When Do We Need PFAS?
The Chemical Class Approach Towards a Healthier Environment

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GREEN SCIENCE POLICY INSTITUTE

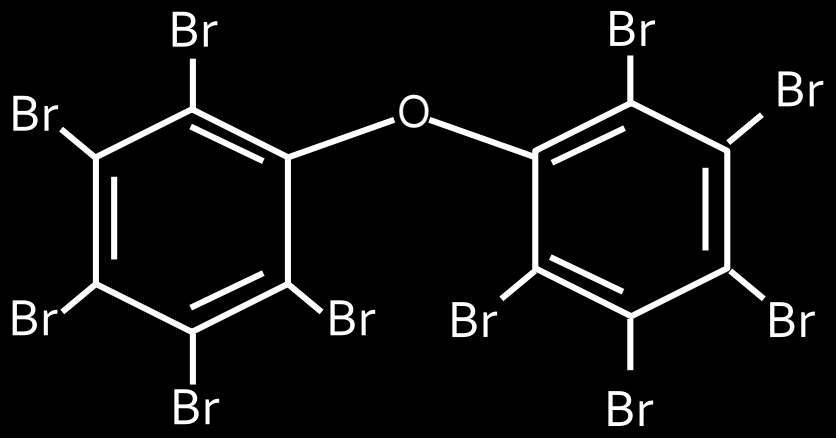
Research

Education

Toxic Reduction Retreats

Policy & Purchasing Change

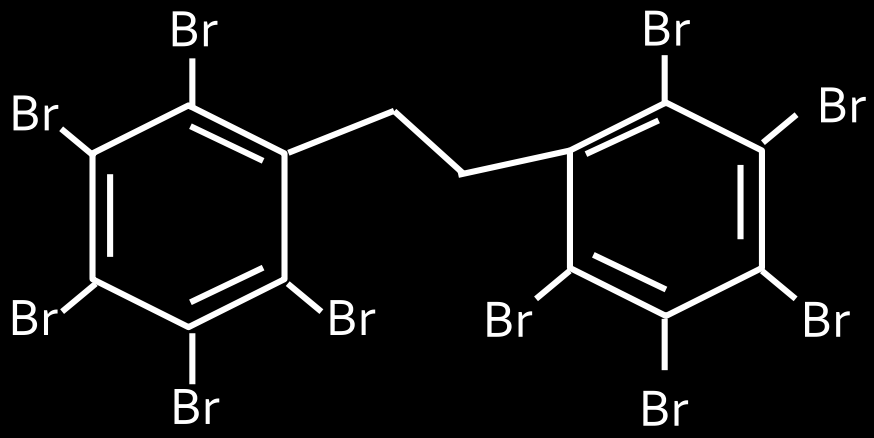
Regrettable Substitution



Decabromodiphenyl ether

Concerns:

- Persistence
- Bioaccumulation
- Toxicity



Decabromodiphenyl ethane

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Six Classes of Chemicals of Concern

