



GREEN SCIENCE
POLICY INSTITUTE

Tackling Toxics: For Healthier Hospitals, People & Planet

Arlene Blum PhD

Research Associate in Chemistry, UC Berkeley
Executive Director, Green Science Policy Institute

March 2018







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













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 , 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

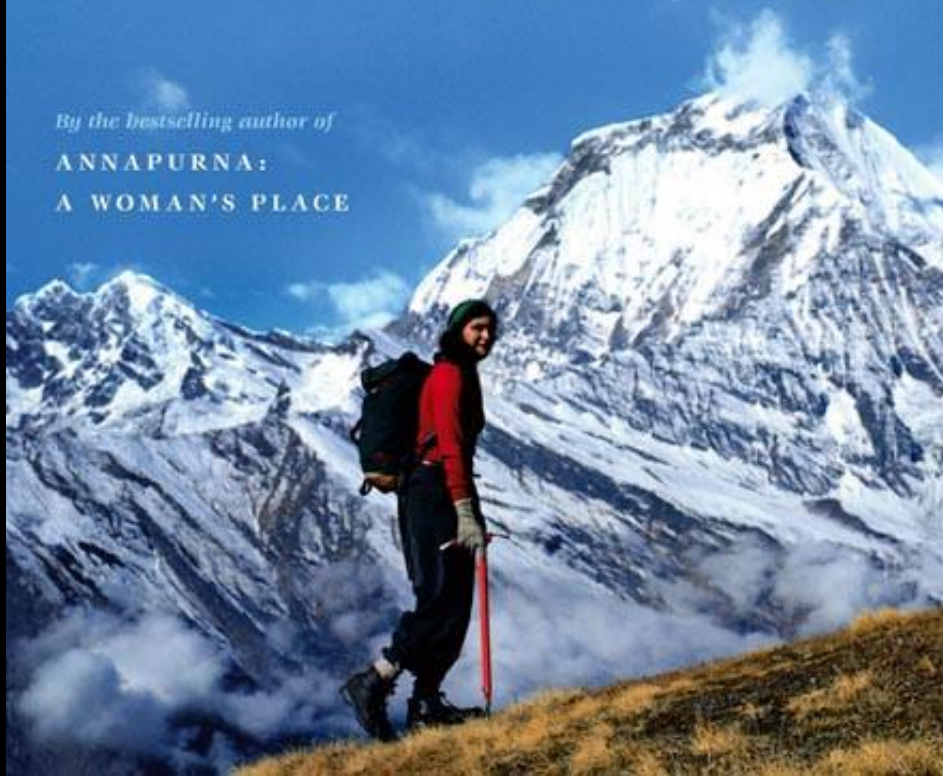
Arlene Blum

BREAKING TRAIL

A Climbing Life

By the bestselling author of

ANNAPURNA:
A WOMAN'S PLACE





GREEN SCIENCE POLICY INSTITUTE

Environmental Science & Technology
Building Research & Information (2022) 48(6):738-755

Building insulation: using codes

Novel and High Volume Use Flame Retardants in US Couches
Heather M. Thomas F.
Nicholas S.
Departments
Support

Fluorine
Laurel A. Margaret
Silent Sp
Californi
Green
Depart
Enter
Natio
Unit
Che
Ox
Di

Environmental Letters
Science & Technology

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

¹Harvard T. H. Chan School of Public Health, Boston, Massachusetts 02215, United States
²Harvard John A. Paulson School of Engineering and Applied Sciences, Cambridge, Massachusetts 02138, United States
³Environmental Working Group, Washington, D.C. 20009, United States
⁴National Exposure Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, United States
⁵University of California at Berkeley, Berkeley, California 94720, United States
⁶Silent Spring Institute, Newton, Massachusetts 02460, United States
⁷University of Rhode Island, Narragansett, Rhode Island 02882, United States
⁸Green Science Policy Institute, Berkeley, California 94705, United States
⁹California Department of Toxic Substances Control, 1001 I Street, Sacramento, California 95814, United States (Formerly at the Green Science Policy Institute, Berkeley, California 94705, United States)
¹⁰Colorado School of Mines, 1500 Illinois Street, Golden, Colorado 80401, United States

Supporting Information

ABSTRACT: Drinking water contamination with poly- and perfluoroalkyl substances (PFASs) 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 (U.S. EPA) 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

Hydrological units with detectable PFASs

Meaning the drinking water

Meaning the drinking water



Education



Research

Retreats

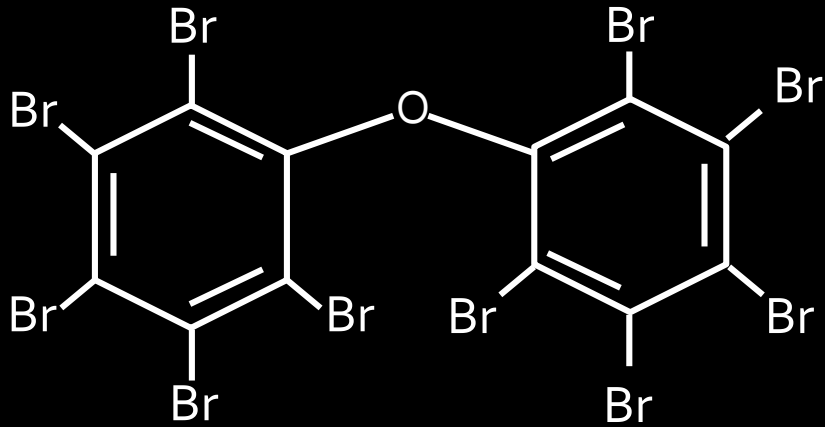
Policy & Purchasing Change

U.S. Toxic Substances Control Act (1976)

- 62,000 previous chemicals “grandfathered”
- 23,000 new chemicals
 - 85% have no health data
 - 67% have no data at all



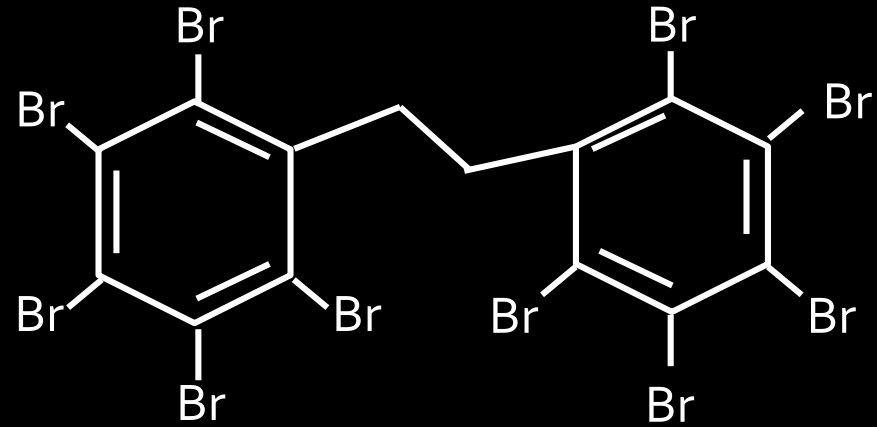
Regrettable Substitution



Decabromodiphenyl
ether

Concerns:

- Persistence
- Bioaccumulation
- Toxicity



Decabromodiphenyl
ethane

Concerns:

- Persistence
- Bioaccumulation
- Toxicity

Six Classes Videos

An innovative approach to reducing toxics

1

Highly
Fluorinated

2

Antimicrobials

3

Flame
Retardants

4

Bisphenols
+ Phthalates

5

Some
Solvents

6

Certain Metals



VIEW and SHARE: www.SixClasses.org

Healthier products, healthier people in four minutes!

