PFAS in the Built Environment:

Tracking Down Forever Chemicals in Building Products

AIA Austin COTE

Tom Bruton, PhD

Green Science Policy Institute

April 22, 2021

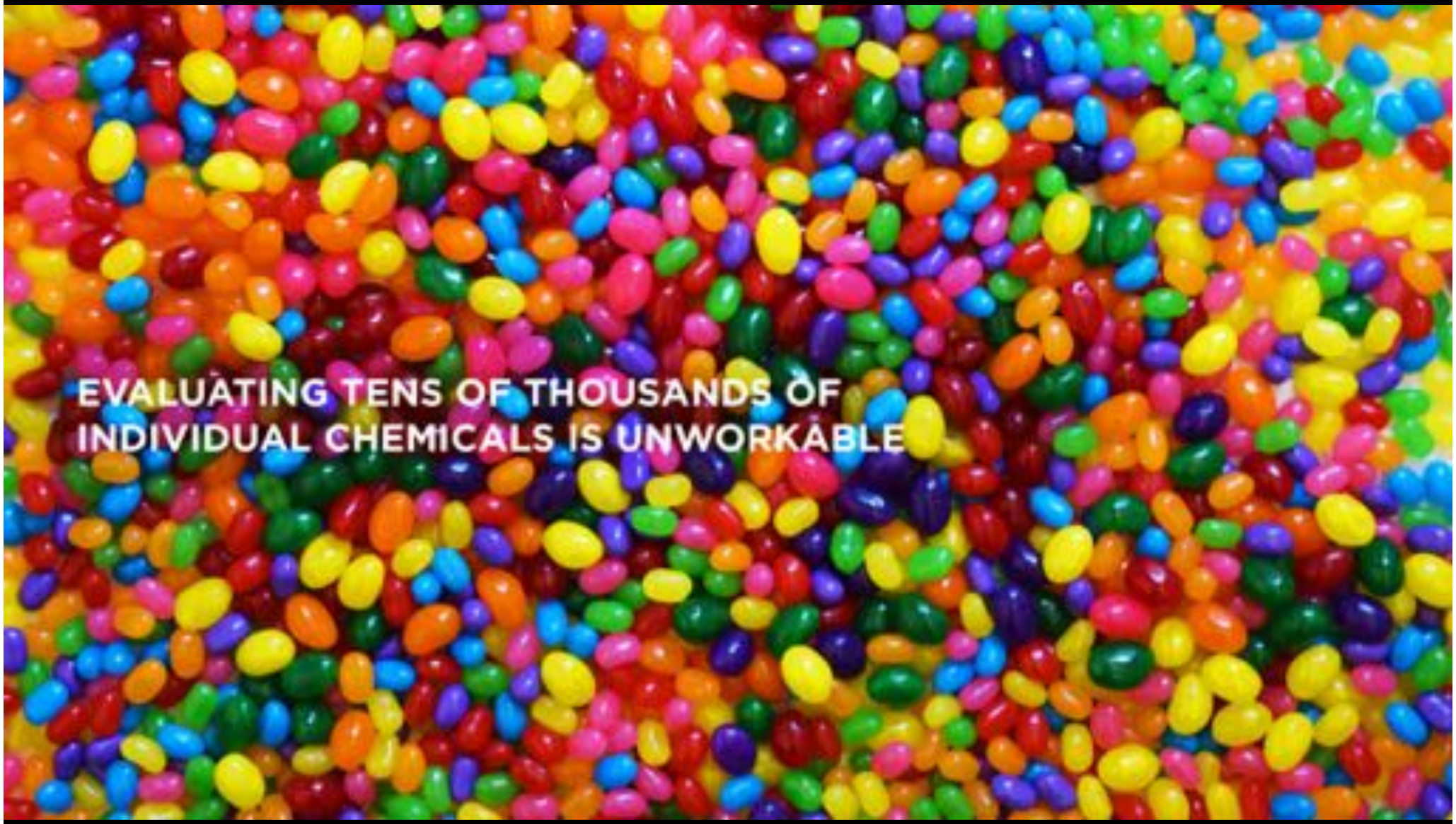
GREEN SCIENCE POLICY INSTITUTE

Scientific Research

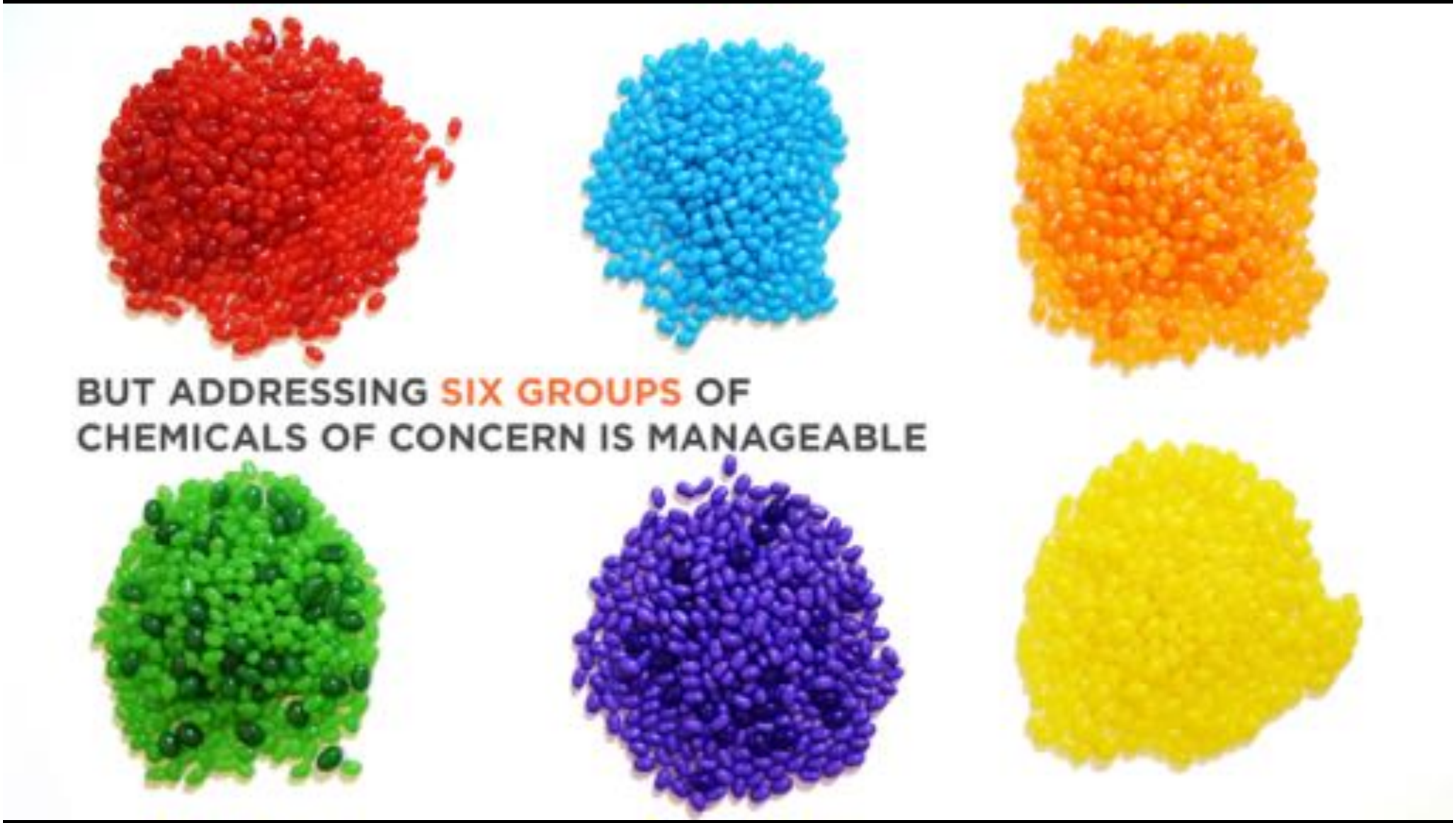
Bring together decision makers

Communicate

Policy & Purchasing Change



GREEN SCIENCE POLICY INSTITUTE
www.GreenSciencePolicy.org


BUT ADDRESSING SIX GROUPS OF
CHEMICALS OF CONCERN IS MANAGEABLE

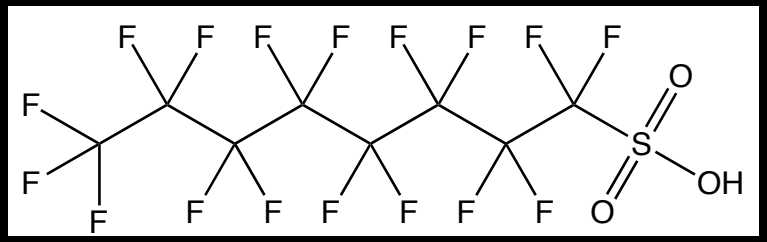
The Six Classes

VIEW and SHARE: www.SixClasses.org

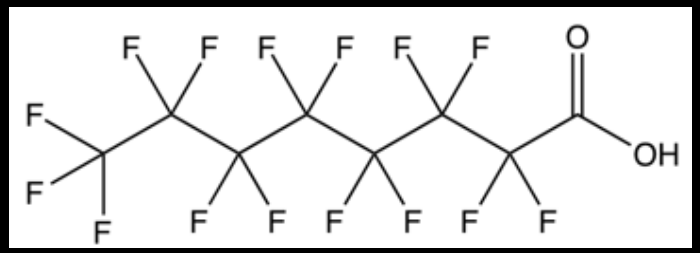
GREEN SCIENCE POLICY INSTITUTE
www.GreenSciencePolicy.org

PFAS
(Per and Polyfluoroalkyl Substances)

PFOS



PFOA

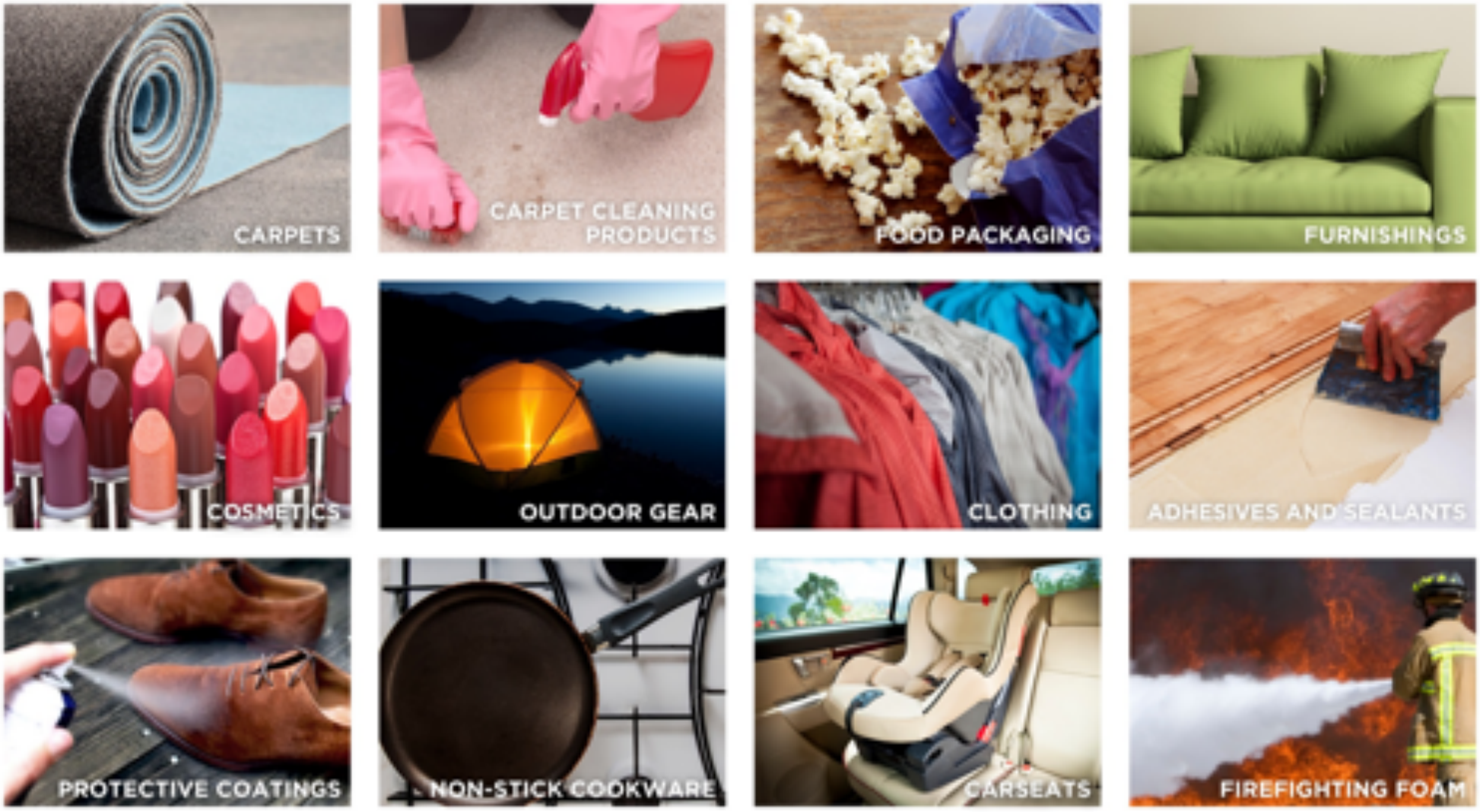


Carbon-Fluorine bond strength:

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

Courtesy: Dr. Jennifer Field

Common Uses


CARPETS
CARPET CLEANING PRODUCTS
FOOD PACKAGING
FURNISHINGS
COSMETICS
OUTDOOR GEAR
CLOTHING
ADHESIVES AND SEALANTS
PROTECTIVE COATINGS
NON-STICK COOKWARE
CARSEATS
FIREFIGHTING FOAM

May 2000

3M Employee Bulletin

Date: 05/16/2000

3M Phasing Out Some of its Specialty Materials

3M will phase out of the perfluorooctanyl chemistry in certain repellents and surfactant products by the end of this year. We thank the people in these business units for their hard work. They have consistently given the company and our customers their best efforts. For more information, below is a news release issued this morning:

ST. PAUL, Minn -- May 16, 2000 -- 3M today announced it is phasing out of the perfluorooctanyl chemistry used to produce certain repellents and surfactant products.

C FRIDAY, MAY 19, 2000

TOP OF THE NEWS

EPA says it pressured 3M over Scotchgard chemical

DAVID BARBOZA NEW YORK TIMES

CHICAGO

The Environmental Protection Agency said

sequences to human health.