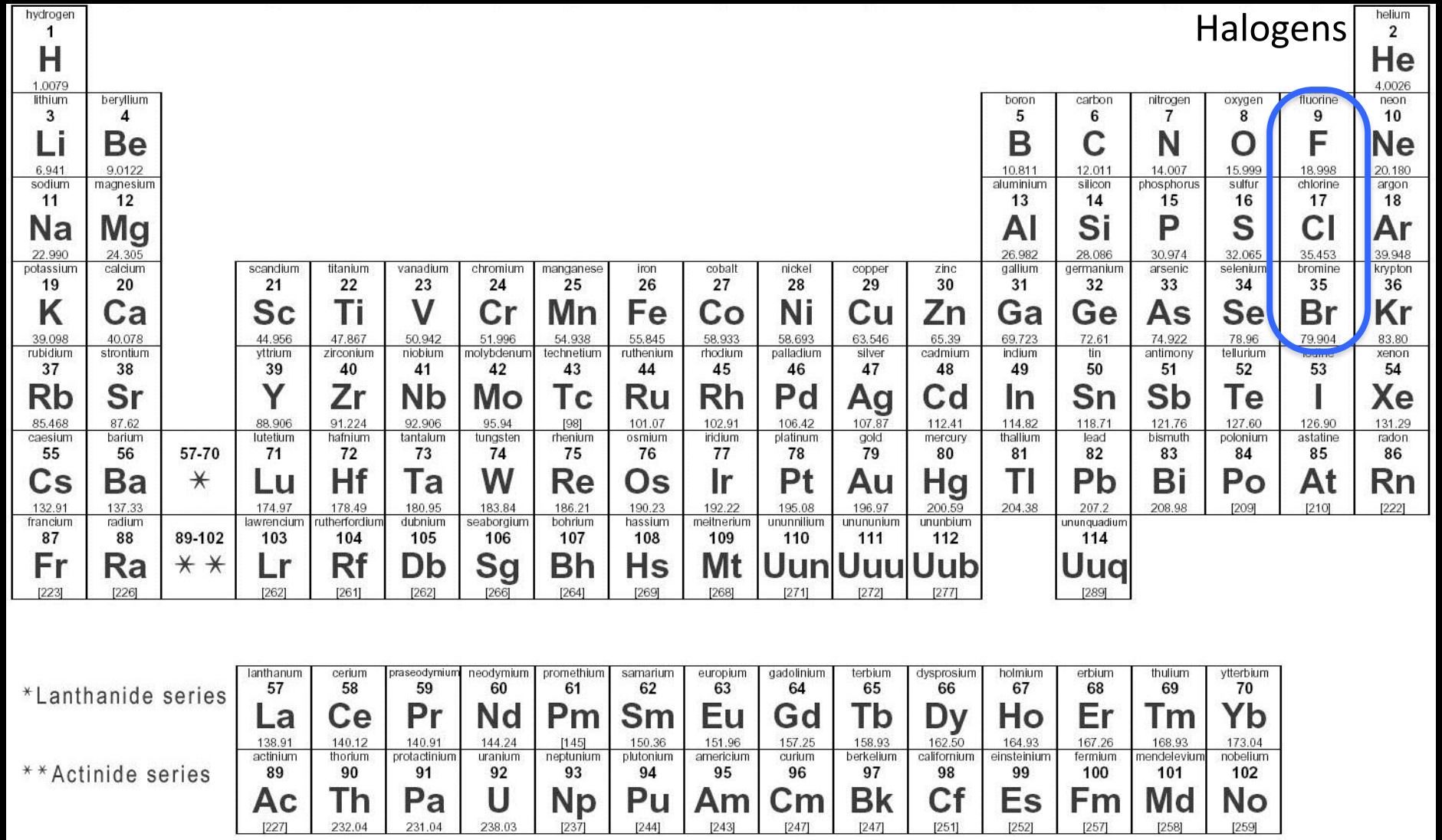
Four-minute videos at www.SixClasses.org

Is it necessary?

Is it worth it?

Is there a safer alternative?

Periodic table of elements



Annapurna

A WOMAN'S PLACE

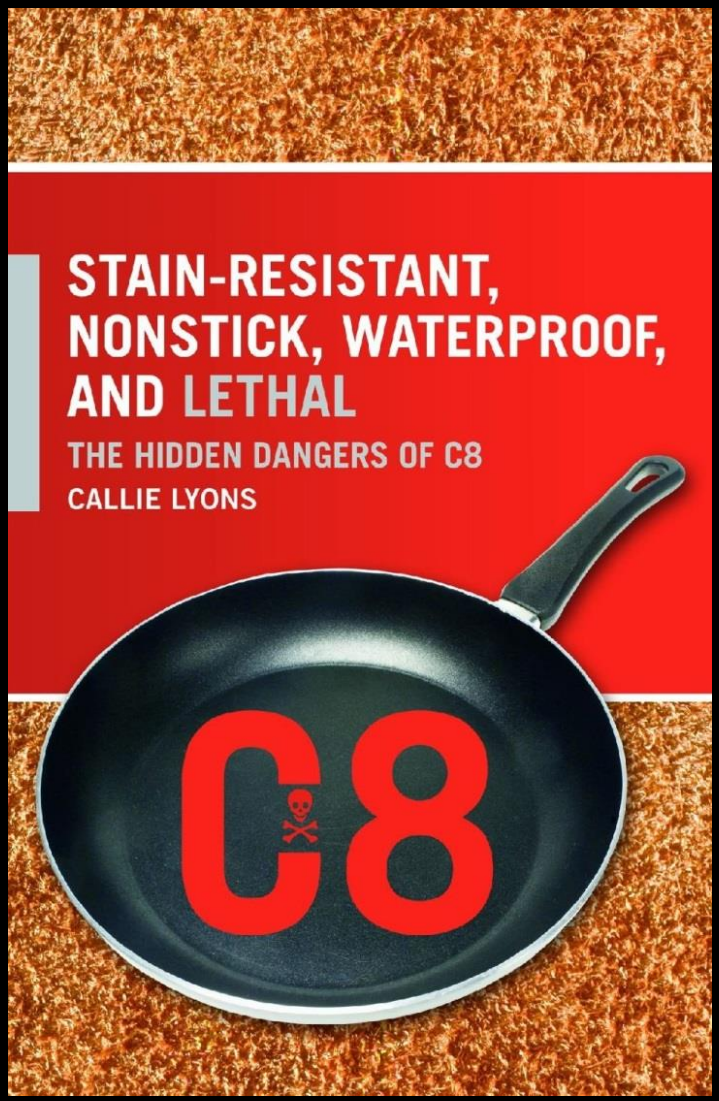
The dramatic story of the first American ascent of one of the world's highest peaks

