

Non-Stick Science: Sixty Years of Research and (In)Action on Fluorinated Compounds

Phil Brown



Northeastern University
*Social Science Environmental Health
Research Institute*

**“Environmental Justice and the Future of Environmental
Health Research”**

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Methods

Qualitative Data Collection

In-depth Interviews (69)

Multi-sited Observations

Regulatory agencies

Research laboratories

Contaminated communities

Scientific Literature Review

Regulatory Document
Analysis

Tracking Contamination Cases

Media Coverage

Date of Discoveries

PFAS Levels Detected

Source(s) of Contamination

Regulatory Responses

Community Concerns

Biomonitoring

Litigation

Per- and Poly-fluoroalkyl Substances PFAS (aka PFCs)

- Non-stick, liquid repellant, stain resistance
 - PFOA (aka C8) used in Teflon
 - PFOS in Scotchgard and Gore-Tex
 - Over 3,000 compounds, many with trade secrecy
- NHANES finds PFOA in 99% of people
- Hundreds of other unknown applications , e.g. cosmetics, dental floss, etc.
- Aqueous fire fighting foam (AFFF) containing PFASs now showing up widely
 - Over 600 military installations
 - Airports
 - Firefighter training sites



Health Effects of PFAS

- ***From C8 Study***

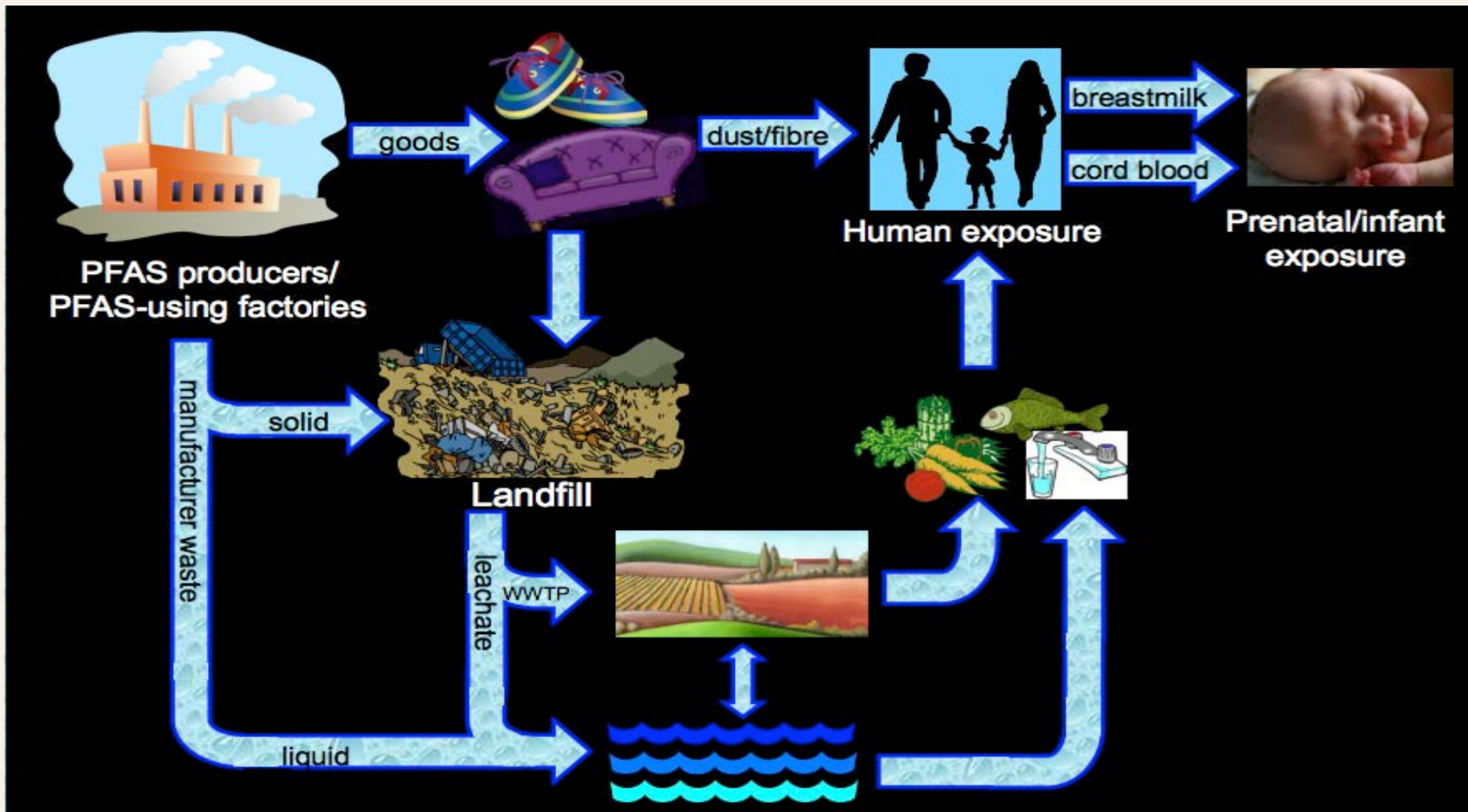
- Testicular cancer
- Kidney cancer
- Ulcerative colitis
- High cholesterol
- Pregnancy-induced hypertension
- Thyroid disruption

- ***Other research***

- Hormonal changes
- Liver malfunction
- Obesity
- Immunotoxicity, incl. interference with child vaccine response
- Lower birth weight and size
- Delayed puberty, decreased fertility, early menopause
- Reduced testosterone
- Prostate cancer
- Ovarian cancer



Sources of Exposures and Pathway



Source: Jennifer Fields, Adapted from Oliaei 2013, *Environ Pollut Res*

Problems of dealing with one chemical at a time

- Takes too long
- Ignores similarities to other chemicals that are only slightly different in structure, but have similar action
- Makes it feasible for manufacturers and users to avoid responsibility
- *And hence...*

PFASs are one of the Green Science Policy Institute's Six Classes of harmful chemicals

1. Highly fluorinated chemicals (PFAS)

stain and water repellants

2. Chlorinated antimicrobials

triclosan and triclocarban

3. Flame retardants

brominated, chlorinated, phosphate

4. Bisphenols and phthalates

phthalates, BPA, BPS, etc.