"This isn't a health issue now, and it won't be a health issue," said Larry Zobel, the medical

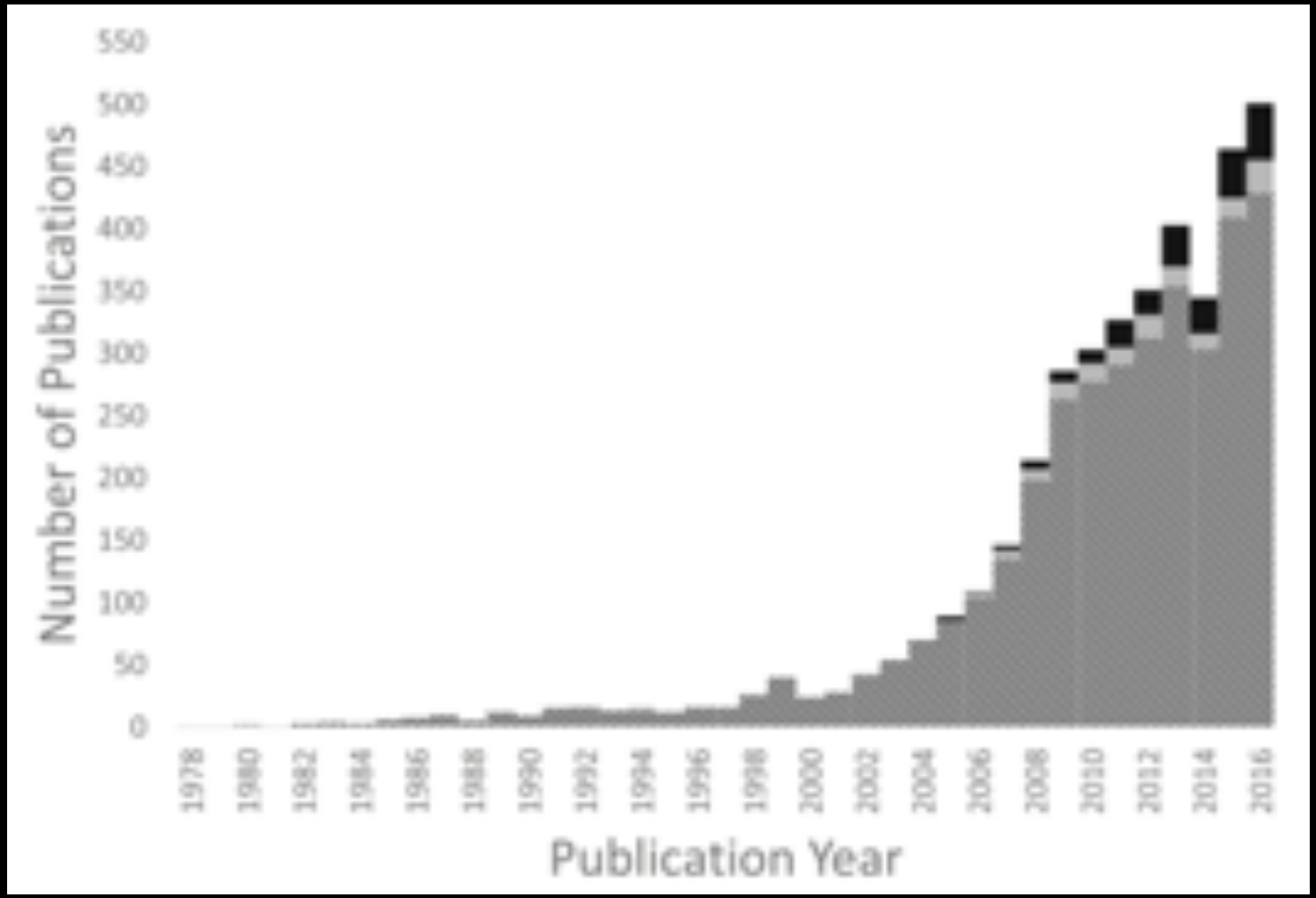
Ohio River Valley:
West Virginia Manufacturing Plant

- PFOA used to manufacture Teflon
- Releases to water & air
- 70,000 + residents with contaminated drinking water
- C8 Health Study

See the film *Dark Waters*

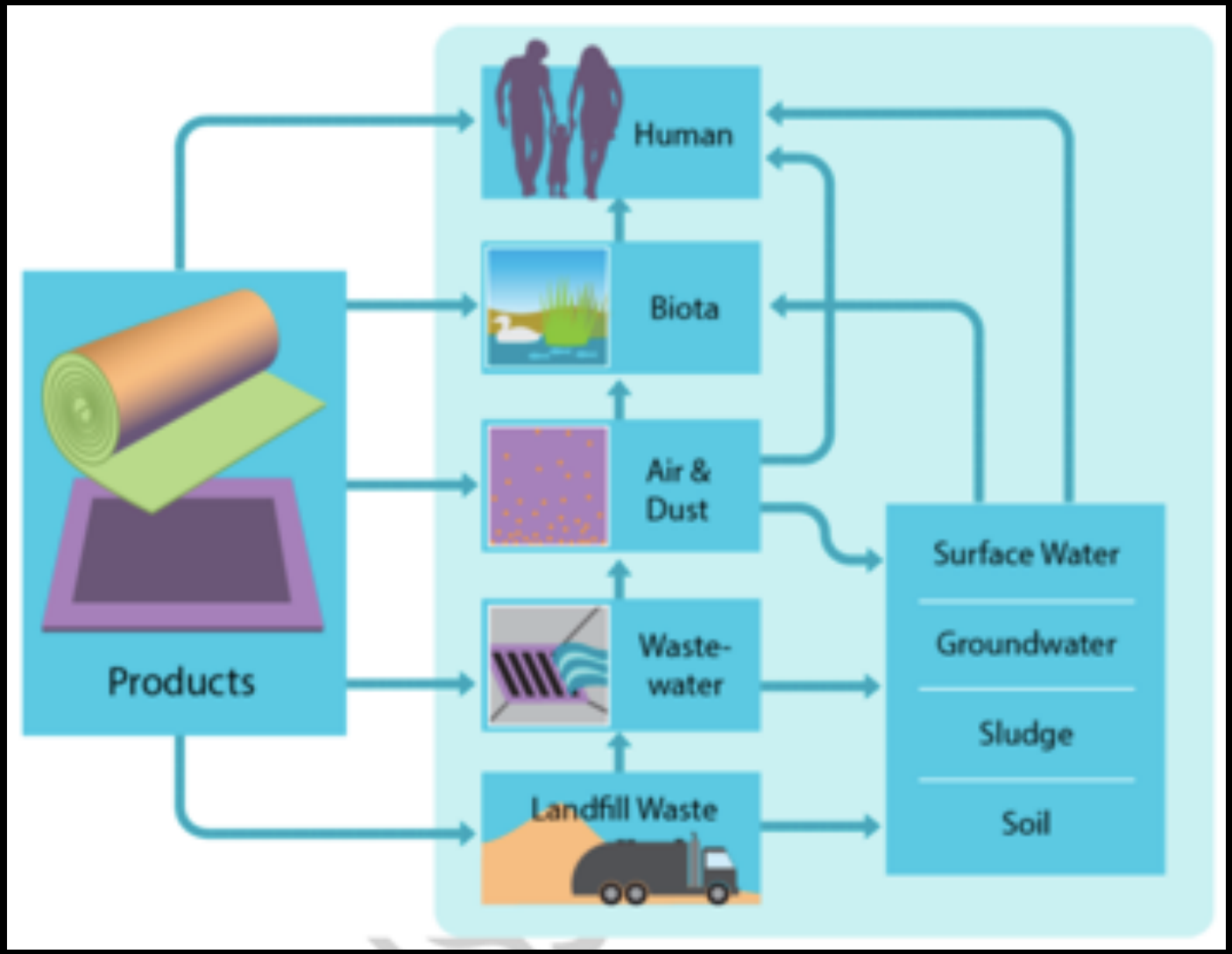
- The story of attorney Rob Bilott, who uncovered massive PFOA contamination from a DuPont factory in WV