Is it necessary?

Is it worth it?

Is there a safer alternative?

Classes 1 to 3

Periodic table of elements

hydrogen 1 H 1.0079												Halogens												helium 2 He 4.0026
lithium 3 Li 6.941		beryllium 4 Be 9.0122														boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180			
sodium 11 Na 22.990		magnesium 12 Mg 24.305														aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948			
potassium 19 K 39.098		calcium 20 Ca 40.078		scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.39	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80					
rubidium 37 Rb 85.468		strontium 38 Sr 87.62		yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.91	palladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29					
caesium 55 Cs 132.91		barium 56 Ba 137.33		57-70 ★	lutetium 71 Lu 174.97	hafnium 72 Hf 178.49	tantalum 73 Ta 180.95	tungsten 74 W 183.84	rhenium 75 Re 186.21	osmium 76 Os 190.23	iridium 77 Ir 192.22	platinum 78 Pt 195.08	gold 79 Au 196.97	mercury 80 Hg 200.59	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po [209]	astatine 85 At [210]	radon 86 Rn [222]				
francium 87 Fr [223]		radium 88 Ra [226]		89-102 ★ ★	lawrencium 103 Lr [262]	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [266]	bohrium 107 Bh [264]	hassium 108 Hs [269]	meitnerium 109 Mt [268]	ununium 110 Uun [271]	ununium 111 Uuu [272]	ununium 112 Uub [277]		ununquadium 114 Uuq [289]								

* Lanthanide series

lanthanum 57 La 138.91	cerium 58 Ce 140.12	praseodymium 59 Pr 140.91	neodymium 60 Nd 144.24	promethium 61 Pm [145]	samarium 62 Sm 150.36	europium 63 Eu 151.96	gadolinium 64 Gd 157.25	terbium 65 Tb 158.93	dysprosium 66 Dy 162.50	holmium 67 Ho 164.93	erbium 68 Er 167.26	thulium 69 Tm 168.93	ytterbium 70 Yb 173.04
--	-------------------------------------	---	--	--	---------------------------------------	---------------------------------------	---	--------------------------------------	---	--------------------------------------	-------------------------------------	--------------------------------------	--

** Actinide series

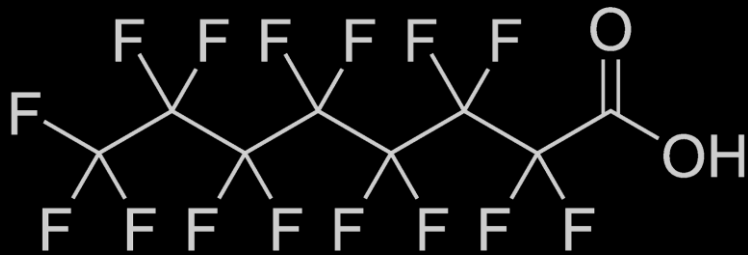
actinium 89 Ac [227]	thorium 90 Th 232.04	protactinium 91 Pa 231.04	uranium 92 U 238.03	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]
--------------------------------------	--------------------------------------	---	-------------------------------------	---------------------------------------	---------------------------------------	---------------------------------------	------------------------------------	---------------------------------------	---	---	--------------------------------------	--	---------------------------------------

Show the PFAS video here

A close-up photograph of several water droplets resting on a green, textured fabric surface. The droplets are spherical and reflect light, demonstrating the water-resistant properties of the material. The fabric has a visible woven pattern.

**HIGHLY FLUORINATED CHEMICALS:
ARE NON-STICK AND WATERPROOF PRODUCTS
WORTH OUR HEALTH?**

Class 1: Highly Fluorinated Chemicals



PFOA

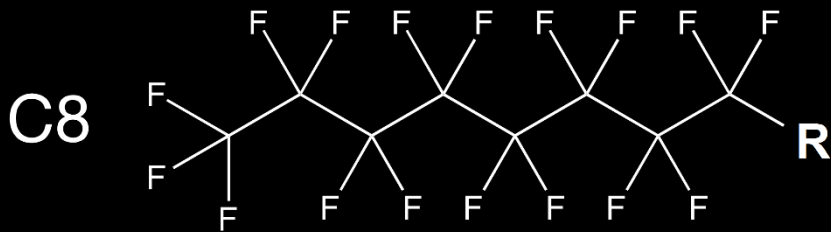


Carbon-Fluorine bond strength:

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

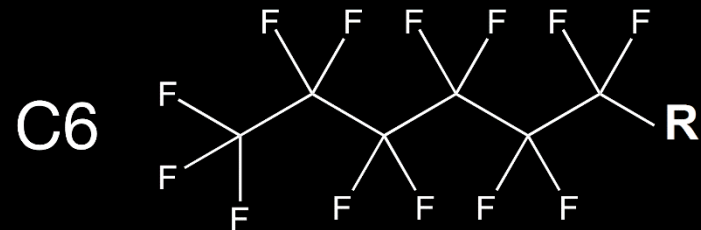
Is C6 an improvement over PFOA and PFOS?

C6 is called the “environmentally friendly” alternative



Concerns:

- Extreme persistence
- Bioaccumulation
- Toxicity



Concerns:

- Extreme persistence
- Bioaccumulation in plants
- Suspected toxicity
- More mobile
- Remediation more difficult

PFAS exposure is a health concern



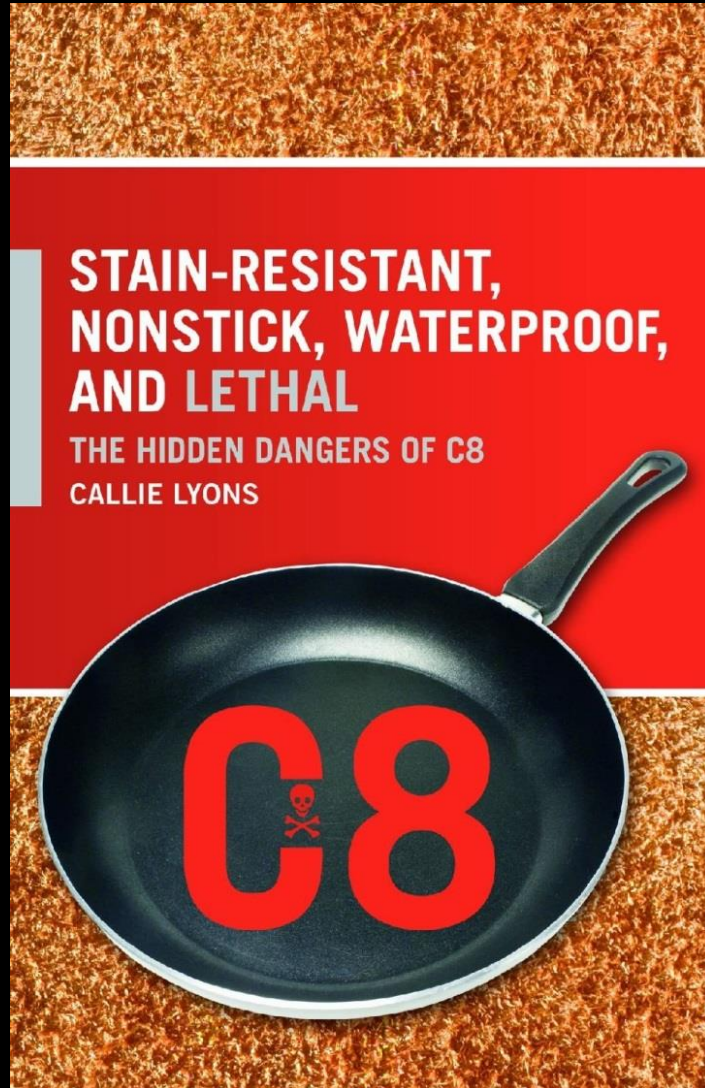
Exposure linked to health risks:

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

Published 2007



2017

Watershed

Tracy K. Smith

US Poet Laureate

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

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

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

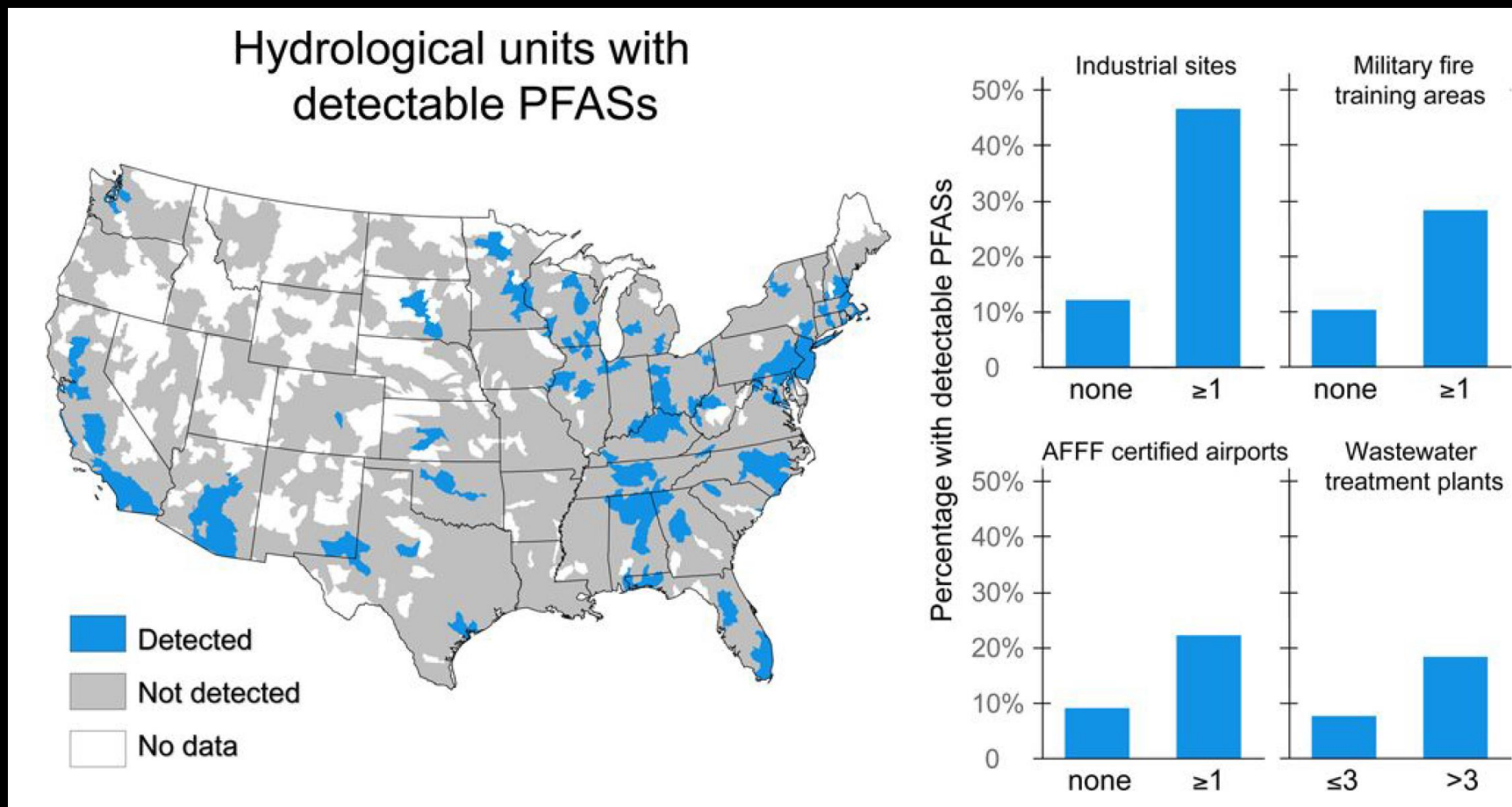
The Lawyer Who Became DuPont's Worst Nightmare

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



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



PFAS Legal Claims

September 2015: 3,500 personal injury and 37 wrongful death claims in Ohio Valley against DuPont went to trial

(The Teflon Toxin Goes to Court, Sharon Lerner, The Intercept)