ARLENE BLUM

20TH ANNIVERSARY EDITION

With a new Preface and Afterword by the author

Published 2007



2017

Watershed

Tracy K. Smith

US Poet Laureatte

200 cows more than 600 hilly acres

property would have been even larger

had J not sold 66 acres to DuPont for

waste from its Washington Works factory where J was employed

did not want to sell

but needed money poor health

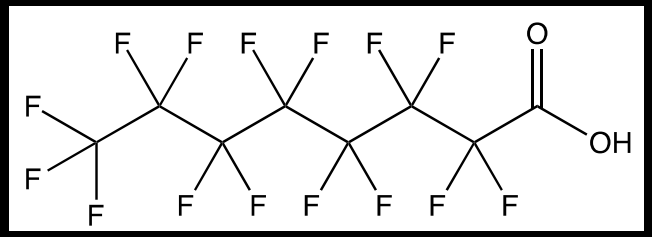
mysterious ailments

PFASs

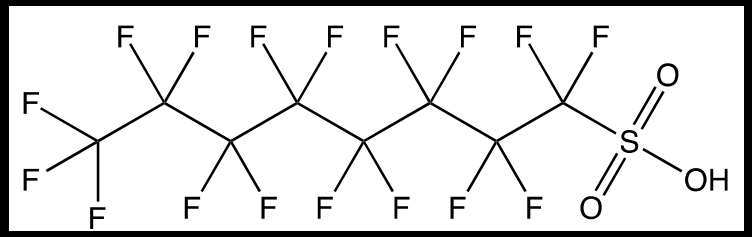
(per- and polyfluoroalkyl substances)

- **All are highly persistent[1]**
  - or degrade to persistent end-products
- **Long-chains are bioaccumulative[2]**
  - in wildlife, in human serum
- **PFOA and PFOS (C8s) are toxic[2,3]**
  - Cancer (kidney and testicular)
  - liver disease
  - immune system effects
  - thyroid disease
  - developmental effects

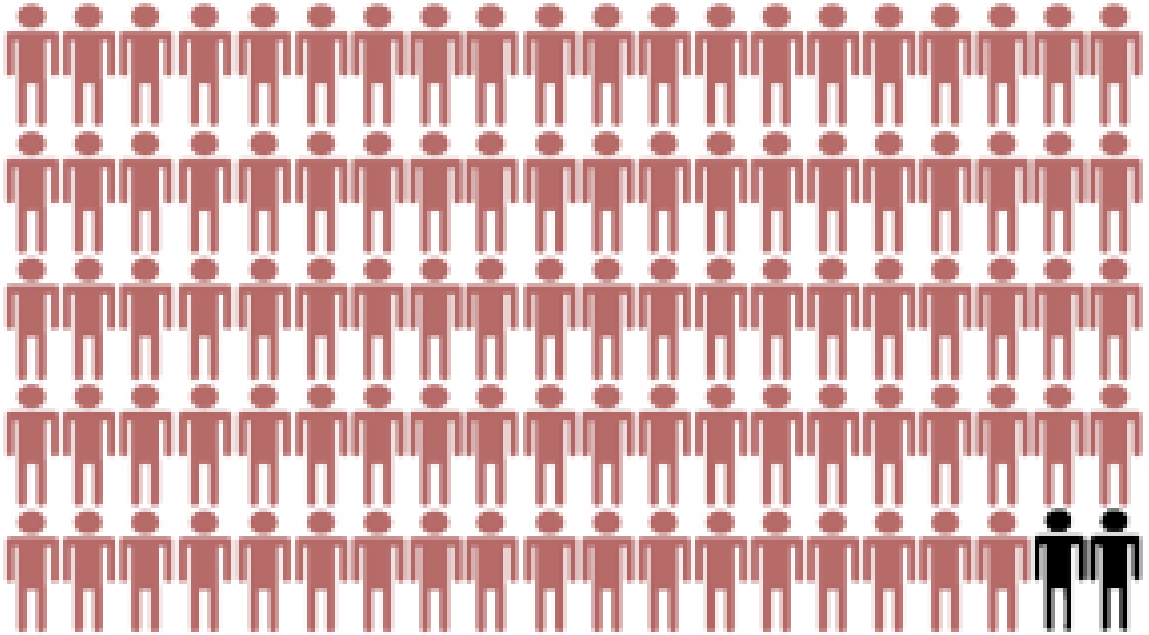
PFOA



PFOS



PFAS exposure is a health concern



Exposure linked to health risks:

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

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

Courtesy, Cindy Hu, Harvard University

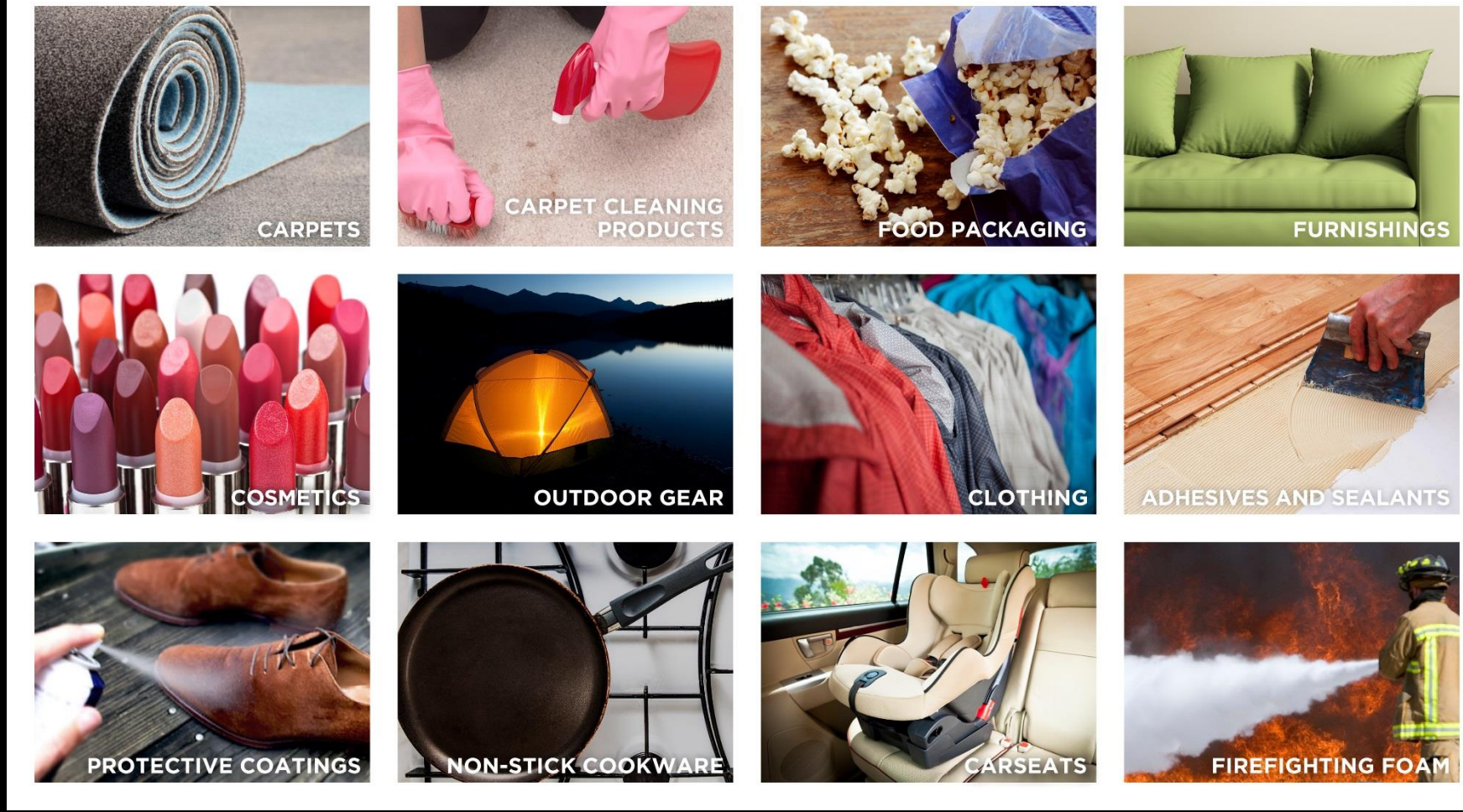
May 2015 The Madrid Statement on Highly Fluorinated Chemicals

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

Signed by 230 scientists from 40 countries

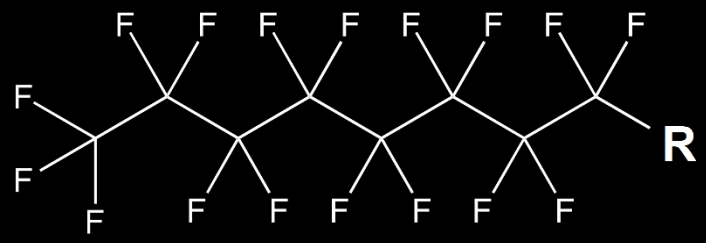
2015: Environmental Health Perspectives

Common Uses


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

Regrettable Substitute?