Scientific publications on PFAS

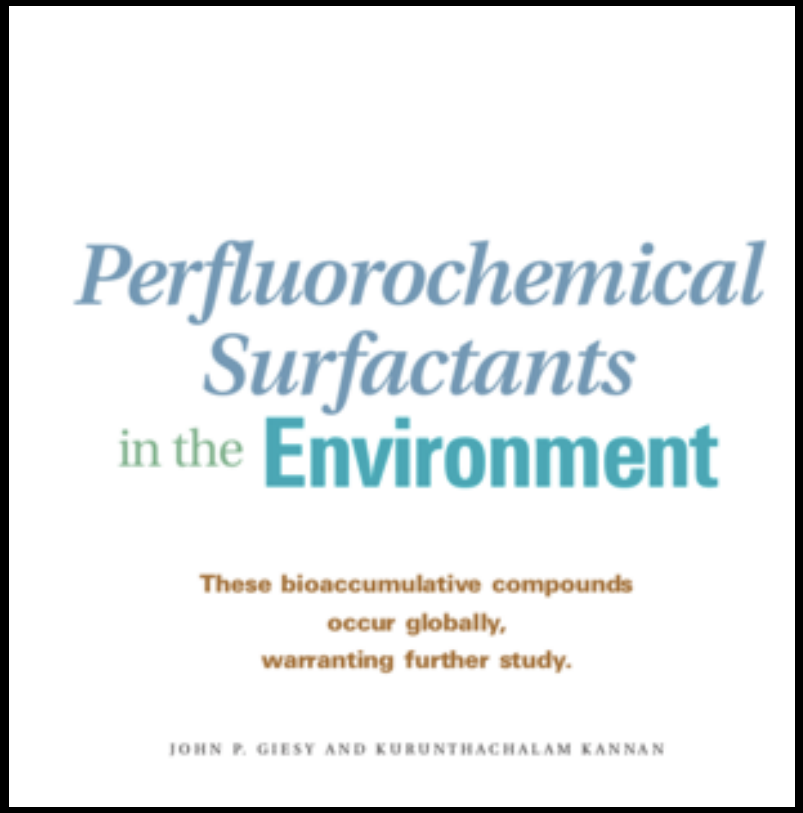


Grandjean, Environ. Health. 2018

Pathways to the Environment



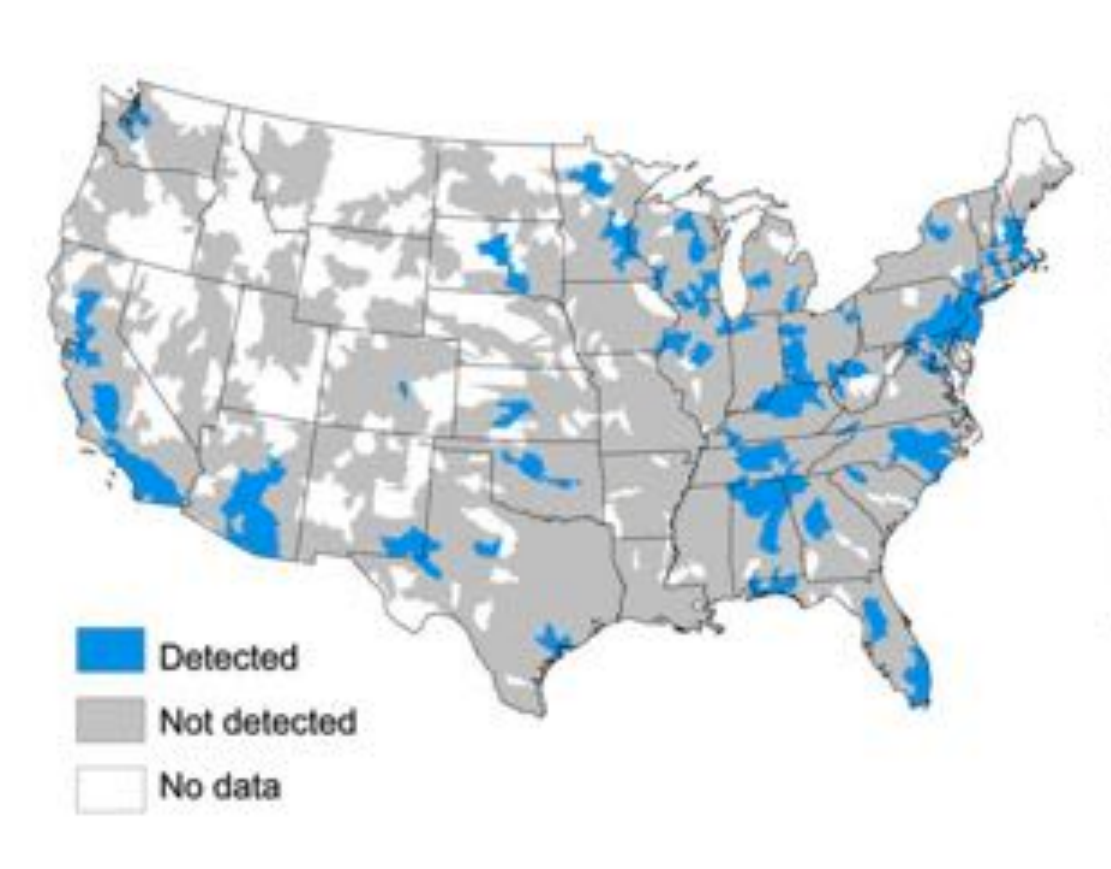
From California DTSC: Product-Chemical Profile for PFAS in Carpets and Rugs



- Ubiquitous
- Long-range transport

Giesy & Kannan,, Environ. Sci. & Technol. 2002

PFAS in U.S. Drinking Water



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

Hu et al., Environ. Sci. Technol. Lett. 2016

PFASs exposure is a health concern

Detectable serum PFASs

Non-detect

Exposure linked to health risks:

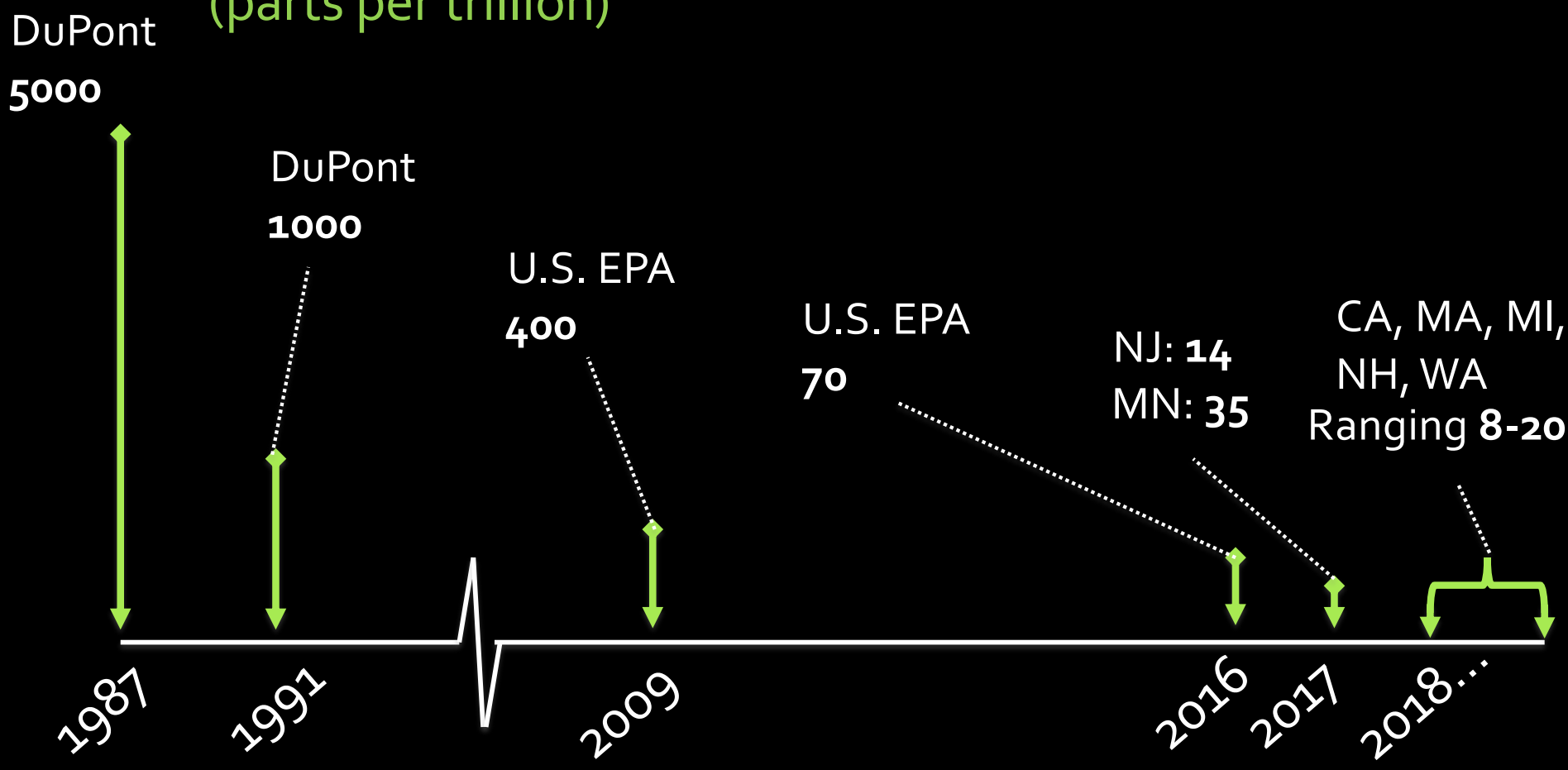
Cancer, elevated cholesterol, obesity, immune suppression, and endocrine disruption