5. Organic solvents

benzene, methylene chloride, xylene, etc.

6. Certain Metals

lead, mercury, chromium, cadmium, arsenic, etc.

source

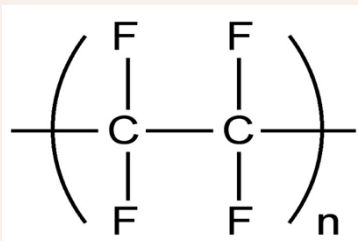


GREEN SCIENCE
POLICY INSTITUTE

We can think of this as

Chemical Class Consciousness

PFASs are all human-made and have been around for a long time



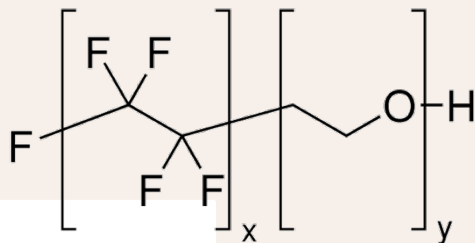
1938 **PFTE** (teflon) is discovered



1951 DuPont begins using **PFOA** in teflon production in West Virginia



1956 3M begins selling Scotchgard (**PFOS**)



1967 FDA approves Zonyl Food packaging (**PFOA**)

WHAT DID INDUSTRY KNOW?: DECADES OF SECRET STUDIES BY DUPONT AND 3M

Source for next slide: Environmental Working Group, from
DuPont and 3M documents in EWG's Chemical Industry Archives

1961	A DuPont toxicologist warns that Teflon chemicals cause liver enlargement in rats and rabbits.
1962	DuPont scientists have 40 volunteers smoke cigarettes laced with Teflon. Ninety percent of the most highly exposed group develop flu-like symptoms known as polymer fume fever.
1973	DuPont finds there is no safe level of exposure to C8/PFOA in animals.
1976	3M begins testing some workers' blood for PFOA and finds it in almost every one tested.
1978	3M finds that PFOA is "completely resistant" to breakdown in the environment.
1979	3M finds PFOS in the blood of five workers in Alabama. Fish in the Tennessee River, where up to 1 million pounds of PFOS waste were dumped each year, are found to have significant concentrations of the chemical in their blood, evidence of bioaccumulation.
1981	3M finds that PFOA causes birth defects in rats.
1981	DuPont finds PFOA in umbilical cord blood from one baby and blood from a second baby born to female workers at the Washington Works plant.
1981	Two of seven children of women working at Washington Works are found to have birth defects of the eye, tear duct or nose. DuPont transfers "all potentially exposed female employees" out of the plant but does not tell them why.
1983	3M doctors warn that organic fluorine levels in workers' blood are steadily rising, evidence that PFCs accumulate faster than the body can eliminate them.
1984	DuPont finds PFOA in tap water in two mid-Ohio Valley communities. Tests continue for 17 years before DuPont informs any area water suppliers.
1992	Data on workers at DuPont's Washington Works plant reveal an excess of deaths from cancer and leukemia.
1993	A 3M study of employees at a PFOA plant finds twice as many deaths from prostate cancer as in the general population.
1997	3M looks worldwide for clean blood samples to compare to its workers' blood but finds only one source not contaminated with PFOS – preserved blood of soldiers who died in the Korean War, before Scotchgard products spread worldwide.
1998	3M finds that PFOS causes liver cancer in rats. Despite federal law prohibiting the use in food of any substance that causes cancer in animals, 3M continued until 2000 to petition the FDA to allow PFOS in microwave popcorn bags.
1999	3M study in six East Coast cities finds PFCs in supermarket food, rivers and lakes, drinking water sources and tap water.

1981: The problem rises to the surface, but...

Why did two decades pass since 1961 animal health effects research and 1962 human health effects research?

- 1981, 3M provided DuPont and the EPA the results of an internal laboratory study finding that pregnant rats exposed to PFOA experienced birth defects in pups
- Documents later obtained in litigation indicate that DuPont began closely monitoring the health of female staff in the Teflon division of the Washington Works Plant due to 3M's 1981 research.
- 1981 - female DuPont employee in the Teflon division, Sue Bailey, gave birth to a baby with severe birth defects. (2 out of 7 births)
- A colleague put Sue Bailey in touch with another worker in the Teflon division whose baby born with eye deformities.
- 1981 - DuPont removed all female staff from the Teflon unit, notified employees to speak with medical staff prior to getting pregnant

What Did Industry Know?