February 2017: \$671 million to settle claims

Minnesota seeks \$5 billion for PFAS water pollution

February 2018: 3M, Minnesota settle for \$850 million

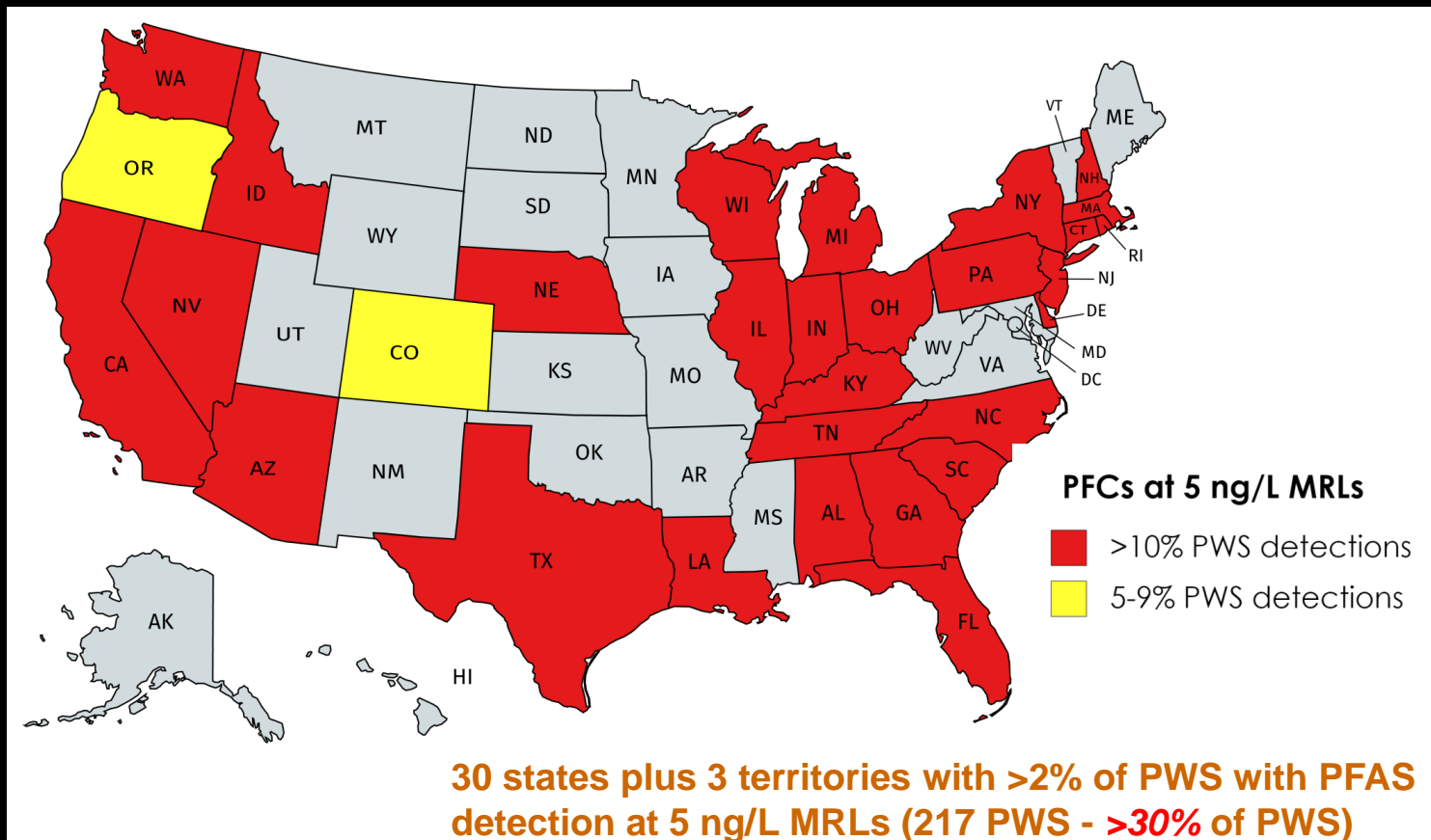
Highly Fluorinated Hush Puppies

- Wolverine used Scotchguard (PFOS) used for leather treatment 1950s – 2000
 - Leather scrap dumped
 - Sludge applied to fields
- PFOA + PFOS level up to 58,000 ppt (842 times EPA health advisory level)



Widespread PFAS occurrence

- Percent of water systems with detectable PFOA:
 - Official EPA estimate: 1%
 - **Estimate from testing lab: up to 24%**



CA proposal to list carpets with any PFAS

February 15, 2018



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

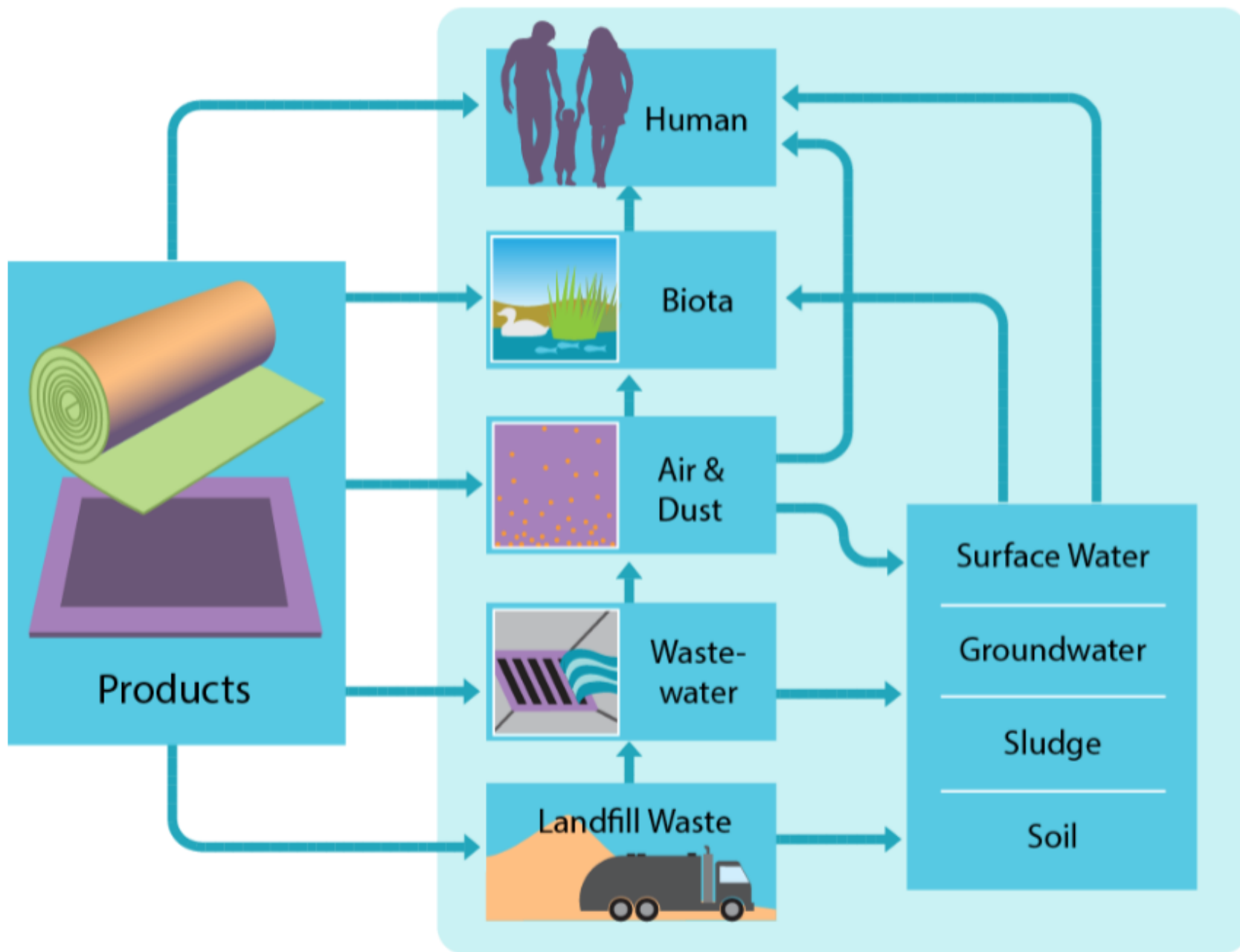
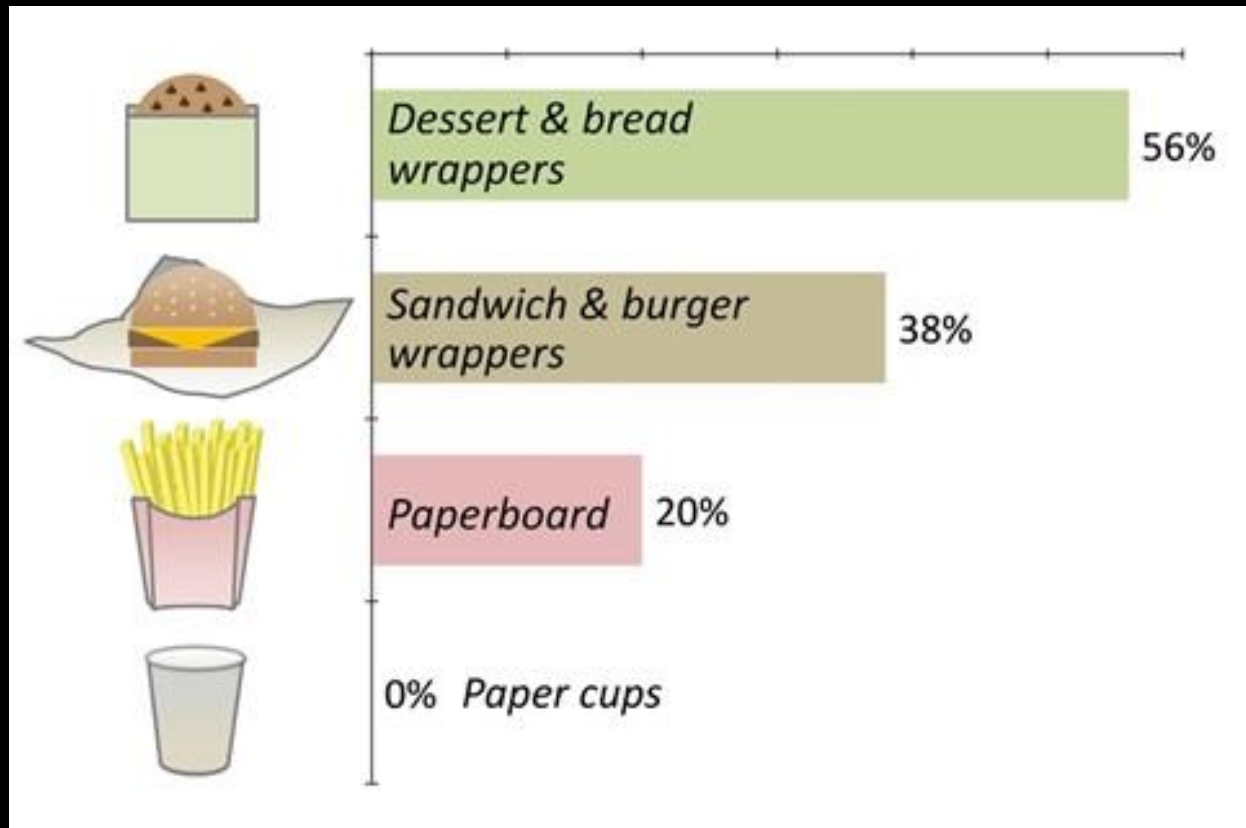


