



Reducing Harm from PFAS For Health & Environment

Arlene Blum, Ph.D.

Green Science Policy Institute &
Cell & Molecular Biology, University of California, Berkeley

February 4, 2022



GREEN SCIENCE POLICY INSTITUTE



Scientific Research

Convene businesses,
government, NGOs,
academic scientists

Communicate

Government Policy & Business Purchasing Change



**MORE THAN 80,000+ CHEMICALS
ARE ON THE MARKET TODAY**



**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!

Is it necessary?

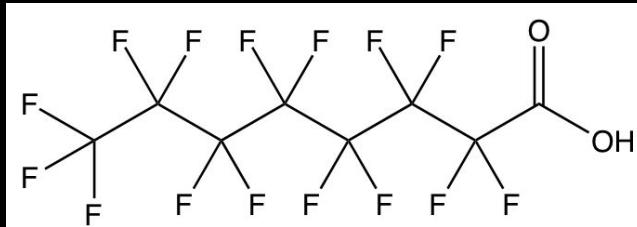
Is it worth it?

Is there a safer alternative?

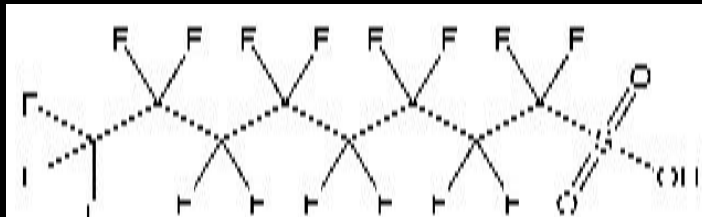
Class 1 PFAS

(Per- and polyfluoroalkyl substances)

PFOA
(C8)



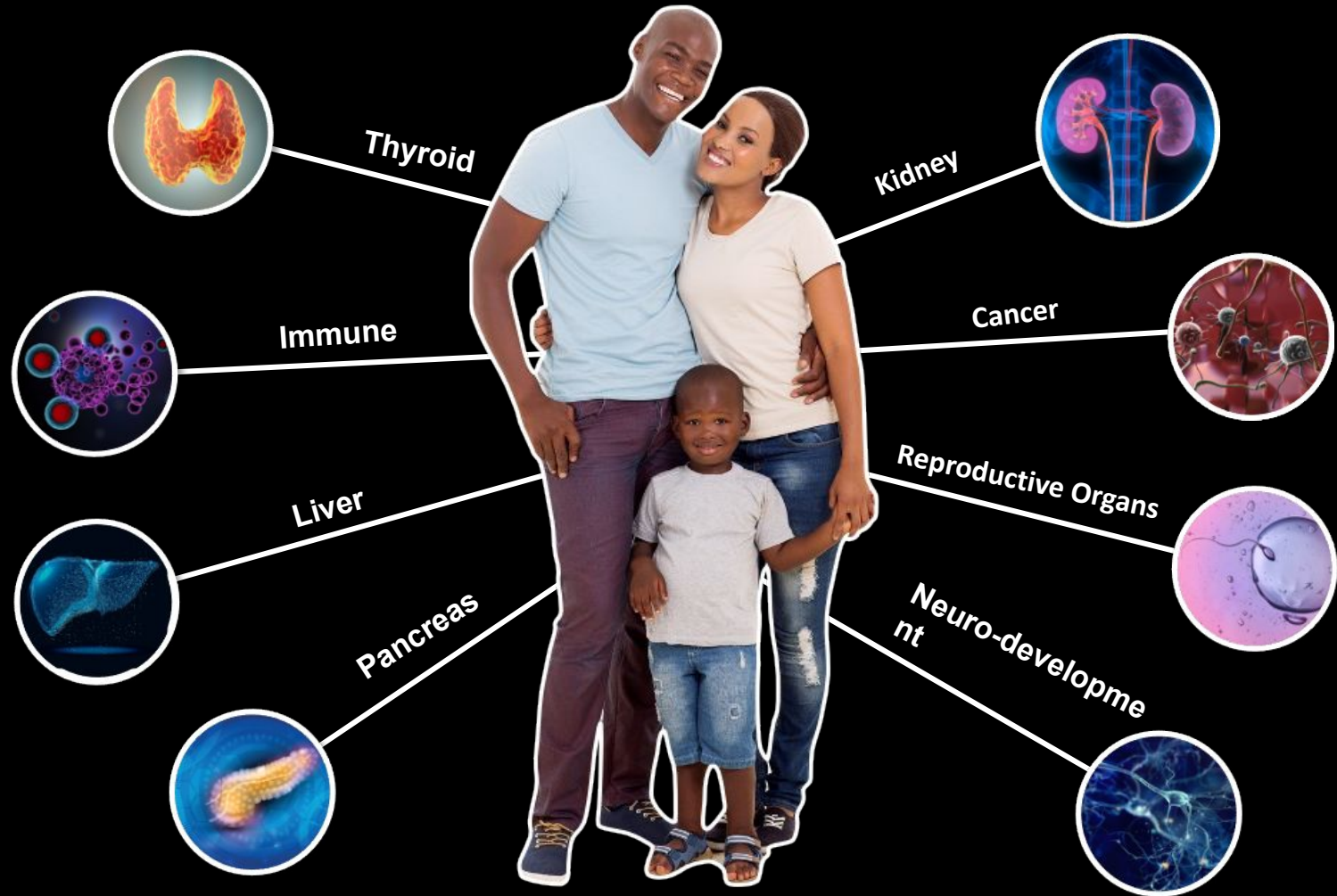
PFOS
(C8)