- 1982 – DuPont shares new animal data with EPA but says nothing about birth defects
- DuPont withheld the company's concerns about exposure and risk from fenceline communities in the Mid-Ohio Valley near its Parkersburg, WV plant

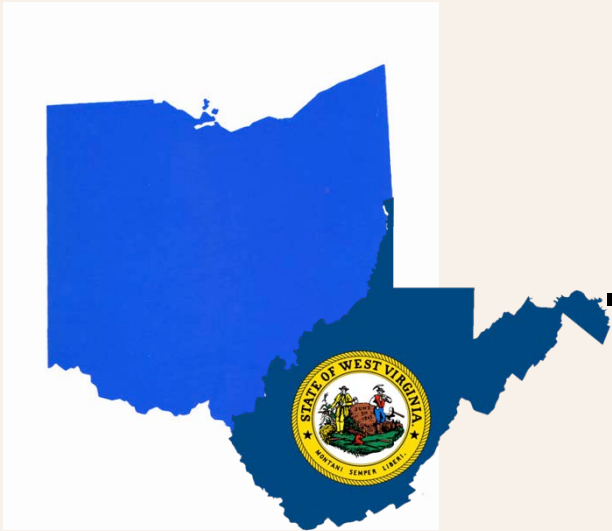


Social Discovery



Tennant Family Farm, Mid Ohio Valley. Source: New York Times

Mid-Ohio River Valley



- **1980 – 1990's:** DuPont dumped ~**7,000 tons** of PFOA waste into the Dry Run Landfill on the Tennant Family Farm.

Over **70,000 residents** exposed to PFOA-laced water for decades

- **1990 – 1999:** Tenants noticed environmental impacts on their farm (dying minnows, wildlife), then the cattle herd died. No luck directly approaching DuPont or the WV DEP, so they eventually contacted Bilott, a family friend.

NIEHS funded EJ study led by Ted Emmett (Penn.) and Decatur Community Association

- **2001:** Rob Bilott filed class action lawsuit for 80,000 people
- **2005:** DuPont settled class-action lawsuit \$235 million and \$16.5 settlement with the EPA, including funding C8 Study
- Required to install water filtration system, but not eliminate chemicals
- **2012** C8 Science Panel released findings, links PFOA exposure to kidney cancer, testicular cancer, thyroid disease, high cholesterol, ulcerative colitis, pregnancy-induced hypertension

Cottage Grove,

PFOA and PFOS

MN



- 3M buried an estimated **45 tons** of PFAS waste at local Woodbury landfill
- Estimated **50,000 pounds** of PFAS released into the Mississippi River each year

2002: Minnesota Pollution Control Agency told Residents 5/6 of their wells were contaminated with PFOA and PFOS

- Chemicals from local 3M plants

October 2004: Residents filed a lawsuit against 3M, citing increased risk of cancer and asthma

- Seeking environmental cleanup, health monitoring, and monetary damages; jury finds for 3M

Hoosick Falls,



NY

- Up to **662ppt** of PFOA in municipal drinking water (**June 2015**)
- Up to **18,000ppt** in groundwater near Saint Gobain plastics plant (**June 2015**)

✓ Contamination found by local resident that tested the municipal water himself after hearing about cases in the Mid-Ohio River Valley and Cottage Grove.

Nov 10, 2015: residents officially learned from local manufacturer Saint Gobain that their water has tested positive for PFOA

- Saint Gobain pledged to install water filtration system and provide bottled water to residents

Hoosick Falls,

PFOA



NY

Community Action

- ✓ Residents established Healthy Hoosick Water, a community activist group lead by a local doctor who claims to have personally witnessed the health consequences of the village's contamination

Jan 27, 2016: Hoosick Falls listed as state Superfund site by NY Department of Health

Feb 21, 2016: Class action lawsuit filed against 3 separate companies: Saint Gobain, Performance Plastics, and Honeywell International

For a long time, we thought
industrial sources were primary

**Newest and very common source: military
sites, airports, fire training centers**



Advertisement



News — Pennsylvania

Nearly 400 military bases must be tested for drinking water contamination — and it will take years

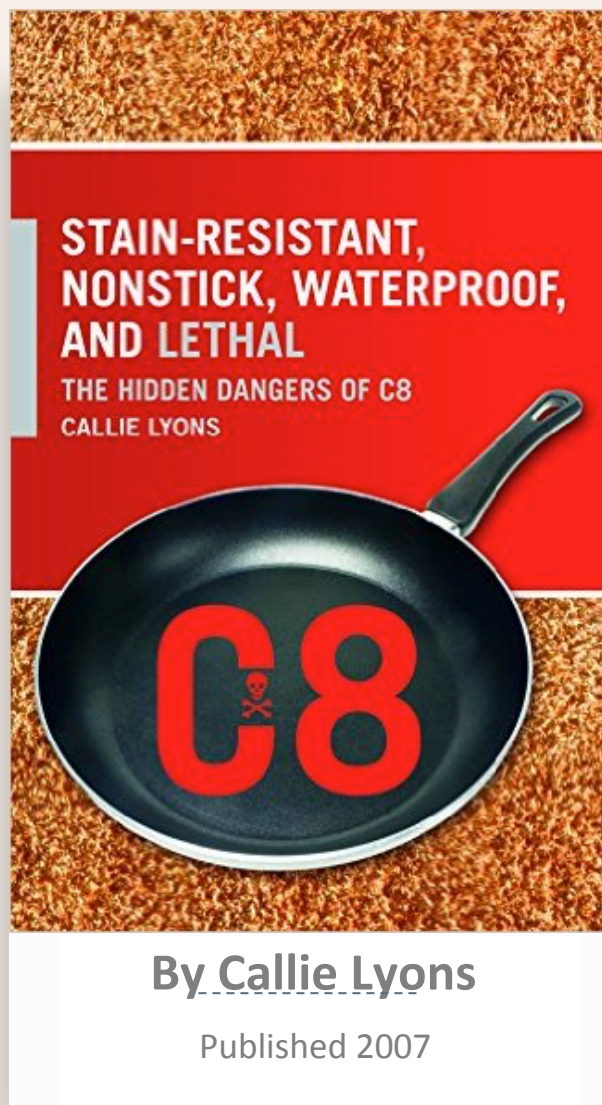
Updated: APRIL 21, 2016 — 5:00 AM EDT

[View Gallery](#)

(U.S. AIR FORCE PHOTO/SENIOR AIRMAN HEATHER HAYWARD/RELEASED)

Foam pours out of a dispenser generator inside Hangar 211 Dec. 21, 2012, at Mountain Home Air Force Base, Idaho. Every two years, Airmen are required to test the fire suppression systems in order to protect people and equipment.