Figure 2: Key routes of PFAS exposure from treated carpets and rugs.

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

BRANDS ARE ELIMINATING HIGHLY FLUORINATED CHEMICALS

IKEA

H&M

Crate&Barrel

LEVI STRAUSS & CO.

PUMA

benetton

ESPRIT

adidas

MARKS &
SPENCER

MANGO

BURBERRY[®]
LONDON

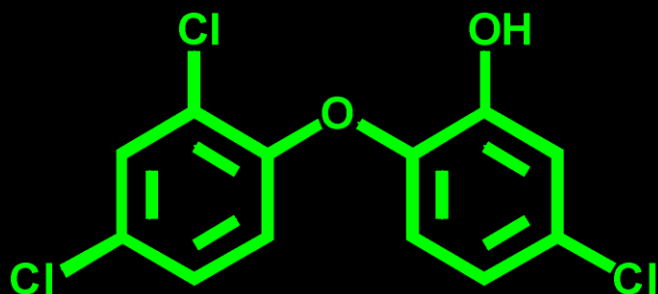
ZARA

Purchasers can avoid fluorinated chemicals

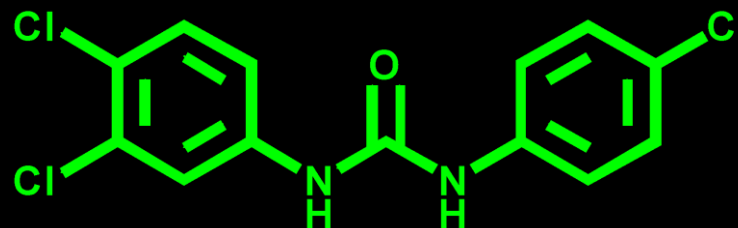
Product Category	With	Without
Flooring	244	13
Carpet face fibers	19	16
Carpet backing	7	21
Floor sealants and coatings	12	1

Class 2: Antimicrobials

Triclosan

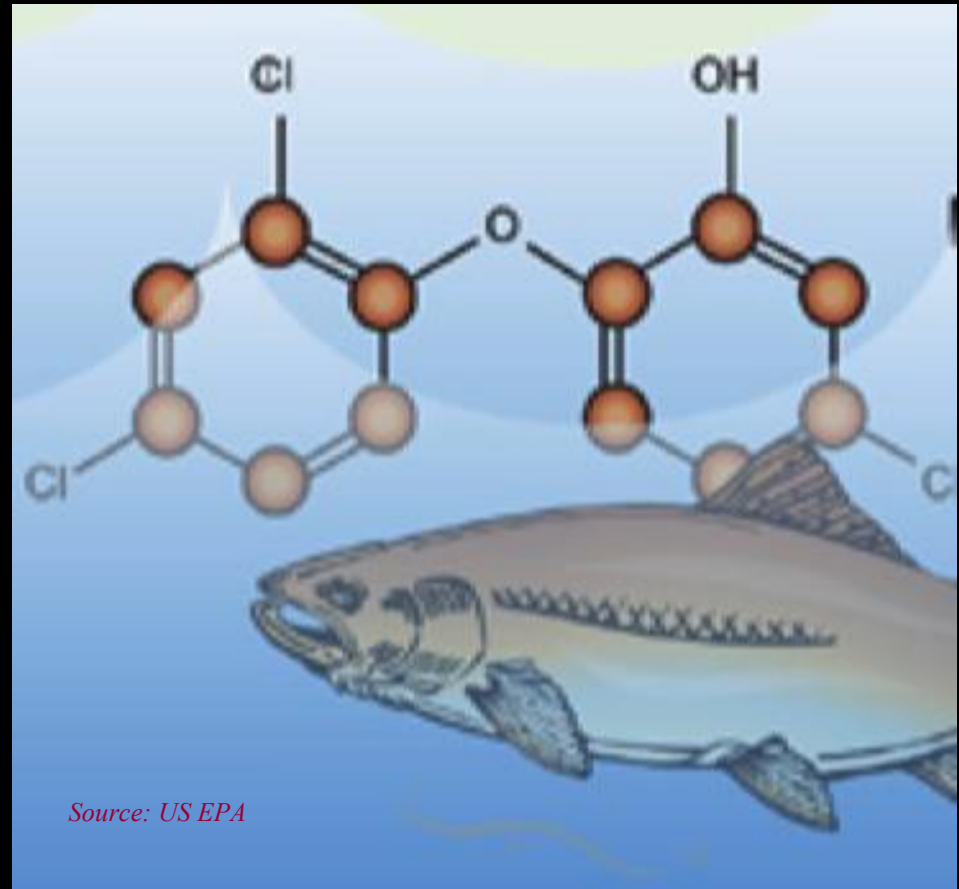


Triclocarban

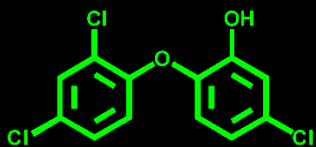




5 – 10 Seconds
(ineffective)



**Lifetime exposure in
aquatic organisms
(toxic)**



FDA Draft
Monograph
on lack of efficacy
and safety

First
detection
in fish

FDA removes
assorted
antimicrobials from
drug category

Patented

1964

1974

1984

1994

A History of Triclosan in the U.S.

2002

Top ten water
contaminant

2007

Endocrine
disruptor;
Detectable in
97% of breast
milk samples

2016

FDA determines 19
antimicrobials not
safe or effective in
consumer soaps

2013

> 2,000
antimicrobial
products.

2010

NGOs petitions
FDA to prohibit
triclosan in soaps.
NGO sues FDA.