Courtesy, Cindy Hu, Harvard University

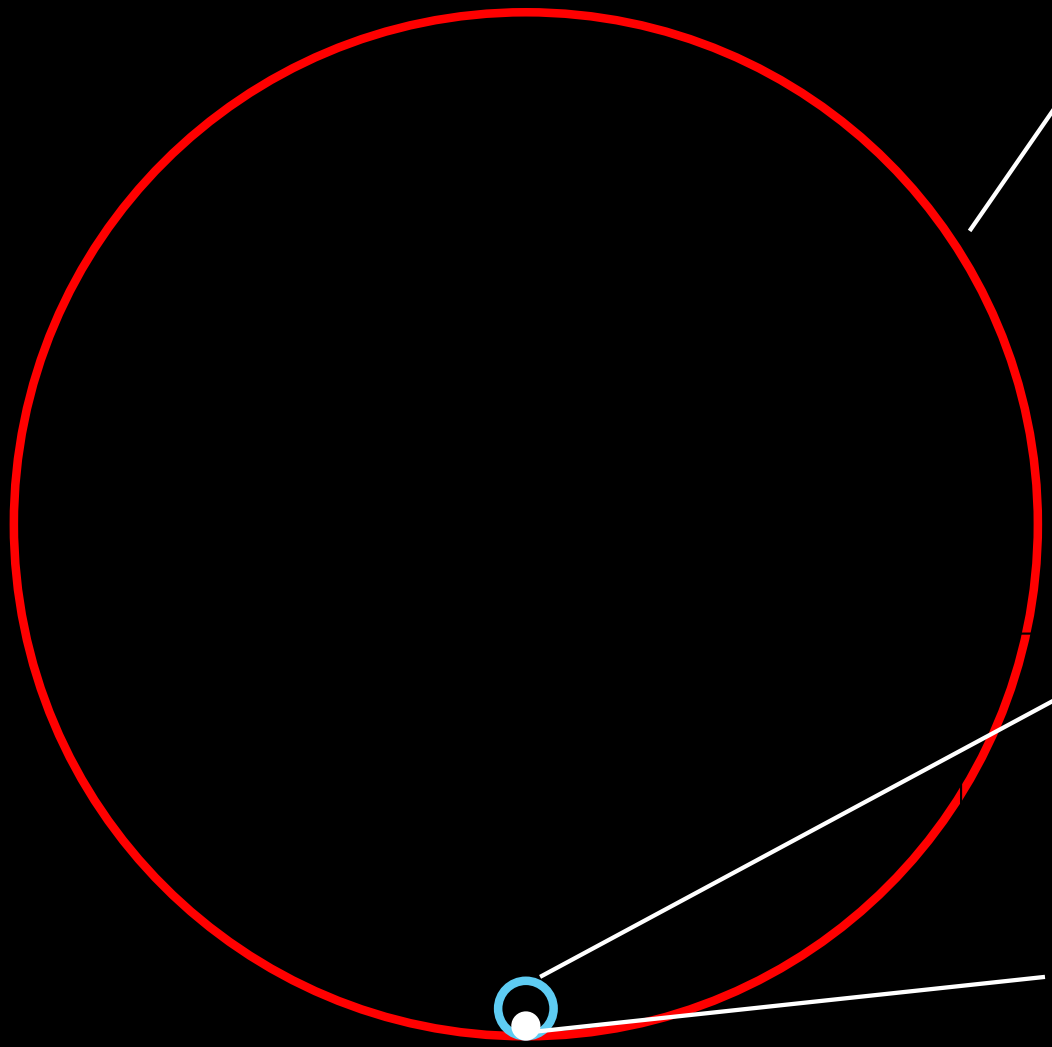
(Ref: Lewis et al., 2015; Grandjean et al., 2012; Braun et al., 2016; Barry et al., 2013)

Drinking Water Health Guidelines for PFOA

(parts per trillion)



Many PFAS



4730 in commerce (OECD, 2018)

29 measurable by EPA-certified methods

2 with federal Health Advisories

GREEN SCIENCE POLICY INSTITUTE
www.GreenSciencePolicy.org

ENVIRONMENTAL Science & Technology LETTERS

This is an open access article published under an ACS AuthorChoice License, which permits copying and redistribution of the article or any adaptations for non-commercial purposes.

pubs.acs.org/journal/estlcu

Global Perspective

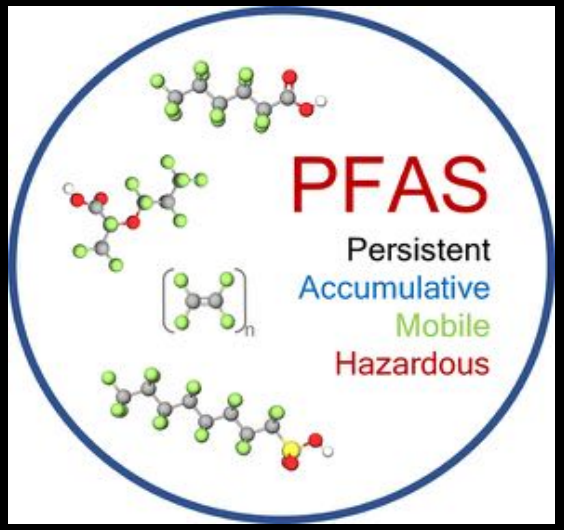
Scientific Basis for Managing PFAS as a Chemical Class

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

- Extreme persistence and potential toxicity make all PFAS suspect, including polymers
- Not enough time to study them all
- Avoid use when possible



DOI: (10.1021/acs.estlett.0c00255)

Recent comments from CDC

Patrick Breysse, Director of the CDC's National Center for Environmental Health:

The presence of PFAS in U.S. drinking water is "one of the most seminal public health challenges for the next decades."

"…it won't be too long before we think hundreds of millions of Americans will be drinking water with levels of these chemicals above levels of concern."

- BNA News, Oct. 17, 2017

Congressional PFAS Task Force

- Launched 1/24/19
- Accomplishments
  - CDC Health Studies
  - USGS monitoring
  - Stop DoD and FAA use of PFAS firefighting foam

Oct. 2020: EU Chemicals Strategy for Sustainability

- New limits on PFAS in drinking water, food, industrial wastes, and sewage sludge

- Restrict PFAS for **all non-essential uses** by 2022-24

https://www.lexology.com/library/detail.aspx?g=58ef3761-98c4-4a4f-877b-85725ce15b07

PFAS are Problematic
& Difficult to Clean Up

Prevention is preferable!