Journalist Exposé



- ✓ Written by Ohio-based newspaper reporter and radio news director, Callie Lyon
- ✓ Follows the C8 issue from its first widespread attention in the 1980s to the announcement of the EPA phase-out and class action lawsuits against DuPont



January 6, 2016

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 FRI MAY 01 09:38:00 EDT 2015



Chemicals used to coat food packaging, such as pizza boxes, to make them stain-proof or waterproof are found in the bodies of people and animals worldwide.

PHOTOGRAPH BY KEITH LEIGHTON, ALAMY



May 1, 2015

Media Attention

IDEAS LAW

Erin Brockovich: It's Not Just Flint—America Has a Scary Water Problem

Erin Brockovich and Ken Cook | Feb. 9, 2016



IDEAS Erin Brockovich is a consumer advocate, and Ken Cook is president of the Environmental Working Group.

We must reform our broken chemical laws to prevent more tragedies

Most Americans take our drinking water for granted: turn the tap, fill a glass and drink. Only when a community's health and safety are imperiled do we pay heed to the threat of industrial chemicals in our water supplies. The grave danger of [lead poisoning to the children of Flint, Mich.](#), has rightly riveted the nation's attention, but another shameful and all too familiar story is unfolding in a village in upstate New York.



Matt Hopper holds his daughter after having her blood drawn to be tested for lead, in Flint, on Jan. 26, 2016.

The water in Hoosick Falls, N.Y., isn't poisoned with lead, but with a [chemical](#) that for decades was a key ingredient in making Teflon and hundreds of other products. Perfluorooctanoic acid, or PFOA, belongs to a class of chemicals that have invaded the bodies of people and animals in the farthest reaches of the globe. PFOA [pollutes the blood of almost all Americans](#) and can pass from mother to unborn child in the womb. It builds up in our bodies, and studies have shown it can cause [cancer](#), reproductive disorders and other serious illnesses.

The contamination of Hoosick Falls' water was revealed through tests said

TIME

February 9, 2016

Fears About Water Supply Grip Village That Made Teflon Products

By JESSE MCKINLEY FEB. 28, 2016



Downtown Hoosick Falls, N.Y., a village of 3,500 people about 30 miles northeast of the Albany. Nathaniel Brooks for The New York Times

Email

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HOOSICK FALLS, N.Y. — One resident called 911 asking whether the village's water would burn his skin off. Families have lined up to have their blood drawn and their wells tested. Banks stopped giving out mortgages, and some local residents stopped washing their dishes, their clothes and themselves. Erin Brockovich [has been to town](#).

Such are the unpleasant contours of a public health emergency that is playing out in Hoosick Falls, a quiet river-bend village near the New York-Vermont border that has been unended by disclosures

The New York Times

February 28, 2016

Community Organizing: Testing for Pease, Portsmouth NH



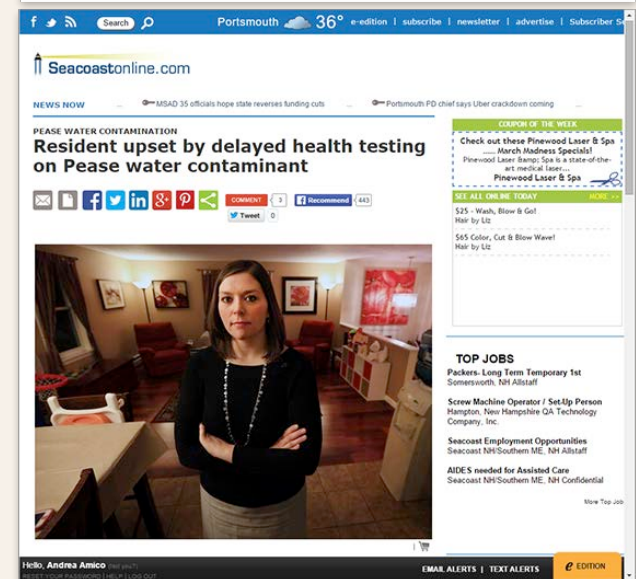
*Leaders from left to
right:
Alayna Davis
Michelle Dalton
Andrea Amico*

With support from Portsmouth resident and Harvard
SPH epidemiologist Courtney Carignan