The Florence Statement on Triclosan and Triclocarban



Documents the scientific consensus about:

- potential for harm
- recommendations to prevent further harm

Signed by 205 international scientists

2017: *Environmental Health Perspectives*

Alternative Antimicrobials

	Toxic to Aquatic Organisms	Can Persist in the Environment	Can Contribute to Antimicrobial Resistance	Health Risks?
Triclosan & Triclocarban	✓	✓	✓	Hormone disruption Allergy sensitivity Altered microbiome
Quats	✓	✓	✓	Asthma Skin irritation Reproductive toxicant?
Nanosilver	✓	✓	✓	Significant data gaps

Antimicrobials

Product Category	With	Without
Countertops	1	14
Floor finishes	5	1
Ceilings	11	1
Interior paint	140	4



A review of scientific research showed that triclosan and triclocarban can harm people and the environment...



...and provide few proven benefits.

Class 3 Flame retardants

Updating 1970s Flammability Standards

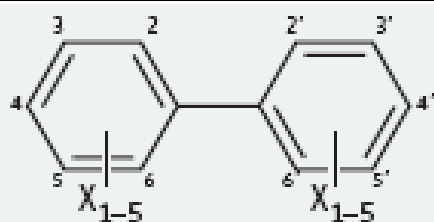
- Children's sleepwear --1976
- Furniture and baby product foam --2014
- Foam building insulation --2019?

Technical Bulletin 117

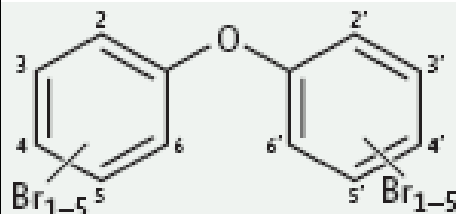


- Required furniture foam to withstand a small open flame for 12 seconds
- No significant fire safety benefit (fires start in exterior fabric not filling)

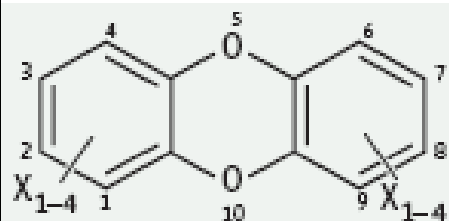
PentaBDE Flame Retardant



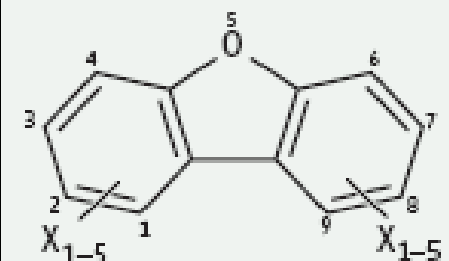
PCBs (X = Cl) and PBBs (X = Br)



PBDEs



Dioxins (X = Cl or Br)



Furans (X = Cl or Br)

Used from 1975 to 2004
to meet TB117.

98% of use in foam in US
and Canada in 2003

Furniture foam flame retardant (PentaBDE) associations with human health problems



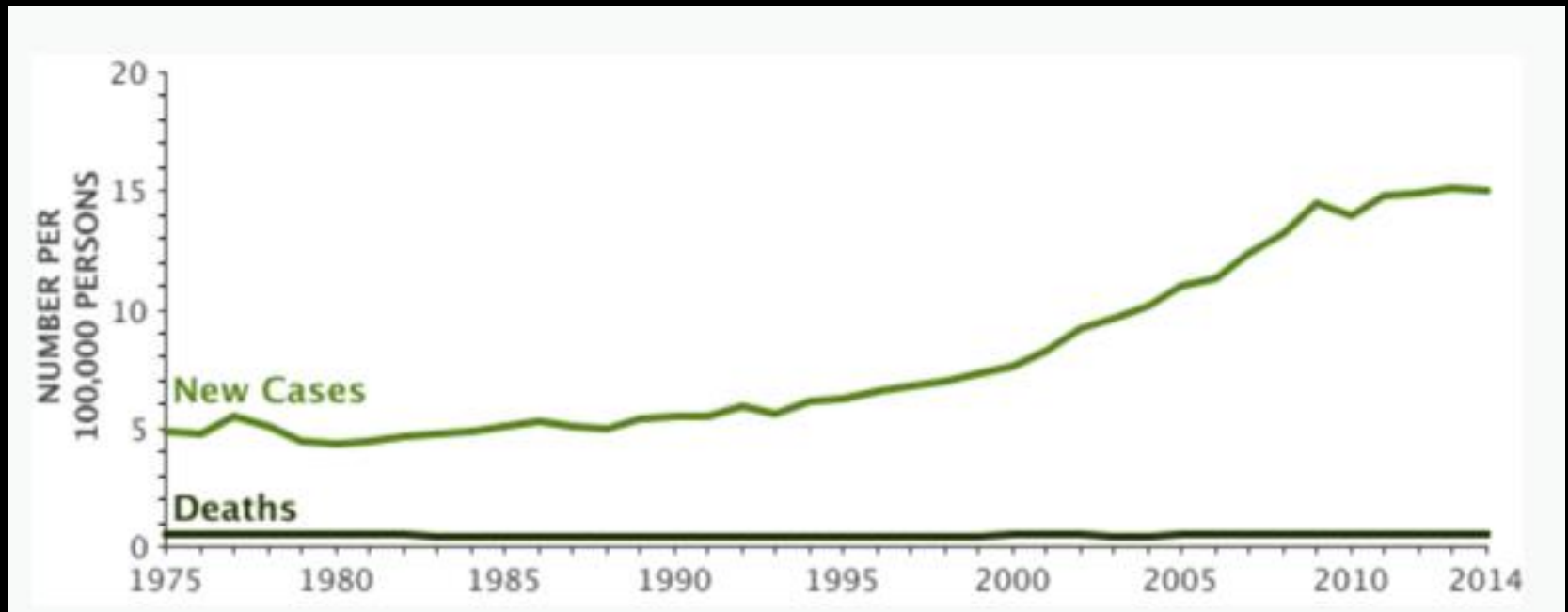
Increased time to pregnancy
Altered thyroid hormone
Thyroid disease in women



Impaired attention
Poorer coordination
Lower IQ
Developmental toxicity
Baby boys' genital problems
Lower birth weight
Delayed puberty in girls
Earlier puberty in boys

*Main et al. 2007; Goodyer et al 2017;
Eskenazi et al., 2010, 2011, 2012; Herbstman et
al. 2010; Makey et al. 2016; Windham et al.
2015; Harley et al. 2017; Allen et al. 2016*