Carbon-Fluorine bond strength:

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

PFAS: Multi-System Toxicants

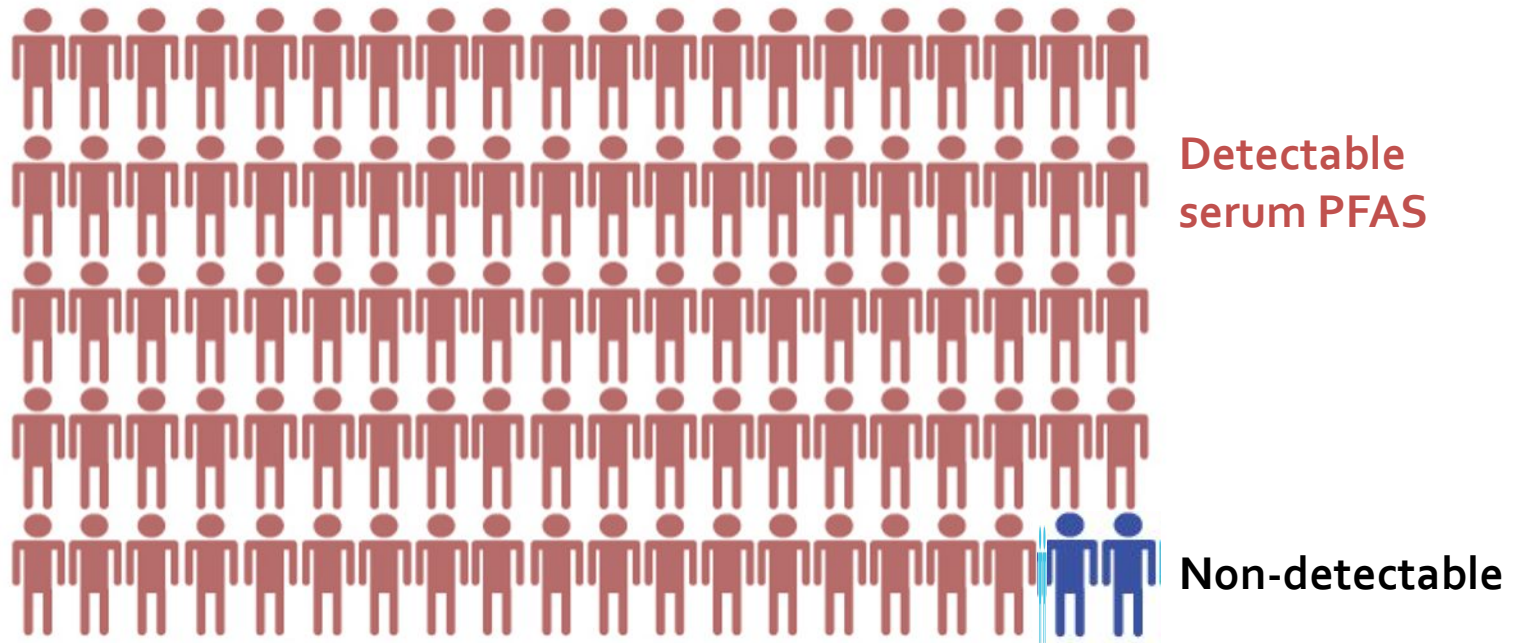


Wide Range of Possible Health Harms

PFOS and/or PFOA

- Testicular cancer
- Kidney cancer
- Prostate cancer
- Ovarian cancer
- Obesity
- Hormonal changes
- Thyroid disruption
- Delayed puberty, decreased fertility, early menopause
- Reduced testosterone
- Pregnancy-induced hypertension
- Lower birth weight & size
- Liver malfunction
- High cholesterol
- Ulcerative colitis
- Immunotoxicity, including interference with child & adult vaccine response

