<https://dtsc.ca.gov/scp/carpets-and-rugs-with-perfluoroalkyl-and-polyfluoroalkyl-substances-pfass/>

Priority Product: Treatments containing PFASs for Use on Converted Textiles or Leathers

- Products sold for after-market use on carpets, furnishings, clothing, shoes, etc.
- Regulation effective 4/1/22
- Manufacturers of treatments containing PFASs required to notify DTSC by 5/31/22
- Result: Numerous companies reformulating to non-PFAS alternatives or removing products from California market



Approach: Regulate PFASs as a Class

- All PFASs are Candidate Chemicals under the SCP regulations
- Regulating only a subset of PFASs has led to use of other PFASs (regrettable substitution)
- See 2021 EHP article for full rationale



HOME CURRENT ISSUE ARCHIVES COLLECTIONS ▾ AUTHORS ▾ ABOUT ▾

Vol. 129, No. 2 | Commentary

Regulating PFAS as a Chemical Class under the California Safer Consumer Products Program

Simona Andreea Bălan , Vivek Chander Mathrani, Dennis Fengmao Guo, and André Maurice Algazi

Published: 17 February 2021 | CID: 025001 | <https://doi.org/10.1289/EHP7431>



Perfluoroalkyl acids are relevant to the entire PFAS class

Perfluoroalkyl acids
e.g. PFOA, PFHxA, GenX

- Most studied
- Most frequently linked to health & environmental harm

Side-chain fluorinated polymers

- Used in DWR
- E.g. "C6"

Fluoropolymers

- Used in membranes
- E.g. PTFE



Perfluoroalkyl acids are relevant to the entire PFAS class

Perfluoroalkyl acids
e.g. PFOA, PFHxA, GenX



Degradation

Side-chain fluorinated
polymers

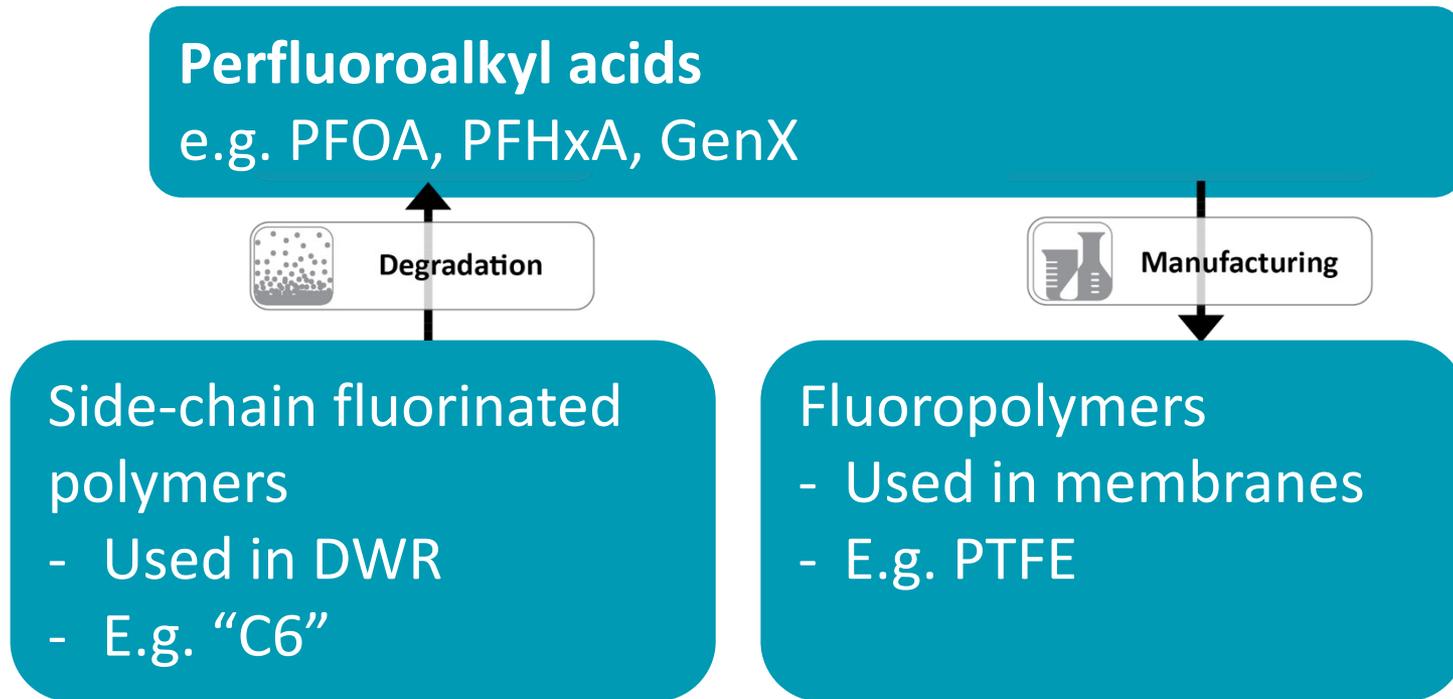
- Used in DWR
- E.g. "C6"