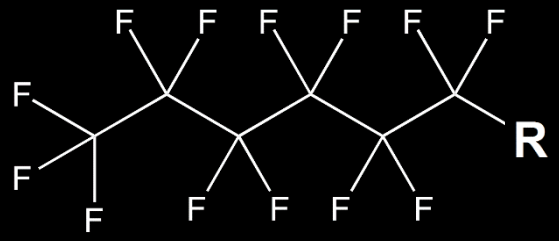
C8



Concerns:

- Extreme persistence
- Bioaccumulation
- Toxicity

C6



Concerns:

- Extreme persistence[1]
- Bioaccumulation in plants[4-5]
- Suspected toxicity[1]
- More mobile[6]
- Remediation more difficult[7-9]

An "environmentally friendly" alternative?

PFAS are Problematic & Difficult to Remediate

Prevention is Preferable!

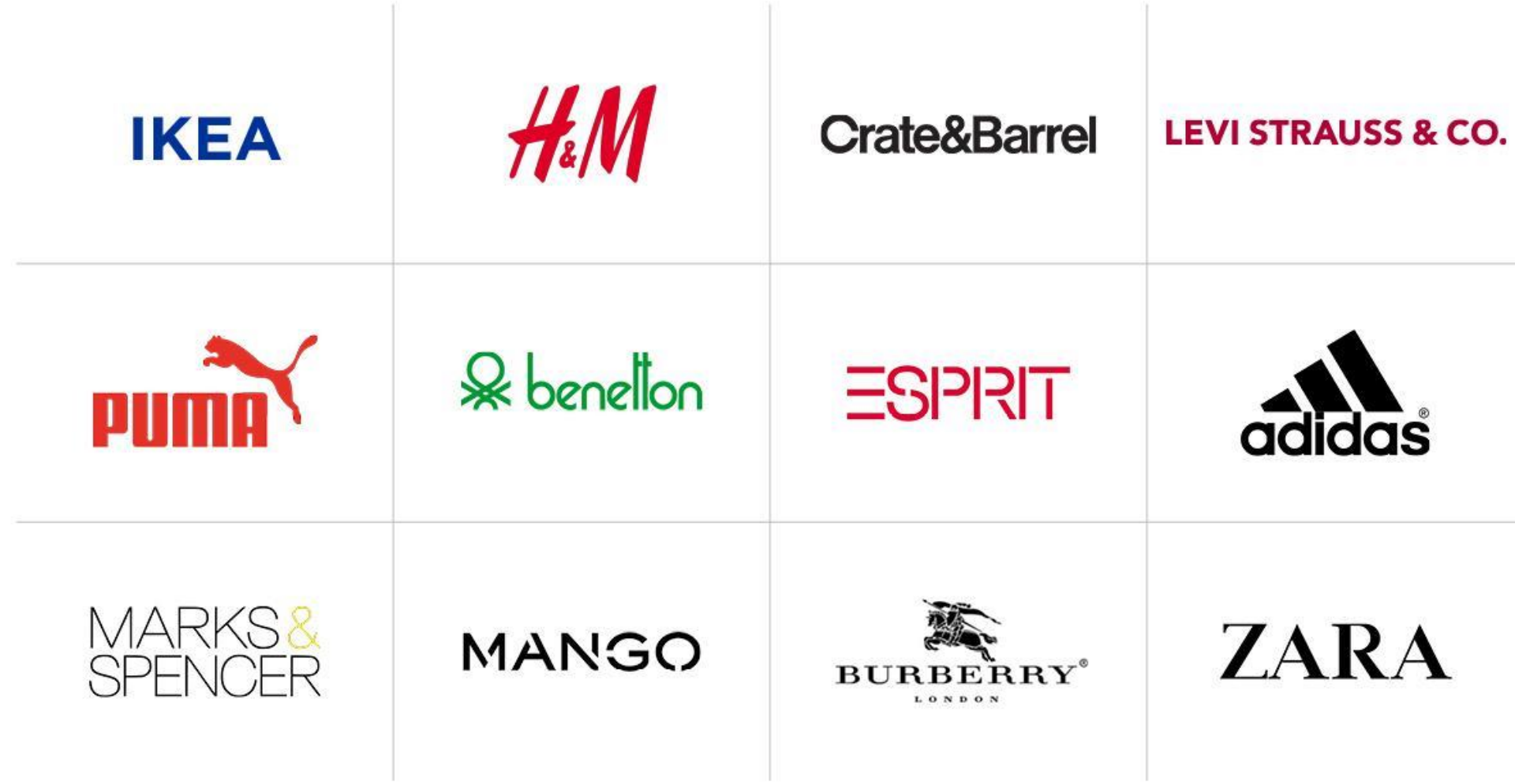
CA proposal to list carpets with any PFAS