U.S. Thyroid cancer incidence and mortality: 1975 - 2014

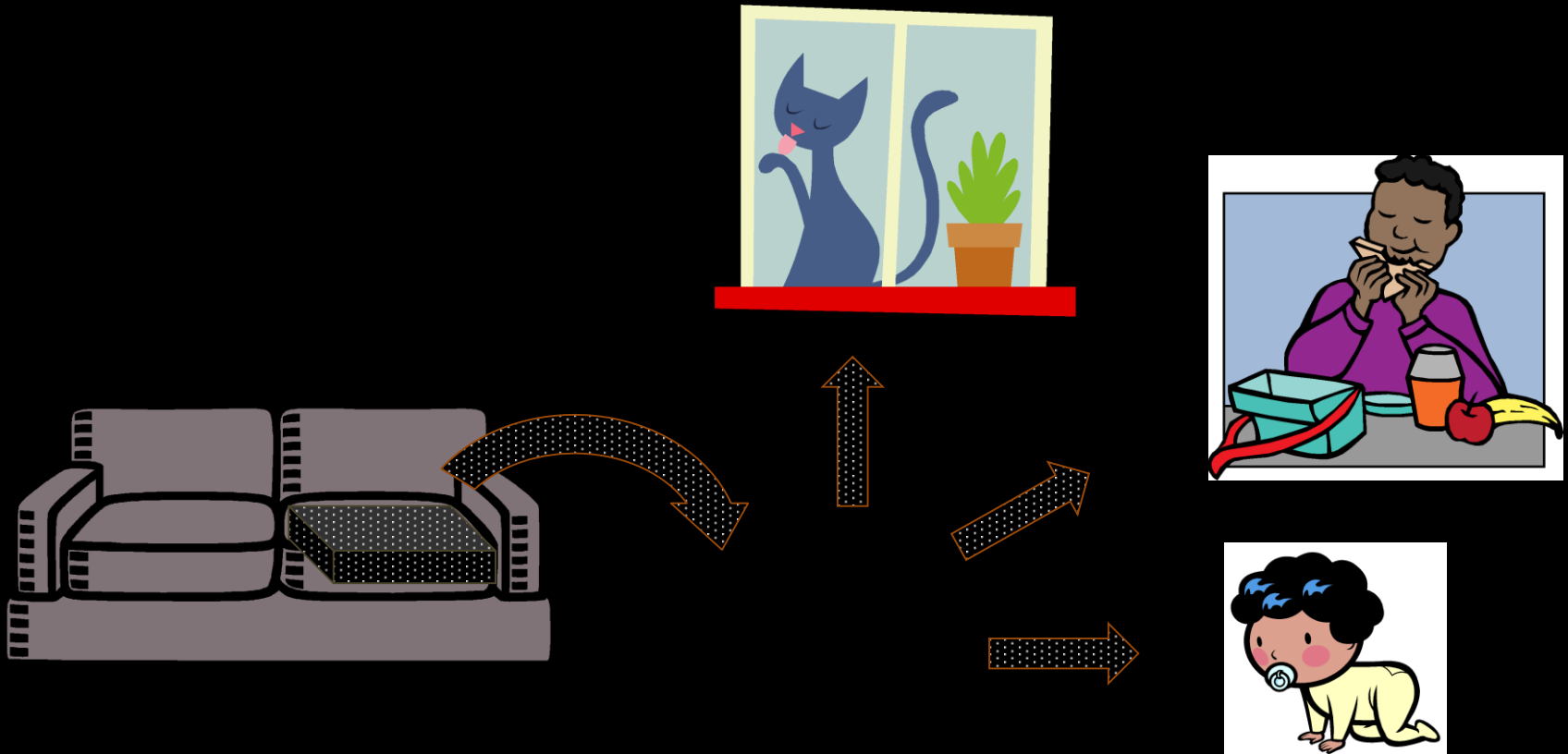


SEER 9 Incidence & U.S. Mortality 1975-2014, All Races, Both Sexes. Rates are Age-Adjusted.

Recent study reports elevated risks of thyroid cancer linked to exposure to Tris (142% increase) and DecaBDE (129% increase).

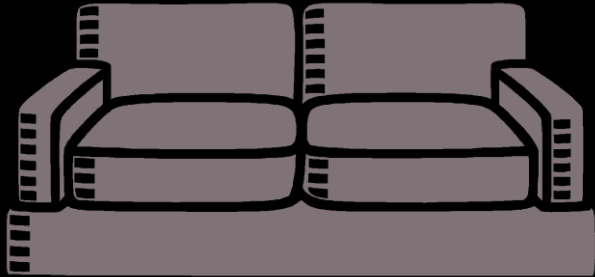
(Hoffman et al. Environ Int Oct 2017)

From Products to People



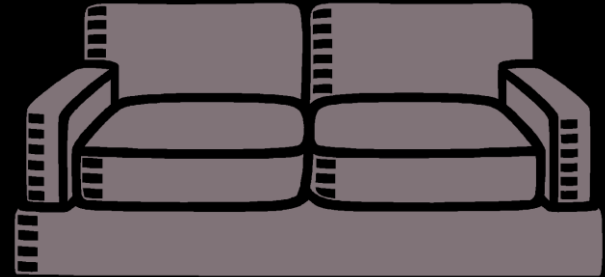
TB117 Fire Safety Benefit?

TB117 foam



~

Non - TB117 foam



“No significant, consistent difference...”

Flame retardants increase smoke toxicity more than they reduce fire growth

Flame retardants delay, but don't prevent ignition
Then, flame retardants can increase....



- Soot and Smoke
- Carbon Monoxide and Hydrogen Cyanide
- Dioxins and Furans

Increased fire safety without flame retardants



Assembly Bill 706, Senate Bill 772, Senate Bill 1291, Senate Bill 147



Paid for by Californians for Fire Safety:

- Albemarle
- Chemtura
- Israel Chemicals LTD (ICL)

San Antonio Statement on Brominated and Chlorinated Flame Retardants

- Signed by over 200 scientist's from 30 countries
- Documents health and environmental harm and lack of proven fire safety benefit





Elimination of Fire Retardant Chemicals in Office Furniture

“Given the increasing body of evidence that indicates the persistence, bio-accumulation and potential health aspects of many fire retardants, we believe the risks associated with the use of these chemicals is greater than the hazard associated with the fire risk from furniture without fire retardants.”

- From the position paper

Business and Institutional Furniture Manufacturer's Association. (BIFMA)

Pulitzer Prize

Finalist

Goldsmith Prize

Investigative Reporting

Environmental

Journalists Society

Environmental Reporting

Gerald Loeb Award

Business and Financial Journalism

National Press Club

Consumer Award

Chicago Tribune



QUESTIONS? CALL 1-800-TRIBUNE

SUNDAY, MAY 6, 2012

BREAKING 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 CALLAHAN AND SAM ROE
Tribune reporters

Dr. David Heimbach knows how to tell a story. Before California lawmakers last year, the noted burn surgeon drew gasps from the crowd as he described a 7-week-old baby girl who was burned in a fire started by a candle while she lay on a pillow that lacked flame retardant chemicals.

"Now this is a tiny little person, no bigger than my Italian greyhound at home," said Heimbach, gesturing to approximate the baby's size. "Half of her body was severely burned. She ultimately died after about three weeks of pain and misery in the hospital."

Heimbach's passionate testimony about the baby's death made the long-term health concerns about flame retardants voiced by doctors, environmentalists and even firefighters sound abstract and petty.

But there was a problem with his testimony: It wasn't true. Records show there was no dangerous pillow or candle fire. The baby he described didn't exist.

Neither did the 9-week-old patient who Heimbach told California legislators died in a candle fire in 2009. Nor did the 6-week-old patient who he told Alaska lawmakers was fatally burned in her crib in 2010.

Heimbach is not just a prominent burn doctor. He is a star witness for the manufacturers of flame retardants.

His testimony, the Tribune found, is part of a decades-long campaign of deception that has loaded the furniture and electronics in American homes with pounds of toxic chemicals linked to cancer, neurological deficits, developmental problems and impaired fertility.

The tactics started with Big Tobacco, which wanted to shift focus away from cigarettes as the cause of fire deaths, and continued as chemical companies worked to preserve a lucrative market for their products, according to a Tribune review of thousands of government, scientific and internal industry

stoked the public's fear of fire and helped organize and steer an association of top fire officials that spent more than a decade campaigning for their cause.