Fluoropolymers

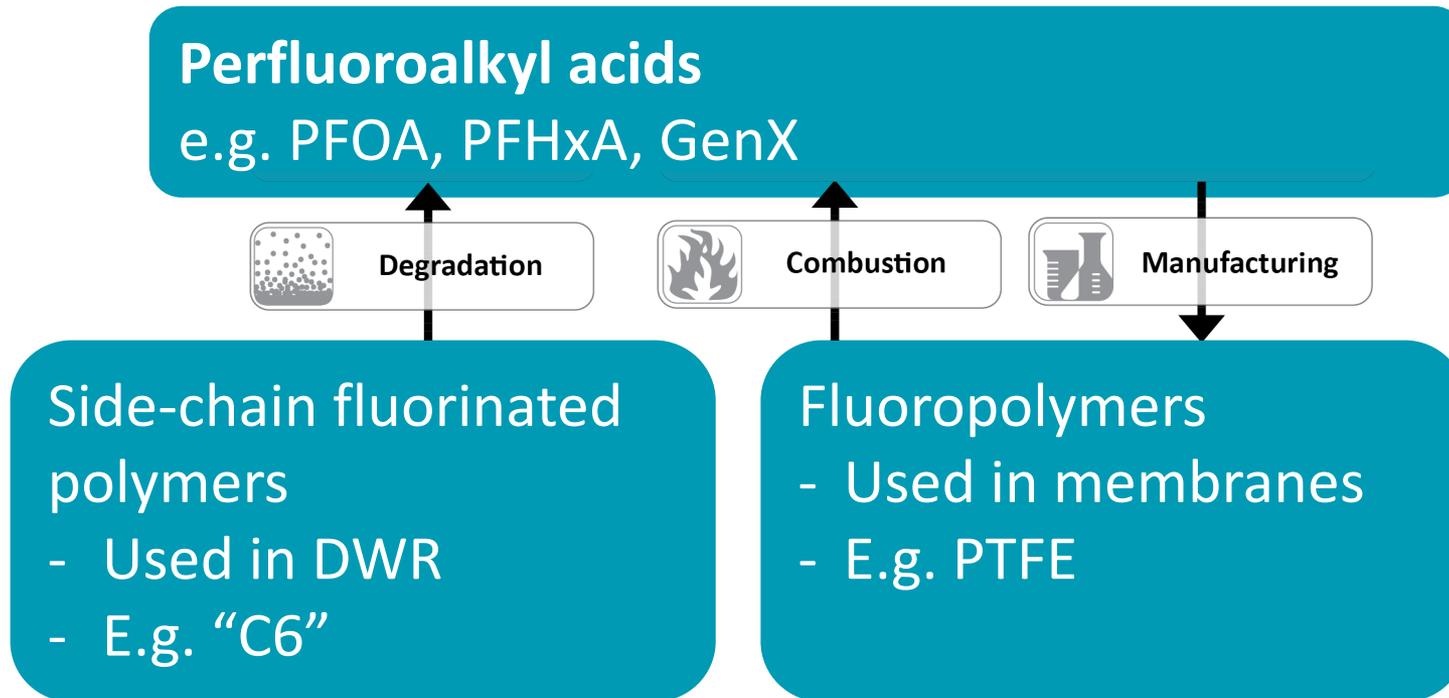
- Used in membranes
- E.g. PTFE



Perfluoroalkyl acids are relevant to the entire PFAS class



Perfluoroalkyl acids are relevant to the entire PFAS class



How to test for ALL PFASs?