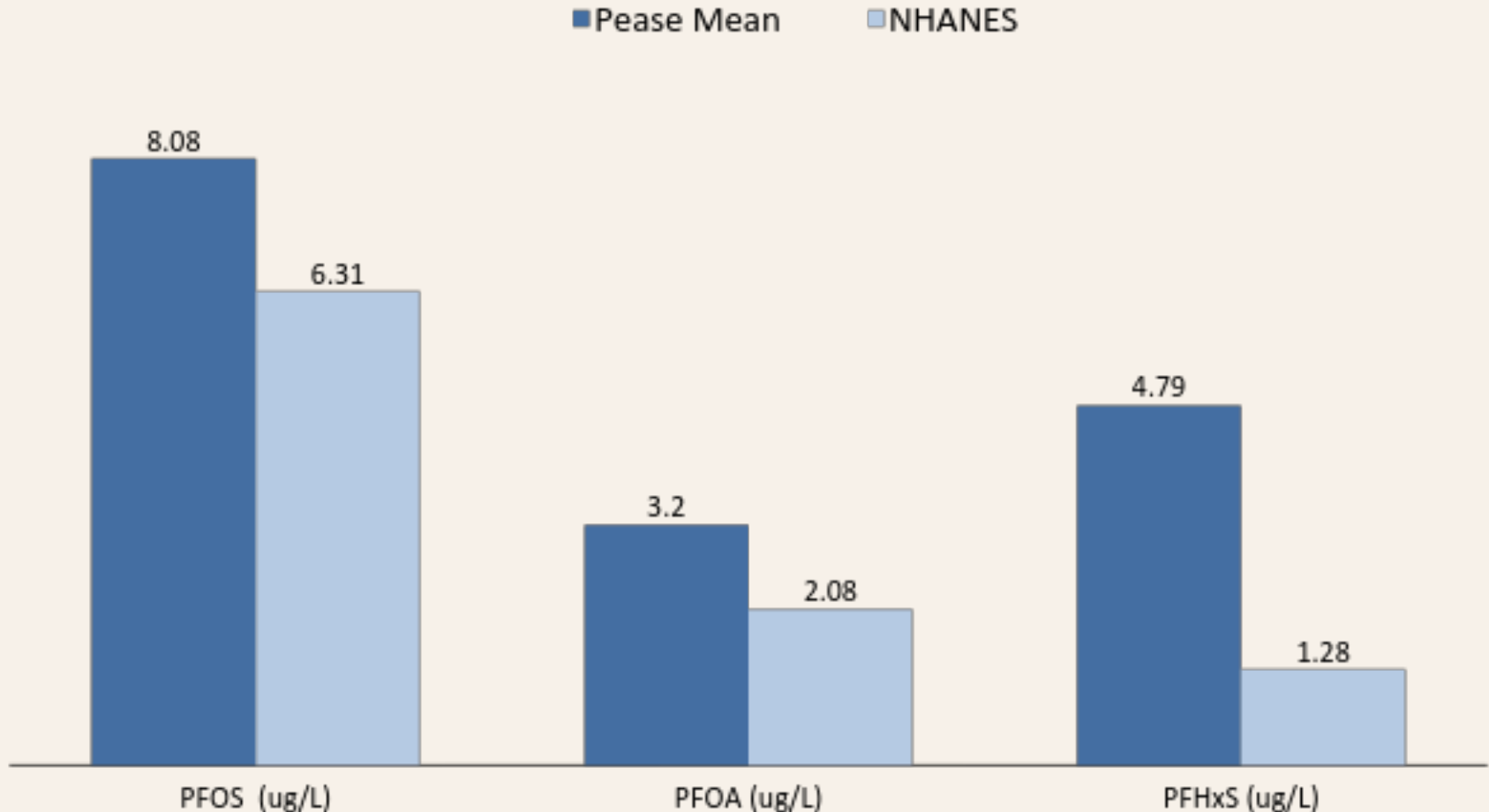


TESTING *for* PEASE

- Pushed for blood testing by NH Health Dept.
- Organized residents
- Recruited health and public health professionals to design research and develop communications and education
- Helped other communities learn how to deal with newly-discovered PFAS contamination
- Presented at professional and activist conferences
- Key planners for June 2017 conference



Pease vs NHANES – Blood Levels



Based on testing of 2,100 Americans in 2011-2012 (NHANES)

*There is no established safe level of PFAS in blood serum and no health advisories for serum levels.

...and so many other locations with residents who have learned a huge amount of science

- Warminster, PA
- North Bennington, VT
- Colorado Springs, CO
- Westfield, MA
- Hyannis, MA

Government Response

Initiated in 2006

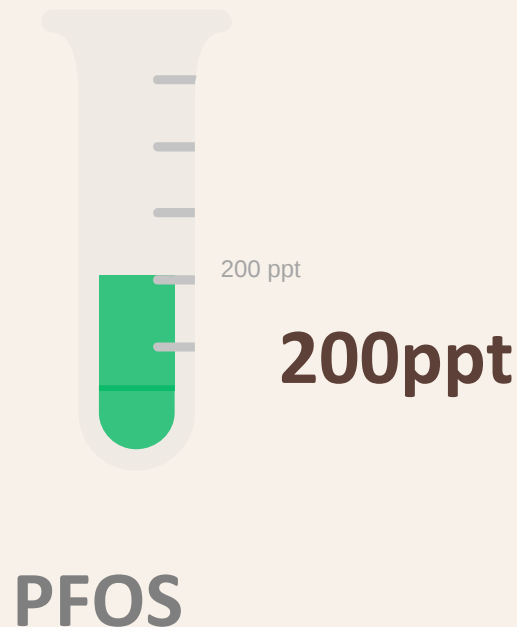
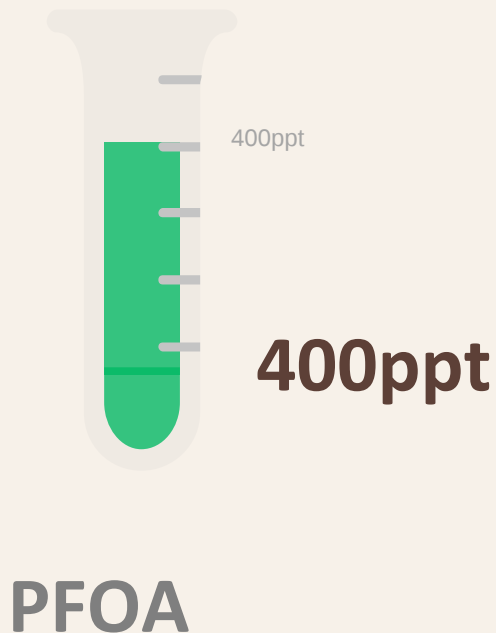
EPA program established in cooperation with **eight major manufacturers** for two goals:

1. Commit to achieve a **95% reduction** in both facility emissions to all media of PFOA, precursor chemicals, and related higher homologue chemicals by 2010
2. Commit to working towards the **elimination** of these chemicals from emissions and products by 2015



EPA Provisional Health Advisory Levels

For SHORT TERM EXPOSURE



Levels set in 2009

“reflect reasonable health-based hazard concentrations above which action should be taken to reduce exposure to unregulated contaminants”

-EPA Office of Water 2009

*ppt = parts per trillion

EPA 2016 Advisory

- Combined PFOA and PFOS = 70 ppt
- Not regulatory
- Under the Safe Drinking Water Act (SDWA), EPA Unregulated Contaminants Monitoring Rule (UCMR) is major source of data for large water systems – potential to contribute to extensive local prevention and remediation

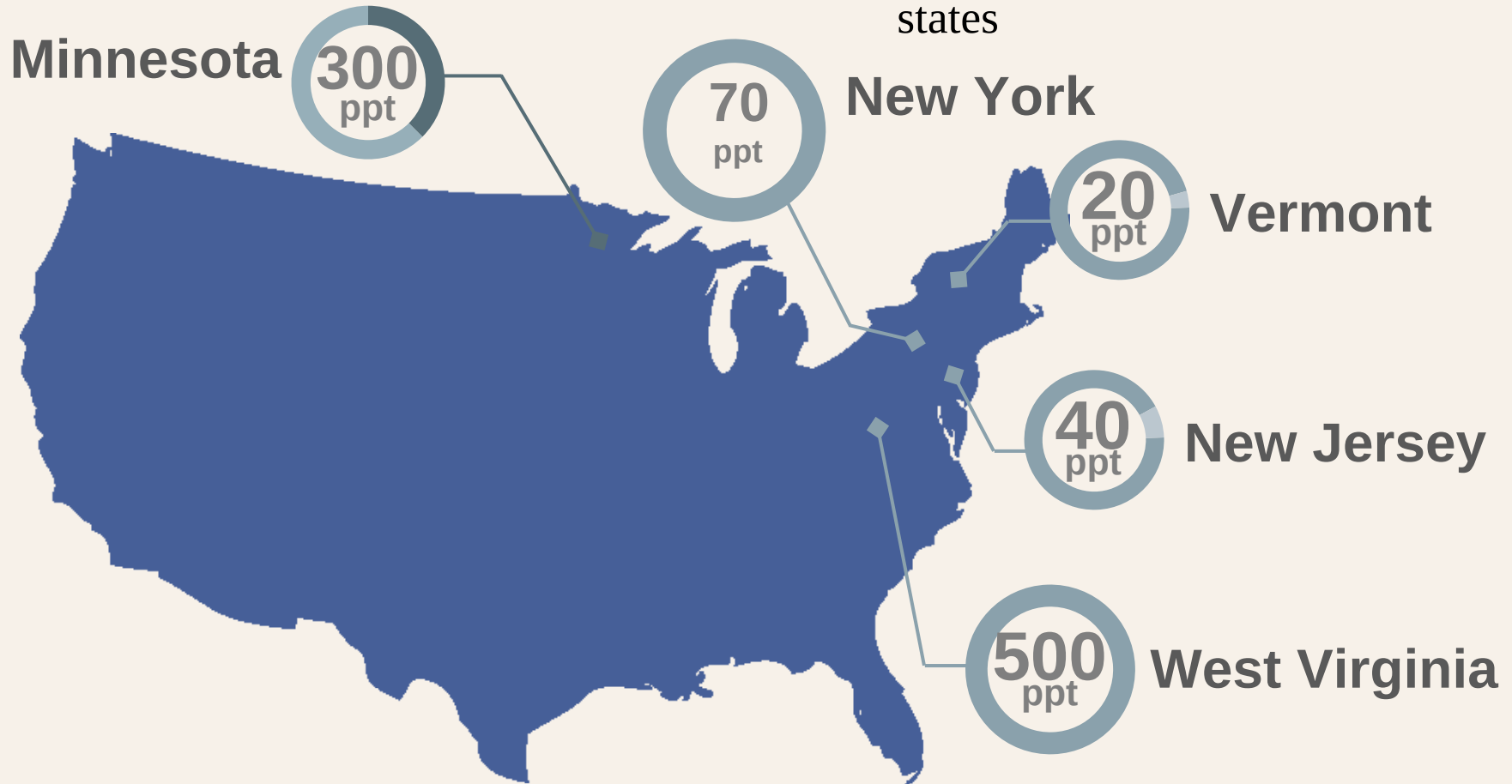


FACT SHEET
PFOA & PFOS Drinking Water
Health Advisories

State-Level Drinking Water Guidelines – PFOA

Note: DuPont and 3M influence

- PFOA alone has been detected in 94 public water systems in 27 states



New Jersey considering 14 ppt advisory

Website: <https://pfasproject.com>



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Social Science Environmental Health
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PER- AND POLYFLUOROALKYL SUBSTANCES

The Social Discovery of a Class of Emerging Contaminants

HOME

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PUBLICATIONS

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CONTAMINATION SITES ▾

ADDITIONAL RESOURCES



NEWS

DuPont has spent more on attorneys than testing people for contamination, critics say

April 20, 2017 — 0 Comments



NEWS

Firms combine PFC suits, seek



New York Expands Drinking Water Protections for Millions

NEWS

New York Expands Drinking Water Protections for Millions

April 14, 2017 — 0 Comments



TOXIC WATERS

Illegal dumping efforts to counter farmer's testimony, and the regulations for air emissions result in water contamination