February 15, 2018

SAFER CONSUMER PRODUCTS

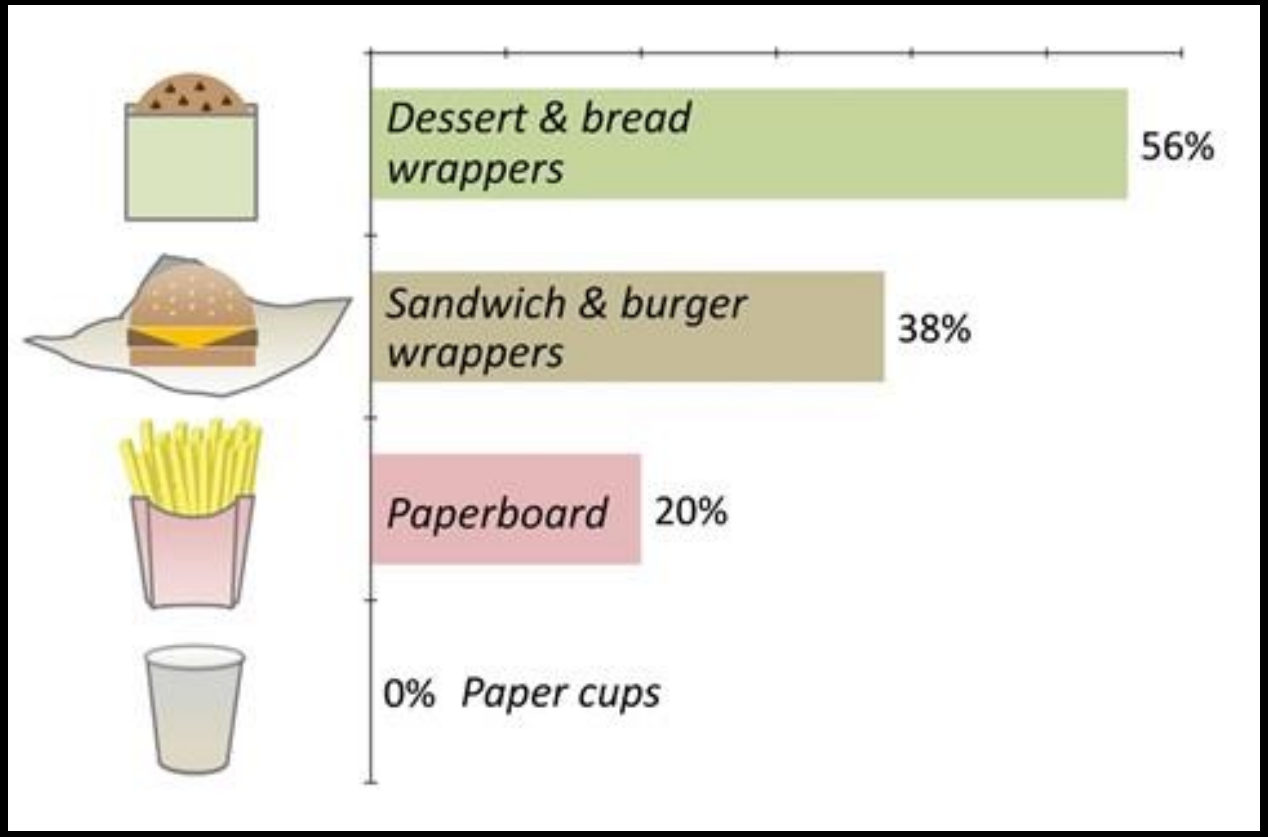
The CA Department of Toxic Substances Control (DTSC) is proposing to list carpets & rugs containing any PFAS as priority products for regulation.

BRANDS ARE ELIMINATING HIGHLY FLUORINATED CHEMICALS



Fluorine in U.S. fast food packaging paper

(percent positive; 400 products sampled)



Adopted from Schaider L. 2017 *Fluorinated compounds in U.S. fast food packaging*.

New York State purchasing ban on PFAS

single use food containers & packaging

"...products purchased …on State contracts shall not contain perfluorinated chemicals (PFCs)..."