■ Not targeted methods

- E.g., EPA Method 537.1:
 - 11Cl-PF3OUdS
 - 9Cl-PF3ONS
 - ADONA
 - HFPO-DA
 - PFBS
 - PFDA
 - PFDoA
 - PFHpA
 - PFHxA
 - PFHxS
 - PFNA
 - PFOA
 - PFOS
 - NEtFOSAA
 - NMeFOSAA
 - PFTA
 - PFTTrDA

Perfluoroalkyl acids
(PFAAs)
e.g. PFOA, PFHxA, GenX

Side-chain fluorinated
polymers
- Used in DWR
- E.g. "C6"

Fluoropolymers
- Used in membranes
- E.g. PTFE



How to test for ALL PFASs?

- Total fluorine methods

- E.g., Combustion ion chromatography (CIC)

- Advantage:

- Measure both polymer and non-polymer PFASs

- Disadvantage:

- Non-specific: some versions lump together organic fluorine (mostly PFASs) with inorganic fluorine (not PFASs)

Perfluoroalkyl acids
(PFAAs)
e.g. PFOA, PFHxA, GenX

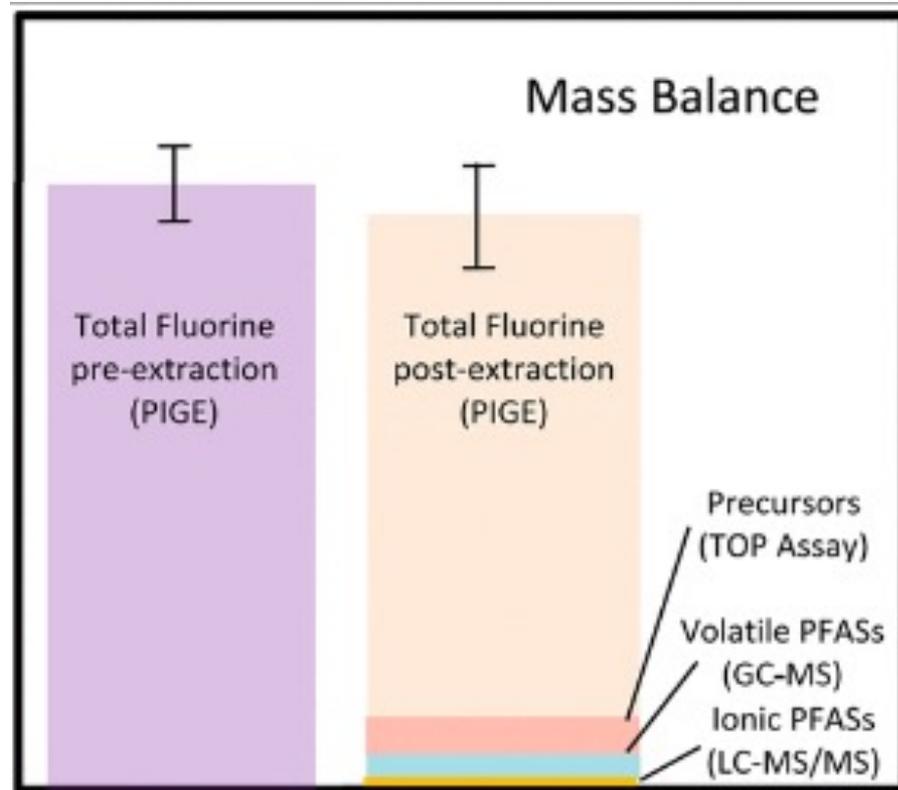
Side-chain fluorinated
polymers
- Used in DWR
- E.g. "C6"

Fluoropolymers
- Used in membranes
- E.g. PTFE



Total Fluorine vs. Targeted PFASs

- Robel et al. 2017 measured both total fluorine and targeted PFASs in samples of paper and textiles
- PFASs measured by targeted methods accounted for **0-3%** of the total fluorine.