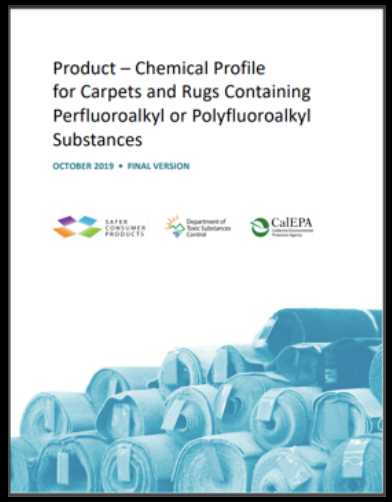
Only use when necessary

PFAS Uses in Building Materials

- Goal: Inspire building industry stakeholders to:
  - Reduce unnecessary uses of PFAS
  - Develop safer alternatives

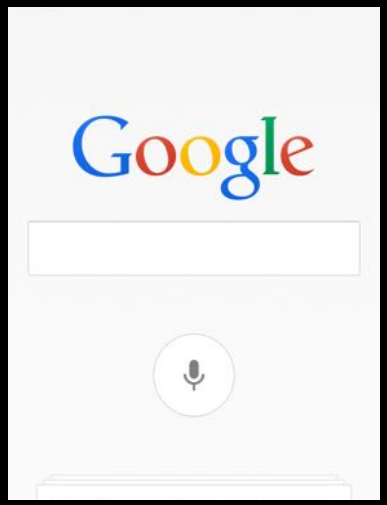
Methodology

Peer-reviewed studies



Gov. & NGO reports

Active U.S. Patents



Company Websites

Transparency Labels

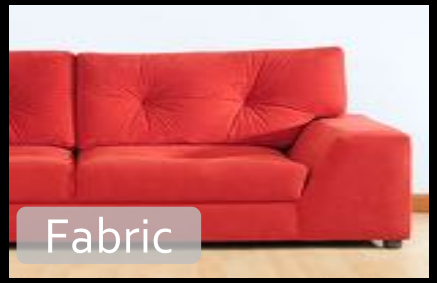
Caveats

- Not exhaustive. We may have missed some uses.
- Market share of PFAS-containing products usually unclear

Alternatives

- Market share?
- Are they effective?
- Are they also chemicals of concern?

Building Product Categories

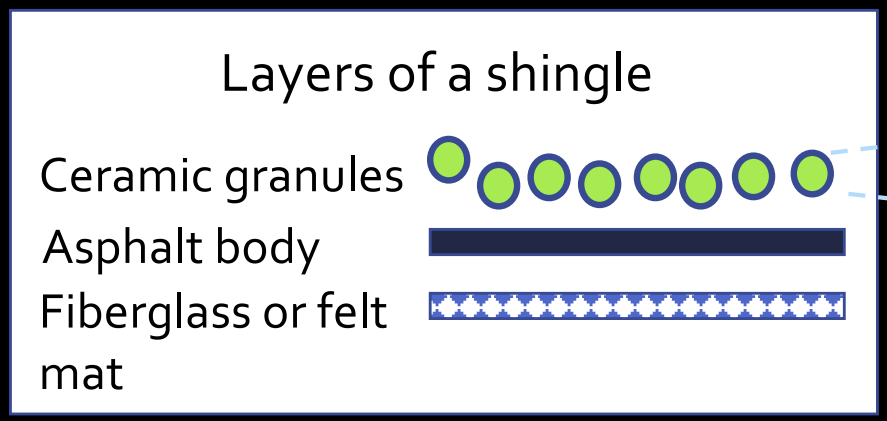


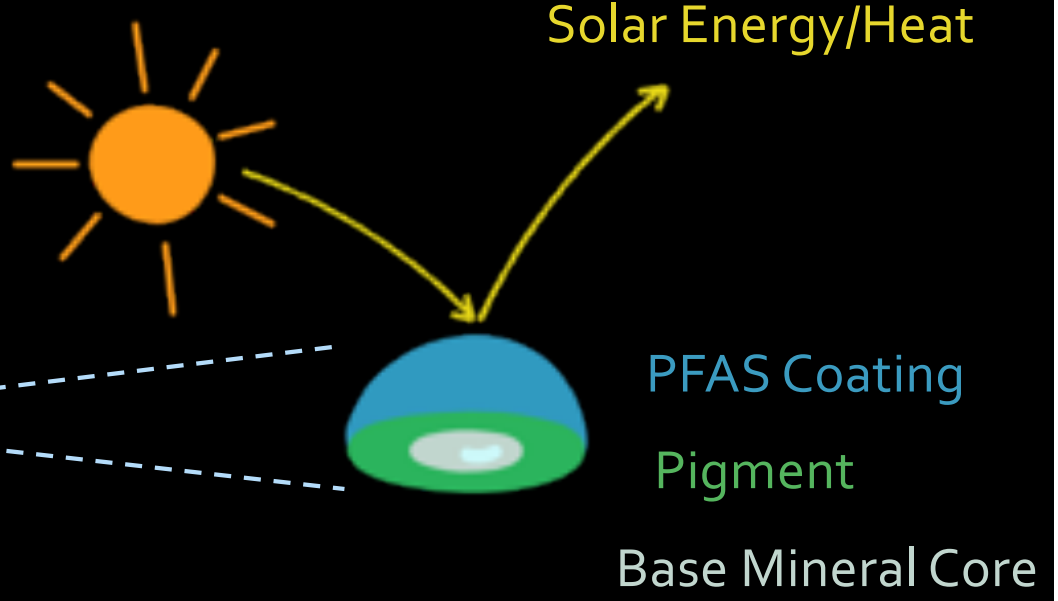
Roofing

- PFAS used to: resist weathering, prolong roof's useful life, reflecting solar radiation (for cooling).

Asphalt Roofing

- PFAS used to coat special high-reflectivity granules
- Increased reflectivity keeps building cooler





Metal Roofing

- PFAS coatings used to protect against:
  - Corrosion
  - Scratching
  - Color loss
- Increased reflectivity keeps building cooler

Weatherproofing Membranes

- Moisture control, reflectivity, durability, stain resistance
- Can contain PFAS layer or PFAS coating

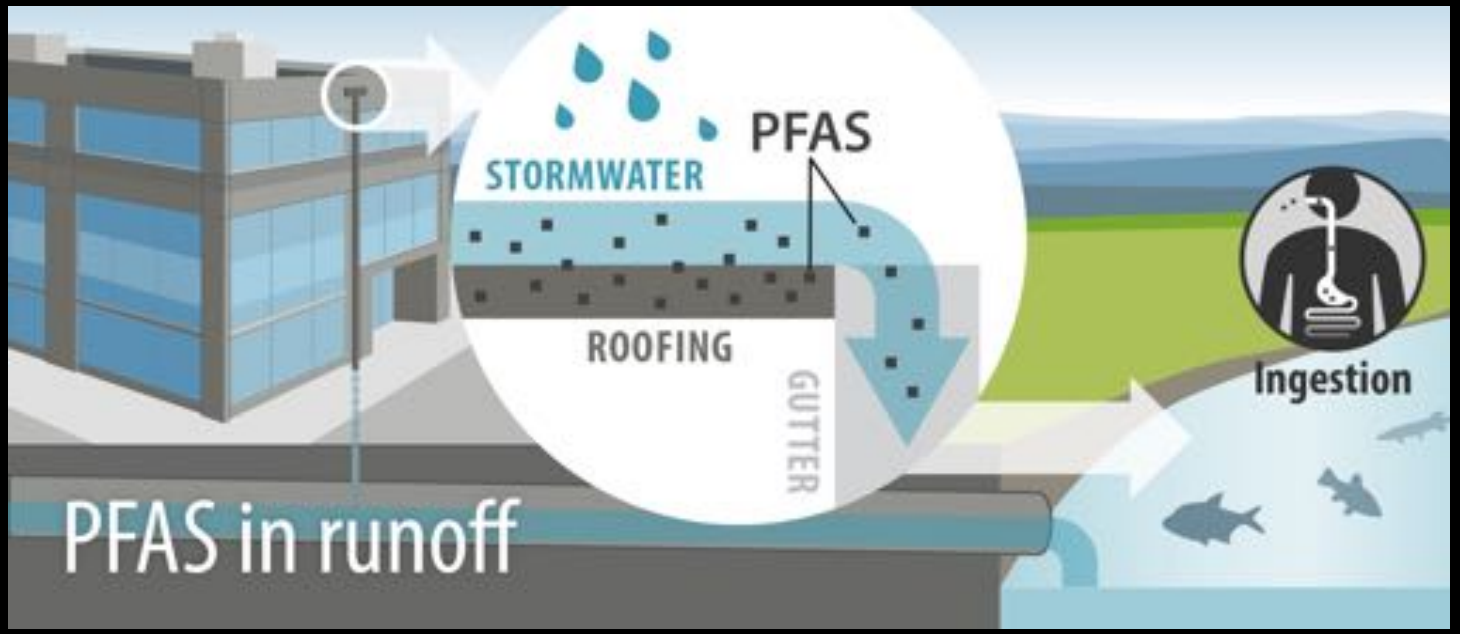
Tensile Roofs

- Flexible textile-based roofs
- Examples: Denver International Airport, Minnesota Metrodome

Roofing accessories

- Gutters: prevent clogging and retain color
- Roofing nails: increases durability and helps nail penetrate shingles

Roofing: Potential Source of PFAS to the Environment?