Washington State's Healthy Food Packaging Act Passes House & Senate

February 28, 2018

HB 2658/SB 6396 passes House on a 30-17 vote

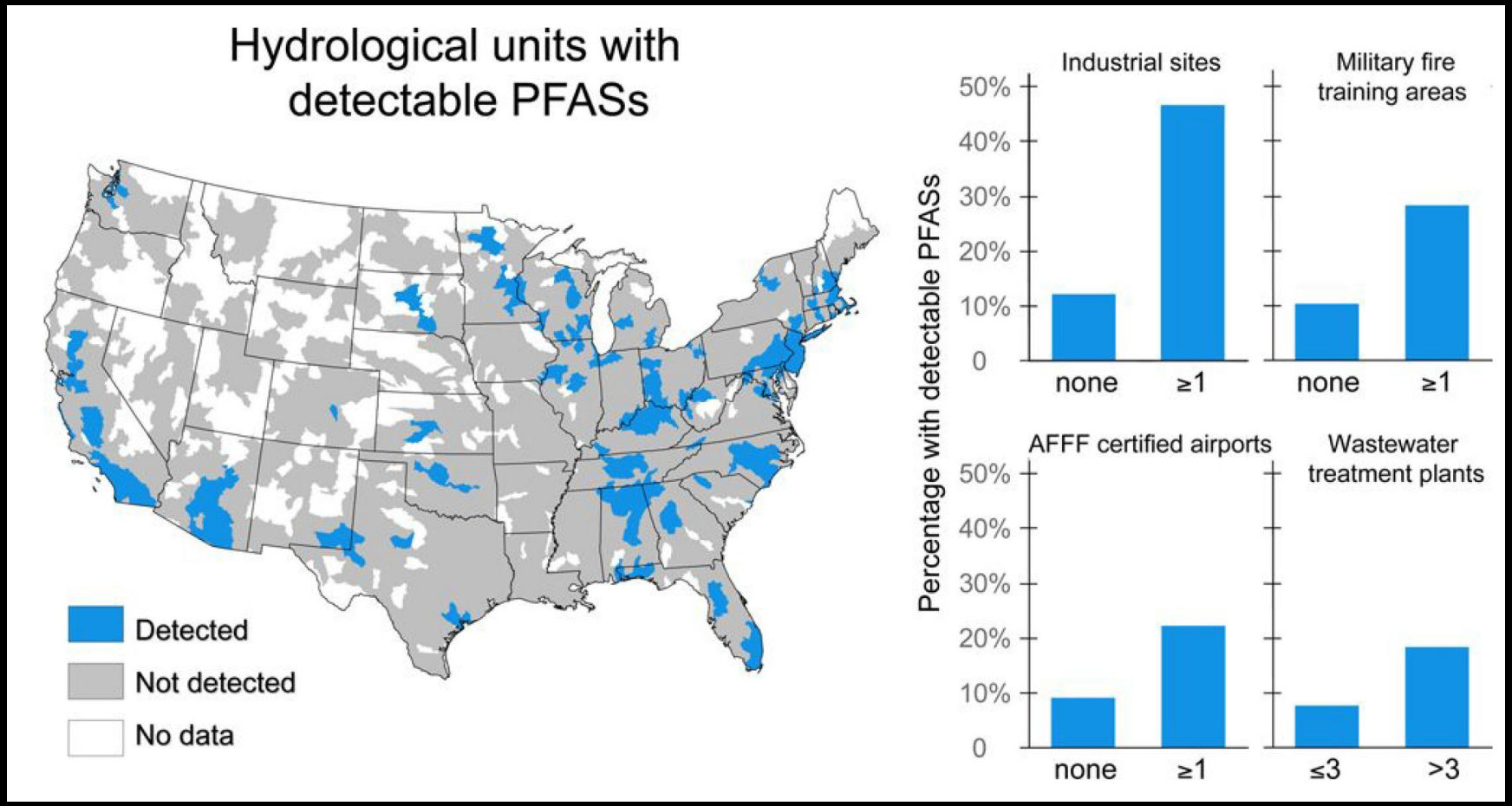
Bans paper food packaging containing any PFAS

https://toxicfreefuture.org/key-issues/legislative-priorities-2018/

TOXIC-FREE FUTURE

SCIENCE • ADVOCACY • RESULTS

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



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

AFFF Phase-out in Norway

- 2011: Domestic airports in Norway phase out AFFF and adopt fluorine-free foam
- 2015: Norwegian Defense Force begins adoption of fluorine-free foams

Source: Norwegian Environment Agency

South Australia: AFFF Ban

Jan. 30, 2018

Applies to all fluorinated firefighting foams for all applications

Australia: about 90% of airports are now using fluorine free foams.
(They can reach the highest level of performance in ICAO (International Civil Aviation Organization) extinguishment tests.)