Avoiding Regrettable Substitutes



- Is it necessary?
- Is there a safer alternative?
- What are the tradeoffs?



Thank you!

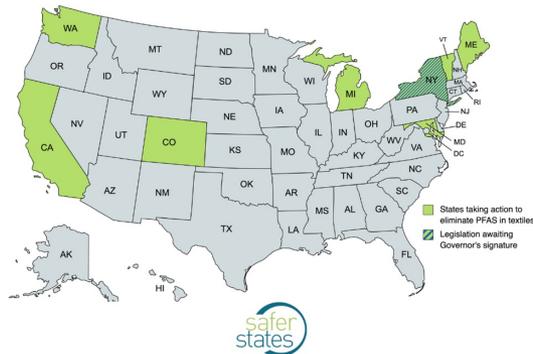
Contact me: Tom.Bruton@dtsc.ca.gov

SCP home page: <https://dtsc.ca.gov/scp/>

Join our e-List: <http://bit.ly/scpupdates>



Regulation of PFAS in Textiles: California and Beyond



Nancy Buermeyer

Director of Program and Policy
Breast Cancer Prevention Partners

Nov. 30, 2022



Why a breast cancer group?

Breast Cancer Prevention Partners

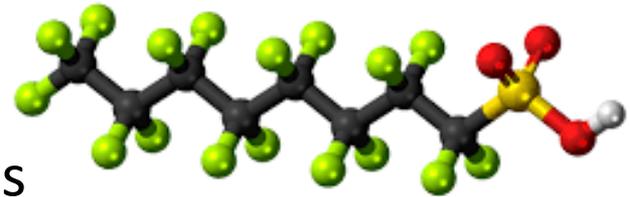
BCPP is the leading science-based advocacy organization working to prevent breast cancer by eliminating our environmental exposures to toxic chemicals and radiation.