Coatings

- PFAS used to improve: ease of application, weather resistance, finish & durability

Metal Coatings

- PFAS in:
  - Roofing
  - Curtain walls
  - Bridges
  - Industrial structures
  - Elevators
  - Sanitary fixtures
- Usually factory applied (coil coatings)

Paint

- PFAS used as:
  - Binder
  - Additive
    - Improved flow, spread, glossiness
    - Decreased bubbling and peeling
- Specialty paints
  - Stain-resistant
  - Graffiti-proof
  - Water-repellent
- Powder coats

Wood lacquers & sealers

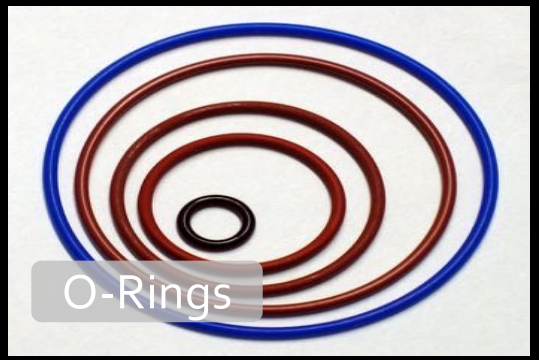
- PFAS used:
  - As wetting agent
  - For stain resistance, oil & water repellency

Plastic Coatings

- Bathtubs, countertops, window frames, whiteboards, etc.

Sealants & Adhesives

Sealants: Used to create an oil- and water-resistant barrier that protects building materials from stains, mold, and physical damage.

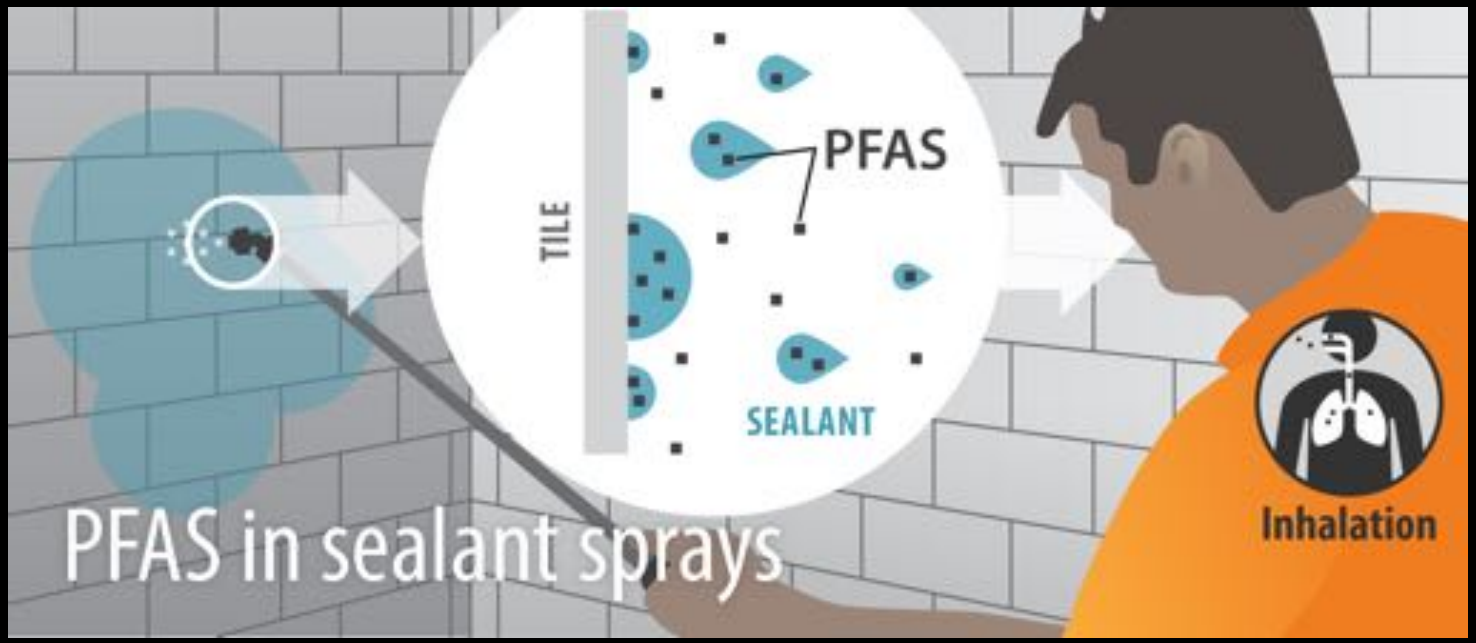


Grout, Tile, Stone, & Concrete Sealers

- PFAS used to increase oil-, water-, and stain resistance
- Examples:
  - stone countertops
  - kitchen and bathroom tilework
  - stone, tile, or concrete flooring
  - patios
  - staircases
  - foundations
  - parking garages
- Exterior surfaces: limit snow & ice buildup

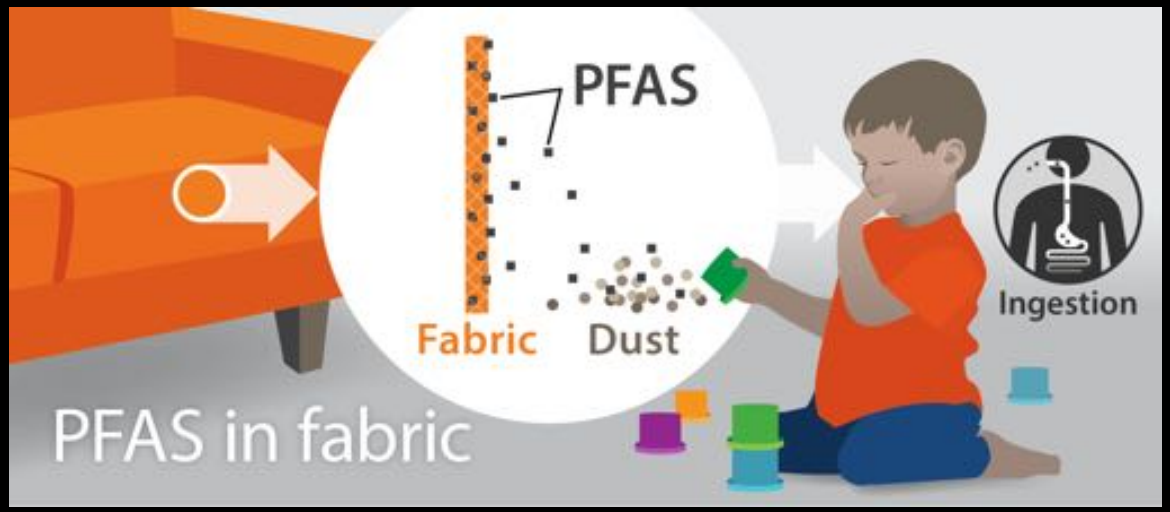
Grout sealer recall

In 2005, the CPSC recalled 300,000 cans of grout sealer due to respiratory complications associated with fluoropolymer exposure.