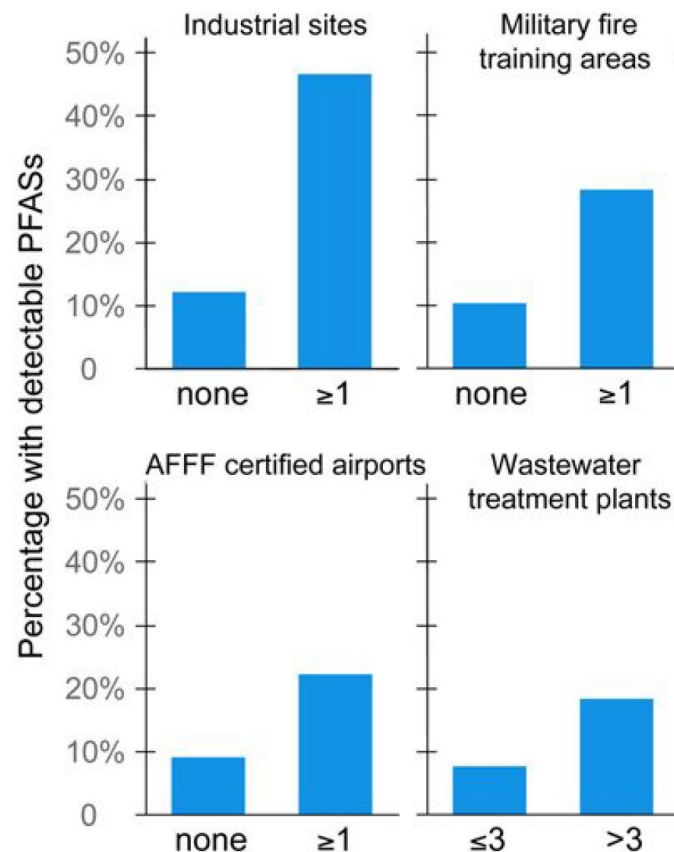
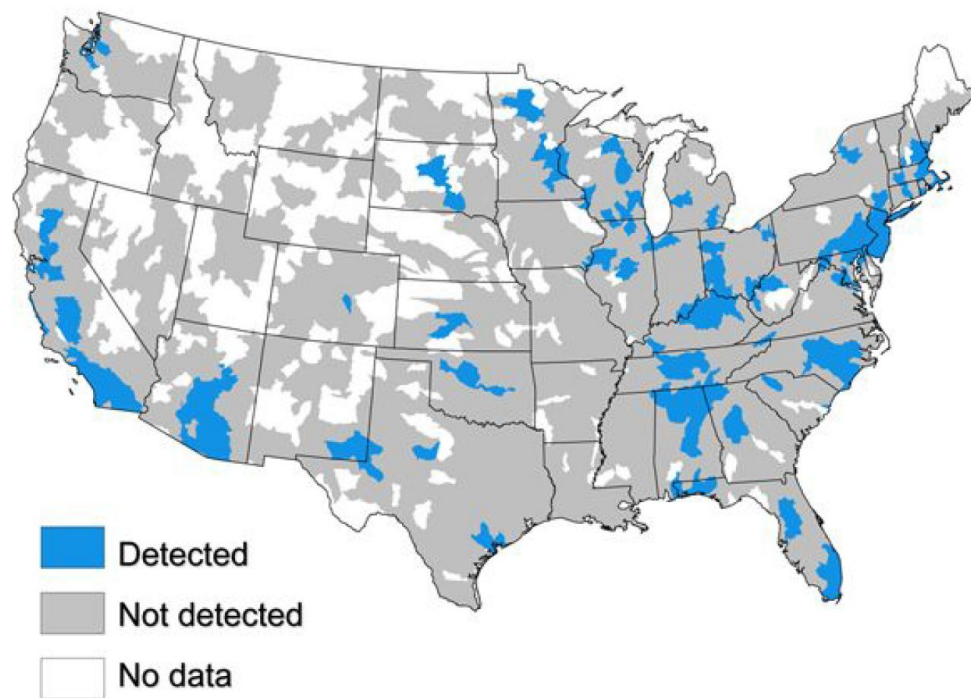
PFAS are in nearly all of us