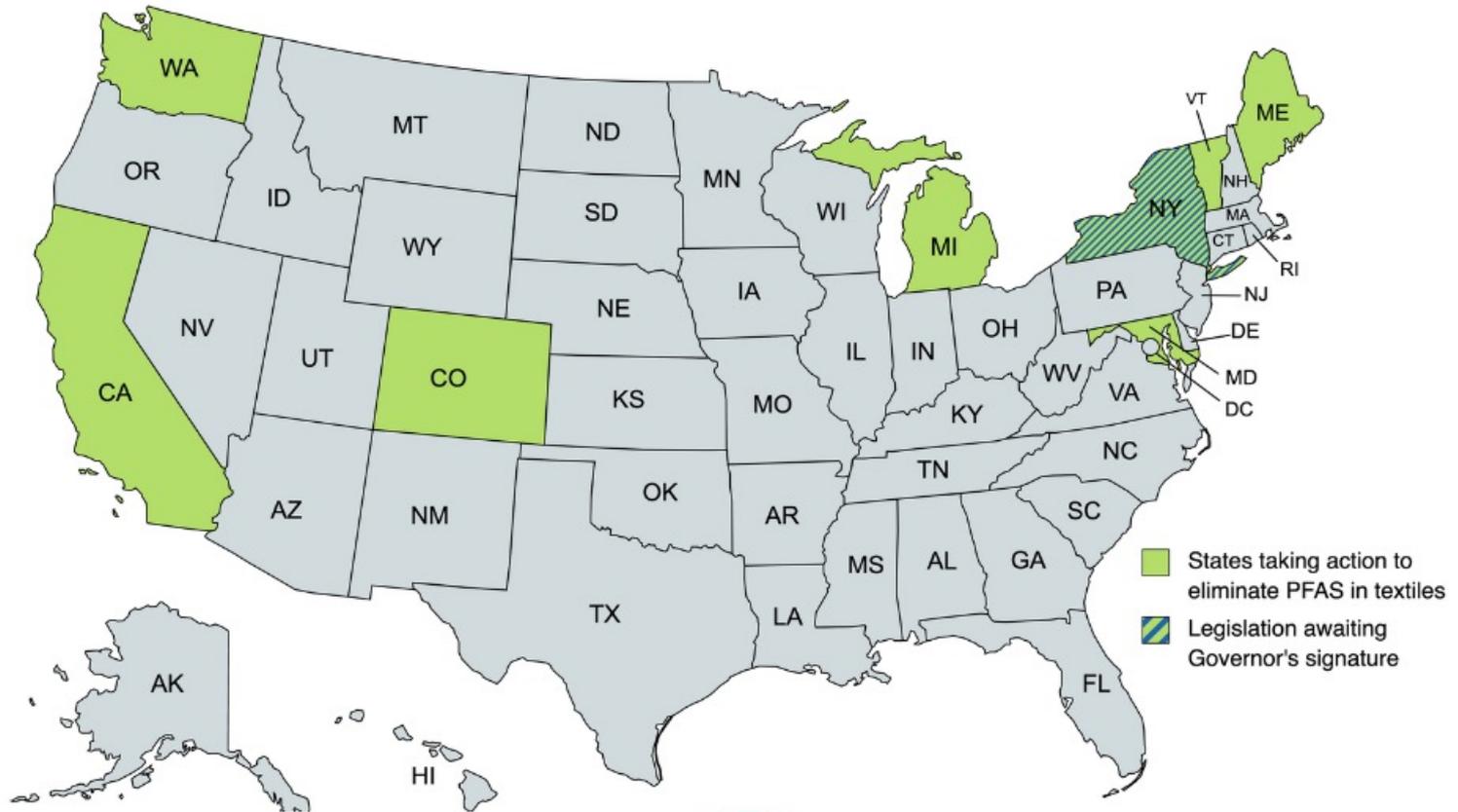
State Laws and Policies

Banning the Entire Class of PFAS

- Bans – intentionally added and threshold for contamination
 - Specific product categories – textiles, food packaging, cosmetics, firefighting foam, carpets and rugs, aftermarket sprays, ski wax, cleaning products, etc.
 - Maine-style – all products without an "essential use" exemption
- Disclosure
- Procurement Policies
- Recycling/Compostability Restrictions



States in the Lead



State Laws - California

Safer Clothing and Textiles Act (AB 1817)

Bans the manufacture, sale, or distribution of clothing and household & commercial textiles that contain PFAS.



What's Covered:

- **Clothing** intended for regular wear or formal occasions, including outdoor apparel, footwear, undergarments, shirts, pants, skirts, dresses, suits, school uniforms, sports uniforms, bibs, diapers, and everyday uniforms for workwear.
- **Textile articles** including accessories, handbags, backpacks, draperies, shower curtains, furnishings, upholstery, beddings, towels, napkins, and tablecloths.

State Laws - California

Safer Clothing and Textiles Act (AB 1817)

Bans the manufacture, sale, or distribution of clothing and household & commercial textiles that contain PFAS.



What's Not Covered:

- Personal protective equipment
- Items for exclusive use by the military
- Transportation (planes, boats, cars, etc.)
- Laboratory uses/industrial filtration applications
- Products regulated by CA Safer Consumer Products Program (carpets, rugs, aftermarket sprays)
- Permanent fabric structures intrinsic to a building's construction or design

State Laws - California

AB 1817 – Regulated PFAS Definition

- **PFAS Definition:** a class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom.
- **Regulated PFAS:**
 - Any intentionally added PFAS
 - PFAS above **100 ppm** until 1/1/2027
 - PFAS above **50 ppm** going forward
 - Measured as total organic fluorine



State Laws - California

AB 1817 - Timelines

As of 1/1/2025:

- Bans PFAS in clothing and textiles.

Extension until 1/1/2028 for:

- Outdoor apparel for severe wet conditions that is **not marketed for general consumer use** and is **designed for sports experts**.
- Requires **disclosure** of PFAS in these products sold between 2025-2028, including online listings.



State Laws – Colorado

PFAS Chemical Consumer Protection Act

Bill covering several product categories passed in 2022.

Textiles-specific Provisions

Starting 1/1/2024:

- Bans PFAS in carpets and rugs and fabric treatments

Starting 1/1/2025:

- Indoor textile furnishings and indoor upholstered furniture

Starting 1/1/2027:

- Outdoor textile furnishings and outdoor upholstered furniture



State Laws – Washington

Safer Products for Washington

Agency currently acting on leather and textile furnishings, carpets, aftermarket treatments.