Washington State's Ban on PFAS in Firefighting Foam Passes both Houses

(HB 2793/SB 6413)

- Passed the Senate on a vote of 38-9 and the House 72-26 on February 27, 2018
- Bans sale of firefighting foam containing any PFAS beginning July 1,2020
- Bans the use of PFAS-containing foam for training beginning July 1, 2018.
- Requires notification regarding firefighting gear that contains any PFAS

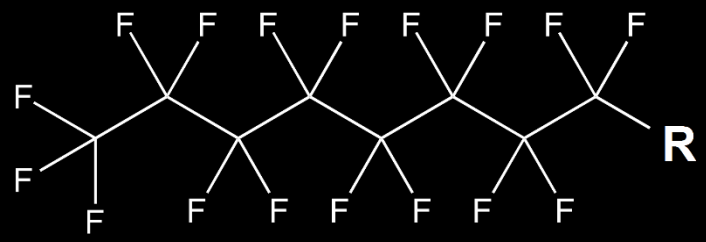
More info https://toxicfreefuture.org/key-issues/legislative-priorities-2018/

TOXIC-FREE FUTURE

SCIENCE • ADVOCACY • RESULTS

US: Is C6 the "environmentally friendly" alternative to C8?

C8



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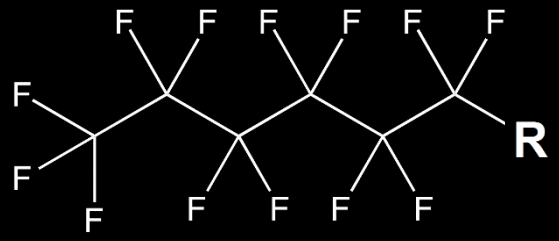

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Recommendation 1
Research Efficacy & Toxicology of Fluorine-Free Foams

Manufacturer	Foam
Angus / National Foam	Jetfoam (Aviation), Respondol (Class B)
Auxquimia	UNIPOL
Vsfocum	Silvara
Bioex	Ecopol
Fomtec	Enviro 3x3 Plus
Solberg	Re-healing Foam RF6 / RF3
Dr. Sthamer	Moussol F-F3/6
Biosafety Technology	Trident
3F	FREEFOR SF, HYFEX SF, FREEDOL SF

Recommendation 2

Change the MILSpec to maintain fire safety and permit the use of fluorine-free foams.

- The MILSPEC, a U.S. military specification, requires PFAS in firefighting foam for liquid fuel fires.
- The FAA requires civilian airports to use foam that meets the MILSPEC, resulting in use of PFAS foams where they may not be needed.

Sharon Lerner, The Intercept, February 10, 2018

- 2000-- 3M decides to stop making PFOS
- 2000, 2001—EPA warns of serious risk of harm
- 2001—Fire Fighting Foam Coalition founded
- 2003—EPA exempted AFFF from its regulatory process
- 2004– Fluorine free foams at 9 seconds above the Navy's 30-second requirement.
- 2010—A Solberg's fluorine-free foam at 5 seconds above the requirement

Photo credit:
The Telegraph

In 2012, after extensive testing, Heathrow in the UK switched away from the use of all PFAS. In 2015, a British Airways airbus caught fire and firefighters safely put out the flames with fluorine-free foam.

"zero cleanup costs and zero environmental concerns"

Graeme Day, fire service compliance manager, Heathrow

http://www.bio-ex.com/responsible-commitment/responsible-environmental-commitment

Recommendation 3

Coordinated health studies of PFAS-contaminated communities

Bruton and Blum *Environmental Health* _####################_
DOI 10.1186/s12940-017-0321-6

Environmental Health

COMMENTARY Open Access

Proposal for coordinated health research in PFAS-contaminated communities in the United States

Thomas A. Bruton[1*] and Arlene Blum[1,2]

- Study multiple PFASs (not just PFOA and PFOS).
- Continued & increased funding is needed.

Recommendation 4

Develop enforceable health levels for PFOA, PFOS, GenX and other short chains.

An enforceable Maximum Contaminant Level (MCL) would:

- Require utilities to perform monitoring
- Require utilities to treat water if necessary
- Expedite cleanups by responsible parties

Prevention is Preferable!

1. Research fluorine-free foam
2. Change the MILSpec to maintain fire safety and allow the use of fluorine-free foams
3. Coordinated health studies of PFAS-contaminated communities
4. Develop enforceable Maximum Contaminant Levels


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