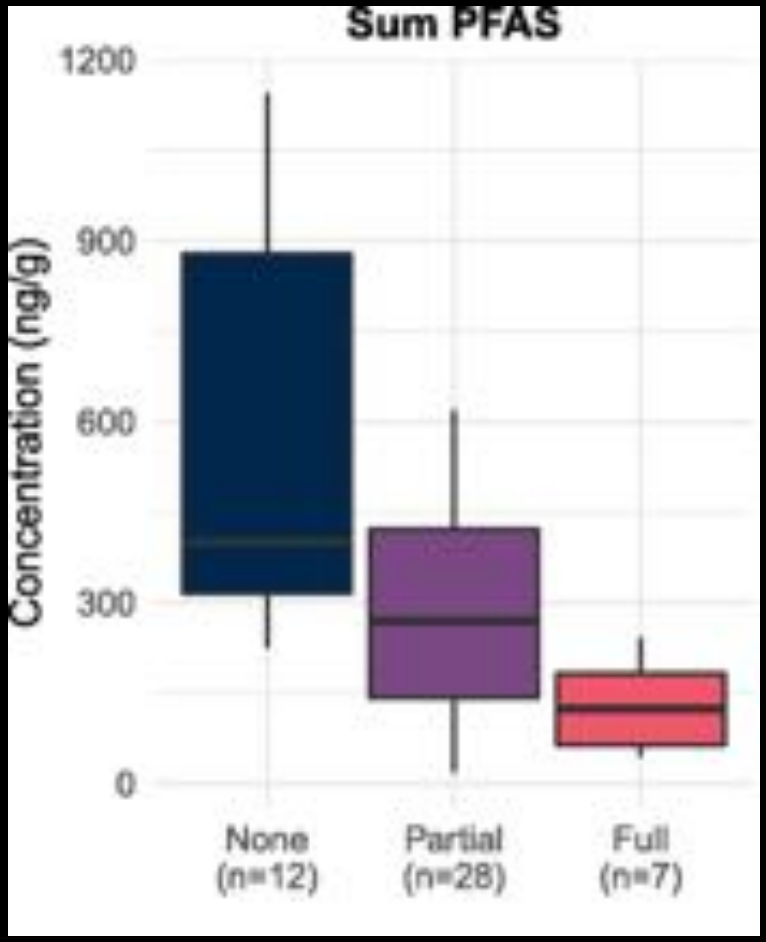
Fabrics

- PFAS used for stain-, soil-, & water resistance
- Factory applied or after-market treatment
- Exposure concern
- Efficacy?



Healthier Materials Intervention

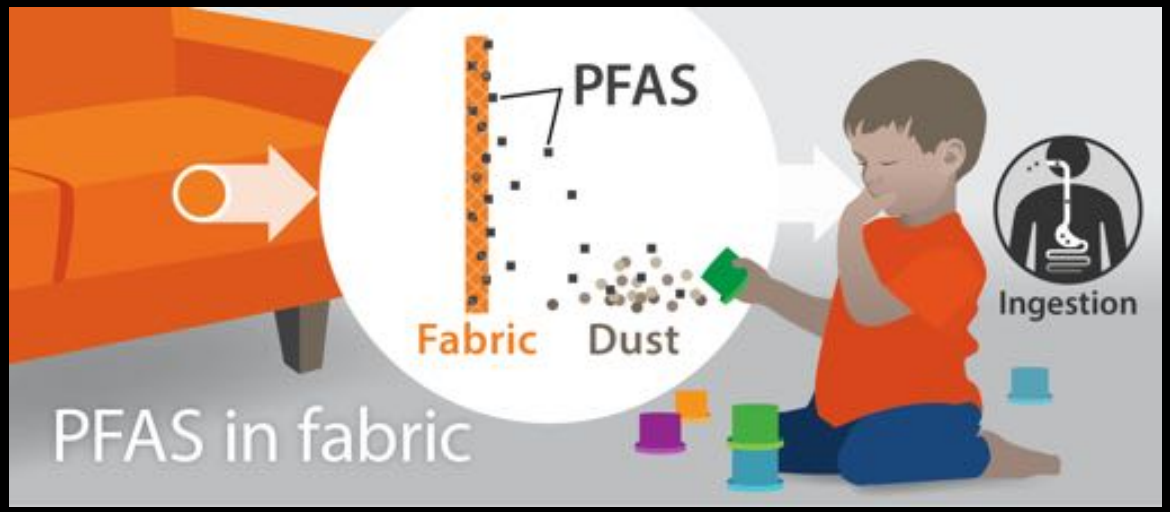
- Compared PFAS levels in dust in conventional vs. rehabbed academic buildings
- PFAS-free furniture and carpet reduced PFAS levels in dust by 78%



Young et al., Environ Intl. 2021

Fabrics

- PFAS used for stain-, soil-, & water resistance
- Factory applied or after-market treatment
- Exposure concern
- Efficacy?



Carpet industry phasing out PFAS

- Demand from large purchasers
- Potential CA regulation
- Potential liability

↓

- Major manufacturers decide to stop using PFAS

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

By VIRGINIA GORDAN • SEP 17, 2019

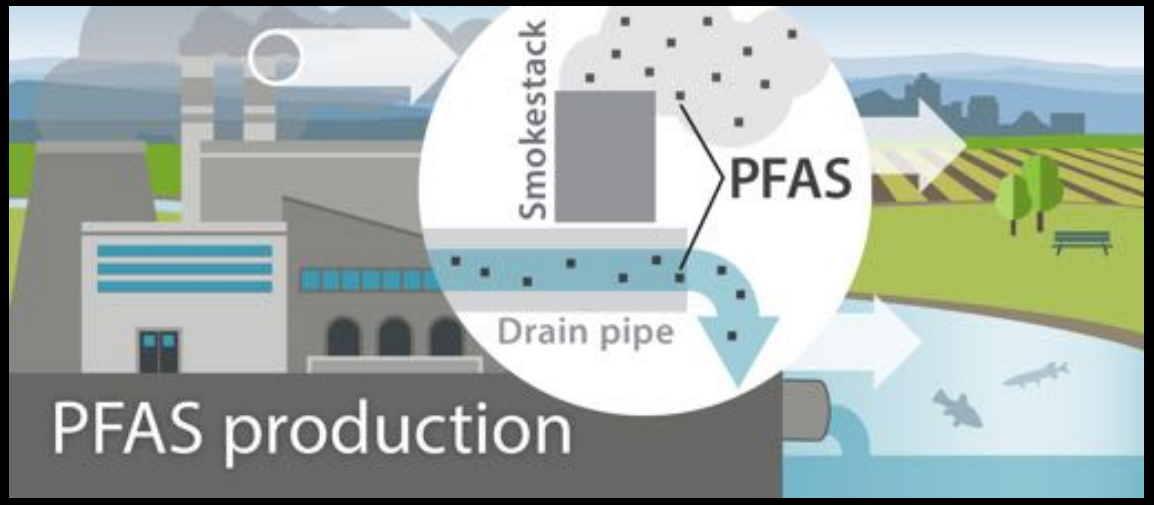
Share Tweet Email

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

Lifecycle impacts

- PFAS production and product manufacturing
- Product use
  - Indoor air, dust
  - Stormwater runoff?
- End of life
  - Landfill
  - Recycling



You Can Help

1. Ingredient disclosure: request it or provide it
   - See our appendix for examples
2. Ask, "Is this function really needed?"
3. Choose safer, non-PFAS alternatives
4. Avoid entire class of PFAS (beware of "PFOA-free")

Architects, Designers, & Builders

Building Product Manufacturers

Government & Regulators

Share & Respond

- Please share the report
- Are there PFAS uses in building materials that we missed?
- Send us information about functional non-PFAS alternatives in building products

Tom@GreenSciencePolicy.org

https://greensciencepolicy.org/docs/pfas-building-materials-2021.pdf

Learn More

PFAS & building materials webinar w/ Rob Bilott
Wed. May 13, 10am pacific

GreenSciencePolicy.org
Sign up for our monthly newsletter and visit our website

PFASCentral.org
Get the latest Science, News, and Policy as well as see our PFAS-Free list for Consumer Products

Thank you!

Co-authors

Seth Rojello Fernández

Carol Kwiatkowski

Questions?

tom@GreenSciencePolicy.org