HB 1694 2022 law:

- Agency required to take accelerated action on PFAS in firefighter gear.
- Allows accelerated action on several other categories in the Department's PFAS action plan, potentially including apparel and gear.



State Laws – New York

Senate Bill S6291A

Pending Governor's Consideration
(Deadline end of year)

Starting Dec. 31, 2023:

- Bans intentionally added PFAS in everyday apparel.

(B) "Apparel" means clothing items intended for regular wear or formal occasions including undergarments, shirts, pants, skirts, dresses, overalls, bodysuits, vests, dancewear, suits, saris, scarves, tops, leggings, leisurewear, formal wear, onesies, bibs, and diapers. "Apparel" shall not include professional uniforms or outerwear intended for extreme conditions.



European Union

PFAS – Chemical by Chemical



- Individual PFAS compounds and their “salts” or “related compounds”
- Thresholds ranging from 25ppb to 1000ppb
- Broader provisions under consideration

Take Away...

PFAS Chemicals are on their way out



Time to get ahead of the curve!

10-15 minute break

Manufacturer's Panels

Quick summaries of each brand's journey towards PFAS-Free (3-5 min)

- Columbia
- Marmot
- Nike
- Peak Design

Manufacturer's Panels

Quick summaries of each brand's journey towards PFAS-Free (3-5 min)

- Patagonia
- NEMO Equipment
- KEEN

PFAS Challenges & Solutions

Group Instructions

- Group of six with time keeper
- **What is a big challenge? A good solution?**
- Think about answers and write 5 minutes
- Report back each **ACTIVE LISTENING** 2-3 minutes
- Choose 1 problem, 1 solution to share 10 minutes
- Flipchart 5 minutes
- Groups report back and discuss 20 minutes

LUNCH

We will start promptly at 1 pm.

Moving to safer
alternatives &
verification



Marty Mulvihill, PhD
Managing Partner, Safer Made
Martin.Mulvihill@safermade.net

Moving to safer alternatives & verification:
AFIRM, bluesign, OEKO-TEX, and ZDHC



**People's concern
about their families'
chemical exposure
translates into
demand for safer
products.**

Innovation opportunities by sector and function

The cover features a vibrant, abstract background with swirling colors of blue, cyan, and red. A dark blue rectangular box is positioned on the right side, containing the title and date. A thin yellow vertical line is on the left side of the box.

Safer Chemistry
Innovation in
the Textile and
Apparel Industry

JUNE 2018

The cover features a photograph of a person's arm and hand holding a blue container. The background is a mix of blue and green. A dark blue rectangular box is positioned on the left side, containing the title and date. A thin yellow vertical line is on the left side of the box.

**SAFER MATERIALS
IN FOOD PACKAGING**

MARCH 2019

PFAS Functions and Alternatives

Function	Alternatives
Water Repellency	Chemicals: Waxes, oils, polymers, silicones Change Base Material
Paper Barrier	Chemical: Polymers Process Change: Increase density
Slip	Chemicals: Silicones Design Change: Control surface roughness
Stain Repellency	Change Base Material: Decrease porosity

Examples from the Safer Made Portfolio

ecologic
packaging the earth can live with

Sustainable packaging



MIMIKAI
INSECT REPELLENT

Effective and safe insect repellent alternative to DEET



Repurpose.

Compostable single use food service



FORCE of NATURE™

Safer home cleaner and disinfectant



P2 Elegant Processes. Sustainable Products.