Courtesy: Cindy Hu, Harvard University

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

Hydrological units with
detectable PFASs

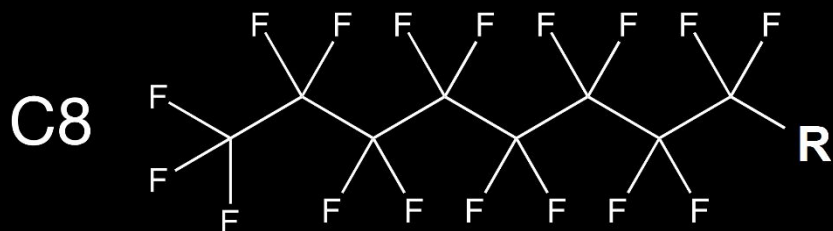


Cindy Hu et al, ES&T Letters, 2016

Drinking Water Health Guidelines for PFOA (parts per trillion)

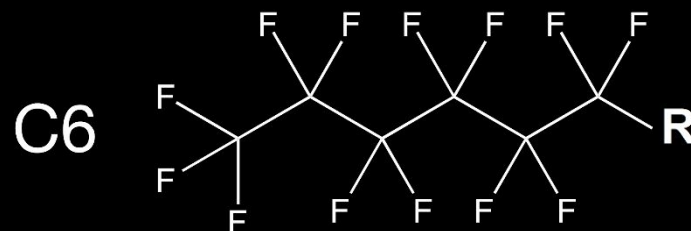


“Regrettable” Substitution?



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

Contamination in New Mexico

- Cannon Air Force Base
 - Firefighting foam entered groundwater
 - PFAS migrated from base to dairy wells to cows to milk
- PFOS level up to 12,000 ppt
 - 171 times EPA health advisory level!

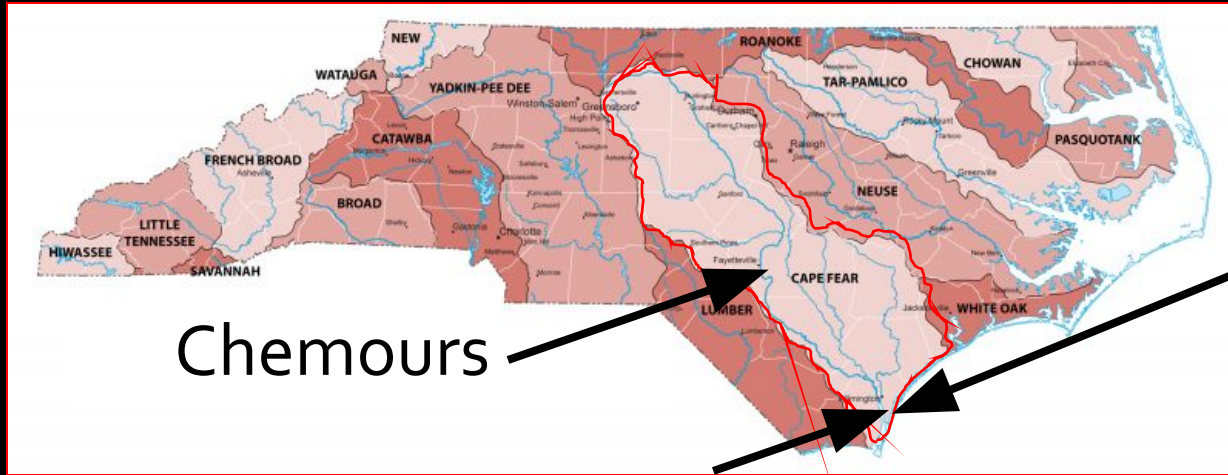


PFAS Spill in Michigan

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

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

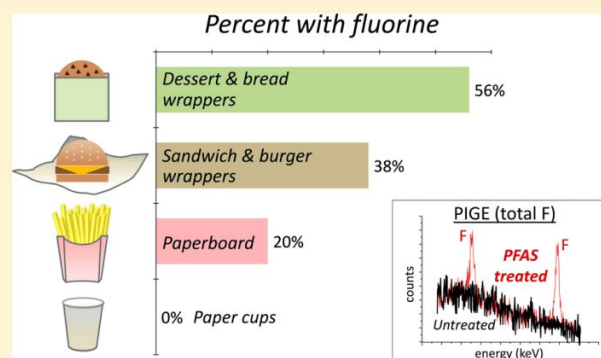
[▽]Chemistry Department, Hope College, Holland, Michigan 49423, United States