RELATED

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UPCOMING CONFERENCE

Save the Date: June 14 – 15, 2017 Highly
Polarized Compounds – Social and
Scientific Discovery at Northeastern
University, Boston

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critics say

April 20, 2017

New York Expands Drinking Water
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Firms combine PFC suits, seek money,
tests for residents of Bucks, Montgomery
counties Pennsylvania

March 27, 2017

Search



Includes Contamination Site Database

Contamination Site Database

B	C	D	E	F	G	H	I	J	K	L	M	
Date of Discovery	Source of Discovery	Contaminant Level and details	Contamination Level (ppt)	Treatment	Alternate Water supply	Local, State, Federal, Regional Government (4 separate columns)	Activity at Site	Litigation	Biomonitoring/ Blood Testing	Reported/ Suspected Health Effects	Media Attention	Comm Chara
Report published 15/19/ 2016.	NH DES well water testing of 11 wells showed high levels of PFOA.	PFOA ranging from non-detect to 620ppt, 4 of the 11 well test results were more than 100ppt	PFOA non-detectable - 620ppt, 4 wells >100ppt	N/A	Residents w/ wells > than 100ppt advised not to drink the water. Bottled water deliveries to homes with private wells within half-mile radius of the former site	(Local) Expected to be a much smaller scale contamination than Merrimack or Litchfield (5/18/16)	Water was tested at former site of Textiles Coated International (TCI).	N/A	N/A	N/A	Continued	Small to people.
About a year ago (2015).	Air Force discovers 1,4 dioxane and starts testing all private wells.	78,000-1,800,000ppt in Johns Pond and Ashumet Pond (7/20/16).	78,000-1,800,000ppt	N/A	9 homes receiving bottled water after finding levels exceeding Federal EPA advisory levels (7/20/16).	(Federal) Air Force conducting testing	Air Force dumped waste water into a trench.	N/A	N/A	N/A	Recent, another site regarding military contamination.	Base or 22,000 Surround of Fair Bourne
PFCs found in drinking water from base wells 01/2016).	52 private off-base samples collected 02/3/16 - 02/13/16	Two wells near Fentress have levels above Federal EPA's PHA.		N/A	Navy will provide bottled water for the two homeowners with high levels of PFCs.	(Local) Director of Chesapeake Health Department told community not to panic.	Naval Auxiliary Landing Field Fentress in the area.	N/A	N/A	N/A	Another site regarding military contamination.	Third n populou Virginia 232,97
PFOA found in groundwater near Vermont Air National Guard base, Pittsford Fire Academy, and IBM and Champlain cable plants 7/13/16).	Water samples taken near National Guard base and Fire Academy. Part of statewide testing (6/9/16). DEC testing near industrial facilities (7/14/16).	National Guard base- 9,300ppt (PFOA), 38,000ppt (PFOS); Fire Academy- 72ppt(PFOS), 6ppt (PFOA) (6/9/16); Essex Junction IBM- 8-190ppt.	National Guard base: 9,300ppt (PFOA) and 38,000ppt (PFOS).	State to ask IBM and Champlain Cable to fund clean up costs (7/14/16).	N/A	(State) Governor Shumlin initiates statewide testing (6/9/16).	Fire fighting foams at base and Fire Academy. IBM pipe transporting chemicals leaked (7/14/16).	N/A	N/A	N/A	Local news coverage. Large media attention for Vermont as a whole	Vermont populou with 15 people.



New Collaboration: Environmental Working Group is putting our database into a searchable map to be launched a week or two before our June conference

And yet another new exposure source:
Food packaging



FDA de-lists three types of food packaging containing PFAS Dec. 29, 2015

- But these uses are already discontinued
- Regulation after-the-fact
- Whack-a-mole
- **Organizing potential:** unique - done by petition from NRDC, with additional co-signing organizations: Breast Cancer Fund
- Center for Environmental Health
- Center for Food Safety
- Center for Science in the Public Interest,
- Children's Environmental Health Network
- Clean Water Action
- Environmental Working Group
- Improving Kids' Environment.

Can Chemical Class Approaches Replace Chemical-by-Chemical Strategies? Lessons from Recent U.S. FDA Regulatory Action on Per- And Polyfluoroalkyl Substances

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ABSTRACT: Concern about the toxicity and exposure of per- and polyfluoroalkyl substances (PFASs) is growing among scientists, regulators, and residents of contaminated communities. In 2016, the United States Food and Drug Administration (FDA) removed three food contact substances (FCSs) containing perfluorinated chemicals from the list of approved FCSs due to concerns regarding chemical safety. To investigate the significance and limitations of the FDA's regulatory action for environmental health research, advocacy, and regulation, we conducted a media analysis and qualitative interviews with a range of involved stakeholders. We find that the FDA's regulatory action represents a potential shift from chemical-by-chemical regulation toward class-based regulation, where groups of chemicals can be identified as sharing properties and risks, and are thus evaluated and regulated together. The FDA decision sets an important precedent of using a petition process to delist chemicals based on a safety standard. However, the narrow reach of this action also highlights the need for more comprehensive, precautionary chemical regulation capable of thoroughly evaluating classes of chemicals, and raises important questions about how classes of chemicals are delimited in environmental health science and regulation.



Potential for Consumer Action

- Success already in limiting PFASs in products, similar to flame retardant consumer activism
- We know that ultimately we can't “shop our way to safety” (Andrew Szasz) but we can “organize our way to safety”

Garnier says they're creating some of the greenest and most effective formulas—but what's green about chemicals linked to breast cancer in your anti-aging cream?