Safer personal care and beauty ingredients



nohbo

Personal care without plastic and preservatives



SYNERGIO
A Higher Form of Nurture

Plant derived preservatives



defunkify

Sustainable laundry and household cleaning



dimpora

PTFE free Membranes



gtt

PFAS free textile finishing



Investing in safer chemistry addresses has sustainability co-benefits

Cumulative Direct Impact of Safer Made Portfolio Companies:

4,650 Metric Tons



Plastic Waste

3,025 Metric Tons



Fiber Waste

460 Metric Tons



Carbon Dioxide

90,595 Kg*



Hazardous Chemicals

PFAS-free Durable Water Repellant Finishing

Chemical Supplier	Mill/Fabric/Material Supplier	Consumer Applied
Bolger & O'Hearn (Altopel F3® products, policy)	Allied HyperDRY Down	Detrapel
CHT (zeroF products, policy)	DownTek (select products, policy)	Grangers Wash + Repel Clothing 2 in 1
Daikin (Unidyne XF, policy)	SamWoo	Scotchgard Fabric Water Shield
NEI (NANOMYTE® SR-200EC, policy)	AKAS (select products, policy)	Merrell Rain & Stain Waterproof / Repel Liquid and Stain Barrier
NICCA (select products, policy)	Sung Feng Textile (select products, policy)	NikWax
Rudolf Group (Bionic-Finish® ECO, policy)	Haartz	
Sarex (select products, policy)	YKK	
Sciessent (Curb Water Repellent products, policy)	Long John Group	
Dystar Evo Protect D	Schoeller Ecorepel	
Maflon Hydrosin NF-01	HeiQ Eco Dry	
Texchem Texfin HTF	Polartec, (select products, policy)	
Green Theme Technologies		
Stahl Permutex WR 43-064		
Bozzetto Group Reapret		
Archroma Smartrepel Hydro		
Huntsman Phobotex RSY		
Beyond Surface Technologies miDori evoPel		
Drywire		
OSM Shield		

PFAS-Free Membranes

Supplier	Material/s
Sympatex	Polyurethane
Dimpora	Polyurethane, Polyolefin, Biobased
Columbia OutDry	Polyurethane
BenQ Xpore	Polyolefin
Trenchant	Polyolefin
Gore-Tex ePE	Polyolefin
Porelle	Polyurethane
Pertex Revolve	Polyester



Closing Thoughts

- Rethinking materials and chemistry will be required to meet sustainability goals.
- Don't look for a one-size-fits-all solution.
- If it seems too good to be true, it probably is, beware of hidden PFAS.
- Understand certification and RSLs and develop partnerships that help meet brand goals.

www.safermade.net



Panel Discussion

- AFIRM – Nate Sponsler
- bluesign technologies – Kevin Myette
- OEKO-TEX – John Frazier
- ZDHC – Scott Echols

Discussion: Next steps

Group Instructions

- Group of six with time keeper
- How can the outdoor industry move away from PFAS (together?) & other harmful chemicals?
- Think about solutions and write 5 minutes
- Report back each ACTIVE LISTENING 2-3 minutes
- Choose one – two solutions to discuss 10 minutes
- Flipchart 5 minutes
- Groups report back and discuss 20 minutes

10-15 minute break

Inspiring a healthier &
more profitable future



Just say NO to PFAS

Ideas from Matthias Foessel, Beyond Surface Technologies

- Design the best gear you can without PFAS – with new legislation the playing field is level.
- Innovation can occur for better gear without PFAS.
- Giving up PFAS could be a temporary small step backward for some of your products but a big step forward for the health of our population and planet.
- We climbed Everest and Annapurna without any PFAS. Do we need PFAS to mostly walk our dogs or go birdwatching?

Discussion: Future actions

Each brand/organization works separately

- Next steps for your brand/organization for moving away from PFAS
- Think about next steps and write 5 minutes
- Discuss together 5 minutes
- Fill out commitment form 3 minutes

Action/Commitments

Name

Partner(s)

To help create the future I envision,
during the next month I will:

1.

2.

3.

Sharing Actions/Commitments

- Share one step for your brand/organization for moving away from PFAS
- Share one of your own personal commitments
- Report back each one min **40 minutes total**
- Discussion

Closing Remarks

Please fill out the evaluation form.

Optional Dinner at 6:30pm

Namaste Madras Cuisine, 2323 Shattuck Ave.



GREEN SCIENCE
POLICY INSTITUTE

Learn More:

GreenSciencePolicy.org

PFASCentral.org

SixClasses.org

Sign up for our monthly e-newsletter.

Please fill out the evaluation form.

Optional Dinner 6:30pm

Namaste Madras Cuisine, 2323 Shattuck