Today, scientists know that some flame retardants escape from household products and settle in dust. That's why toddlers, who play on the floor and put things in their mouths, generally have far higher levels of these chemicals in their bodies than their parents.

Blood levels of certain widely used flame retardants doubled in adults every two to five years between 1970 and 2004. More recent studies show levels haven't declined in the U.S. even though some of the chemicals have been pulled from the market. A typical American baby is born with the highest recorded concentrations of flame retardants among infants in the world.

People might be willing to accept the health risks if the



California Flammability Standards TB117-2013

Mandatory January 1, 2015

Flame retardants not needed,
but can still be used

Product Labels Required

TB133 being revoked in California
due to lack of need and potential
for harm

NOTICE

THIS ARTICLE MEETS THE FLAMMABILITY REQUIREMENTS OF CALIFORNIA BUREAU OF ELECTRONIC AND APPLIANCE REPAIR, HOME FURNISHINGS AND THERMAL INSULATION TECHNICAL BULLETIN 117-2013. CARE SHOULD BE EXERCISED NEAR OPEN FLAME OR WITH BURNING CIGARETTES.

The upholstery materials in this product:

☐ contain added flame retardant chemicals
☒ contain NO added flame retardant chemicals

The State of California has updated the flammability standard and determined the fire safety requirements for this product can be met without adding flame retardant chemicals. The State has identified many flame retardant chemicals as being known to, or strongly suspected of, adversely impacting human health or development.

NFPA 277 would reintroduce an open-flame standard in residential upholstered furniture

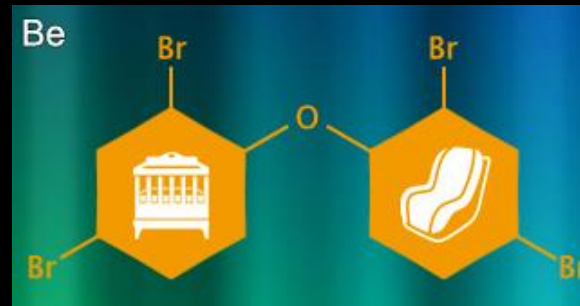
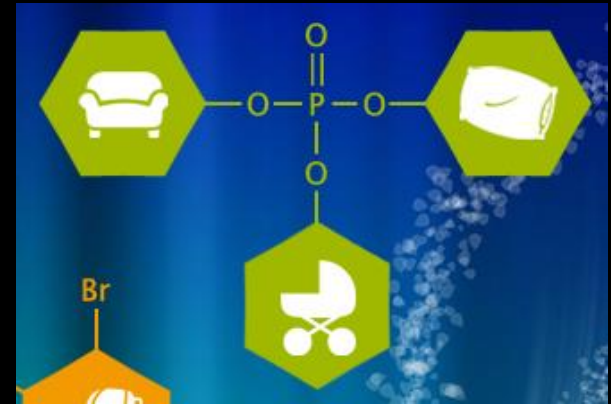
- A new furniture flammability test is not needed.
- NFPA 277 would not significantly improve fire safety, but would harm our health and environment.
- NFPA process lacked transparency & was industry dominated.
- Next meeting: March 2018



If passed, NFPA 277 could bring toxic flame retardants back into US furniture!

Are there flame retardants in your furniture?

- Submit samples of polyurethane foam to Duke University
- Free testing; results within 45 days



<http://foam.pratt.duke.edu/home>

Building codes drive FR use in insulation



BRI BUILDING RESEARCH & INFORMATION (2012) 40(6), 738–755



INFORMATION PAPER

Flame retardants in building insulation: a case for re-evaluating building codes

Vytenis Babrauskas¹, Donald Lucas², David Eisenberg³, Veena Singla⁴,
Michel Dedeo⁴ and Arlene Blum^{4,5}

¹Fire Science & Technology Inc., 9000 – 300th Place SE, Issaquah, WA 98027, US
E-mail: vytob@doctorfire.com

²Lawrence Berkeley National Laboratory, 1 Cyclotron Road MS 70-0108B, Berkeley, CA 94720, US
E-mail: dlucas@lbl.gov

³Development Center for Appropriate Technology, PO Box 27513, Tucson, AZ 85726-7513, US
E-mail: strawnet@gmail.com

⁴Green Science Policy Institute, PO Box 5455, Berkeley, CA 94705, US
E-mails: veena@greensciencepolicy.org, michel@greensciencepolicy.org and
arlene@greensciencepolicy.org

California Assembly Bill 127 (2013): Safer Building Insulation

- California fire marshal may propose updates that:
 - Maintain overall fire safety
 - Provide flexibility in meeting fire safety standards with or without chemical flame retardants
- Implementation:
 - Working Group (ended summer 2015)
 - Testing & analysis at Oklahoma State University

<http://osfm.fire.ca.gov/codedevelopment/wgfsbim.php>

Oklahoma State University Study

Commissioned by California OSFM following AB 127 Working Group.

Key Findings

- Comparable ignition and heat release rates between foam plastic insulation with and without flame retardants and other combustible construction materials .
- When installed below grade, no risk of fire spread to the structure from insulation without flame retardants.

California codes can be safely updated to allow below-grade use of insulation without flame retardants.

Class Four:

Bisphenols



FUNCTIONS: hardening agents, strengtheners, stabilizers

Phthalates



FUNCTIONS: plasticizers, lubricants, solvents, fragrances

Class 5:

Some Solvents



FUNCTIONS: dissolving and dispersing other substances

Class 6: Certain Metals

Mercury



Arsenic



Cadmium



Lead



FUNCTIONS: conductors, malleable, resistant to corrosion

Purchasers are Key

- Manufacturers of consumer products
- Large retailers
- Educational, institutional & governmental
- Designers and specifiers
- Consumers

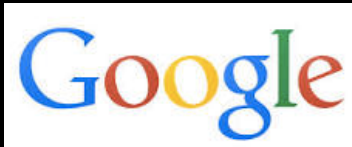
Moving the market toward transparency & healthier products

- Ask chemical disclosure questions on contracts
- Require verification such as laboratory tests
- Offer healthier products and identify those products
- Take products off contract that contain chemicals of concern
- Educate members to buy greener products
- Help members track their spending on green purchasing


55 manufacturers with products meeting Healthy Interiors criteria



Material Buyer's Club



- Require transparency from manufacturers
- Utilize collective purchasing power to create a demand for healthier products and materials

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. The text is overlaid on the upper right portion of the image.

For monthly e-newsletters,
give Arlene your card or
sign the mailing list

**A copy of this talk will be at
www.GreenSciencePolicy.org**

A scenic mountain landscape. In the foreground, a dirt path leads through a field of green grass and red wildflowers. In the background, a large, snow-capped mountain peak rises above a layer of white clouds. The sky is clear and blue.

By limiting use of the Six Classes

We can have a healthier world.

**For more information:
GreenSciencePolicy.org**



GREEN SCIENCE
POLICY INSTITUTE

Workshop Instructions Tackling Toxics: The Class Concept for Healthier Hospitals

March 21, 2018

Introductions

- Name
- Your position and where you work
- What brought you here?

Group Instructions

- Group of four or five with time keeper
- Pick one class and one product. How can you use the class concept for healthier purchasing?
- Think about ideas and write 5 minutes
- Report back ACTIVE LISTENING 3 minutes
- Choose 2 ideas for discussion 5-10 minutes
- Flipchart
- Group report back and discussion

Commitments

Name

Partners

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

1.

2.

3.