[○]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

ABSTRACT: Per- and polyfluoroalkyl substances (PFASs) are highly persistent synthetic chemicals, some of which have been associated with cancer, developmental toxicity, immunotoxicity, and other health effects. PFASs in grease-resistant food packaging can leach into food and increase dietary exposure. We collected ~400 samples of food contact papers, paperboard containers, and beverage containers from fast food restaurants throughout the United States and measured total fluorine using particle-induced γ -ray emission (PIGE) spectroscopy. PIGE can rapidly and inexpensively measure total fluorine in solid-phase samples. We found that 46% of food contact papers and 20% of paperboard samples contained detectable fluorine (>16 nmol/cm²). Liquid chromatography/high-resolution mass spectrometry analysis of a subset of 20 samples found perfluorocarboxylates, perfluorosulfonates, and other known PFASs and/or unidentified polyfluorinated compounds (based on nontargeted analysis). The total peak area for PFASs was higher in 70% of samples (10 of 14) with a total fluorine level of >200 nmol/cm² compared to six samples with a total fluorine level of <16 nmol/cm². Samples with high total fluorine levels but low levels of measured PFASs may contain volatile PFASs, PFAS polymers, newer replacement PFASs, or other fluorinated compounds. The prevalence of fluorinated chemicals in fast food packaging demonstrates their potentially significant contribution to dietary PFAS exposure and environmental contamination during production and disposal.





United States Senate WASHINGTON, DC 20510

March 9, 2017

Mr. Daniel S. Schwartz
Chief Executive Officer
Restaurant Brands International Inc.
226 Wycroft 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

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 phased 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.

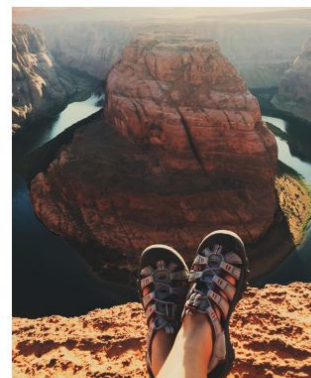
Michigan Radio, September, 2019

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!**



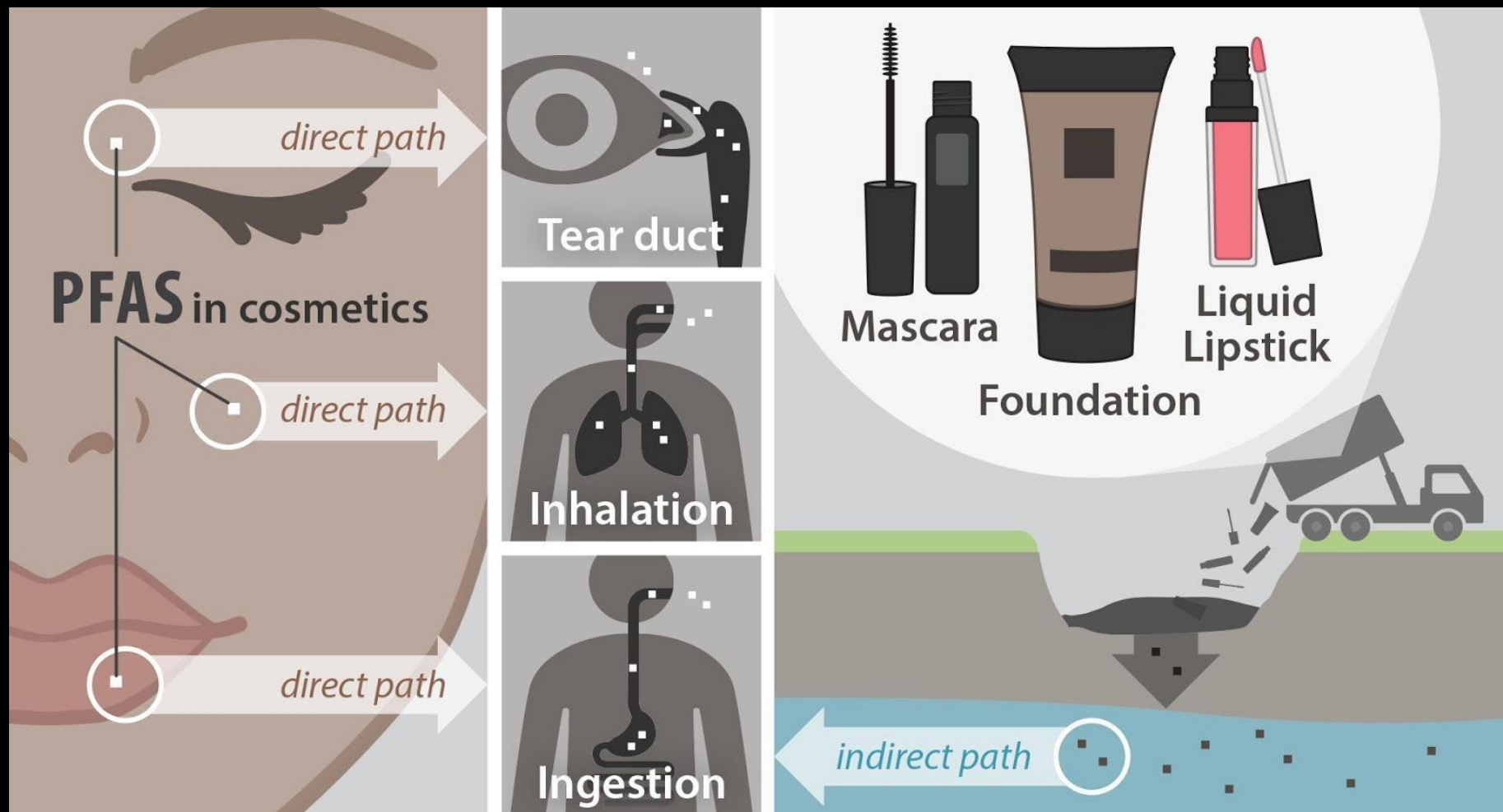
Do we need it?



67% REDUCTION
Precautionary Principle



Fluorinated compounds in North American cosmetics



California Regulation on PFAS



PFAS in paper food packaging
(AB 1200)



Disclosure of toxic chemicals in cookware
(AB 1200)



PFAS in firefighting foam, in most cases
(SB 1044)



Personal care products, some PFAS
(AB 2762)



Certain juvenile products (AB 652)



Recyclable & compostable materials
(AB 1201)

Moving away from PFAS



CARPETS



CARPET CLEANING PRODUCTS



FOOD PACKAGING



FURNISHINGS



COSMETICS



OUTDOOR GEAR



CLOTHING



ADHESIVES AND SEALANTS



PROTECTIVE COATINGS



NON-STICK COOKWARE



CARSEATS



FIREFIGHTING FOAM



PFAS Central: sharing notable news, scientific papers & events



NEWS

Fertilizer Used in DC School Gardens Highest Nationwide For Potentially Toxic Chemical

The Sierra Club tested fertilizers produced by sewage treatment plants around the country for PFAS.

[LEARN MORE](#)



SCIENCE

Information Requirements under the Essential-Use Concept: PFAS Case Studies

An investigation into how much information is available on the types and functions of PFAS in specific uses, how much information is available on alternatives, their performance and hazardous properties, and whether this information is sufficient as a basis for deciding on the essentiality of a PFAS use, was



POLICY

Newsom signs laws banning 'forever chemicals' in children's products, food packaging

California Gov. Gavin Newsom signed two laws on Tuesday banning the use of toxic "forever chemicals" in children's products and disposable food packaging.

[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](#))

A high-altitude mountain peak, likely Mount Everest, is shown under a clear blue sky. A bright sun in the upper left corner creates a strong lens flare. A climber in a yellow helmet and dark gear is visible on a steep, snow-covered ridge. The mountain's surface is rugged with snow and ice.

For monthly e-newsletters:
SixClasses.org/Newsletter

Questions:
Arlene@GreenSciencePolicy.org

A scenic mountain landscape. In the foreground, a dirt path winds through a field of green grass and vibrant red wildflowers. The middle ground shows rolling green hills and a dense forest of evergreen trees. In the background, a large, snow-capped mountain peak rises above a layer of white clouds. The sky is a clear, bright blue.

By stopping the use of the PFAS,

we can have a healthier world.

GreenSciencePolicy.org

[Six Classes.org](https://SixClasses.org)

ArleneBlum.com