Both contain the chemical linked to breast cancer called PFOA



PFOA



#RethinkThePink #GarnierComeClean

BREASTCANCERFUND.ORG



TOGETHER WE CAN BUILD A

TOXIC-FREE FUTURE

where dangerous chemicals are no longer produced,
used and released into our environment

SIGN UP FOR UPDATES

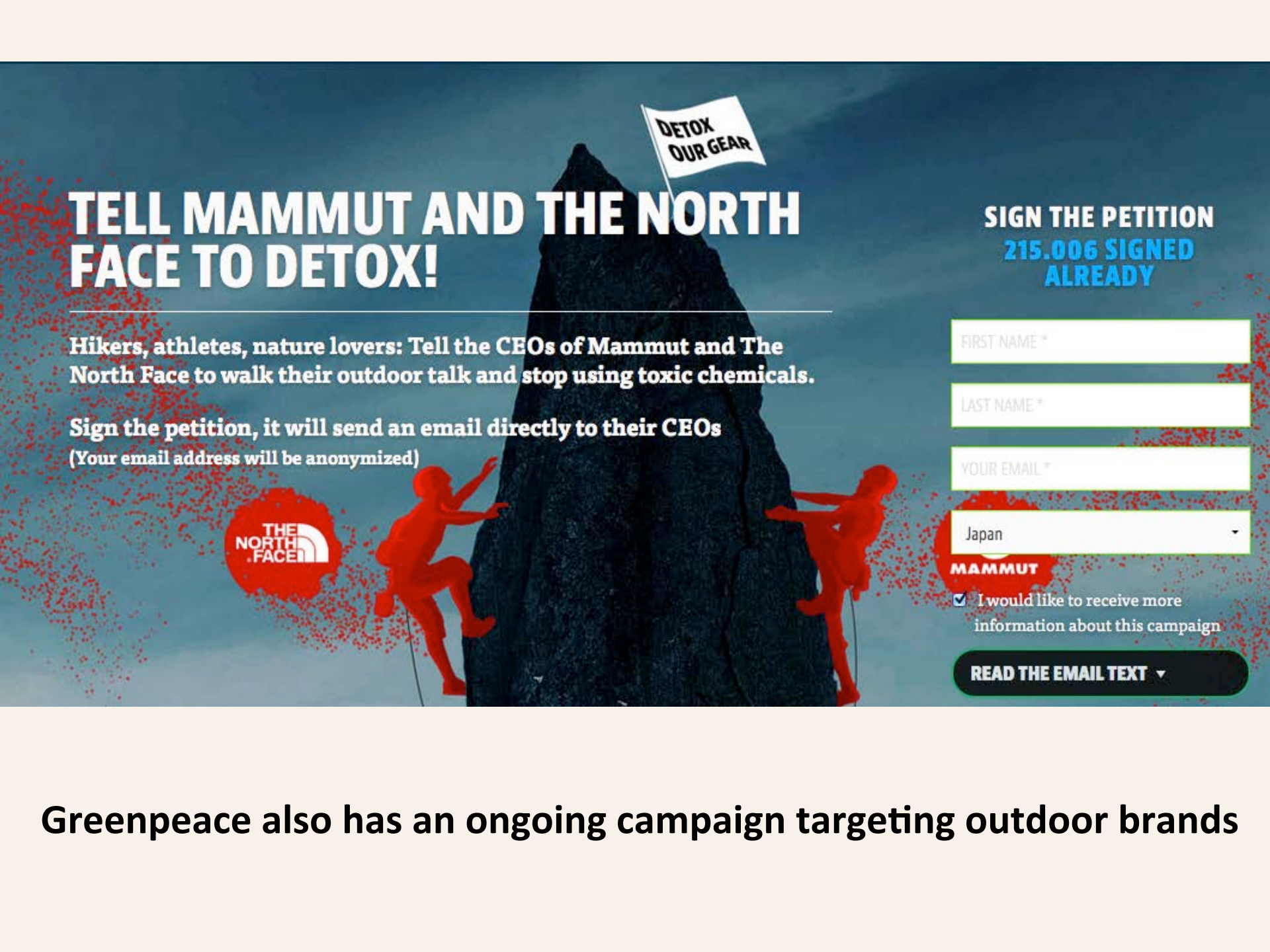
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GLOBAL AND REGIONAL DETOX CAMPAIGNS



TELL MAMMUT AND THE NORTH FACE TO DETOX!

Hikers, athletes, nature lovers: Tell the CEOs of Mammut and The North Face to walk their outdoor talk and stop using toxic chemicals.

Sign the petition, it will send an email directly to their CEOs
(Your email address will be anonymized)

THE
NORTH
FACE

SIGN THE PETITION
**215.006 SIGNED
ALREADY**

FIRST NAME *

LAST NAME *

YOUR EMAIL *

Japan

MAMMUT

☒ I would like to receive more
information about this campaign

READ THE EMAIL TEXT ▾

Greenpeace also has an ongoing campaign targeting outdoor brands

**Coop
Denmark**



Voluntary commitment to eliminate PFAS

All products from these apparel brands will be free of long-chain fluorinated chemicals after those dates.

 As of Jan. 2013	 As of Jul. 2013	 As of Aug. 2014	 As of Oct. 2014	 As of Jan. 2015
 By Jul. 2015	 By Jul. 2015	 By Dec. 2015	 By Dec. 2015	
 By Dec. 2015	 By Jul. 2016	 By Dec. 2017	 By Dec. 2015	 99% removal by Dec. 2017

Most Companies are switching to a new generation of short- chain PFAS



Sustainable effects for textiles

BEYOND

SURFACE TECHNOLOGIES

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Beyond Surface Technologies

Featured News

Corporate Investment in Alternative Technologies

Furniture manufacturers invite talk on assessing safer chemicals

By Kelly Lenox

Organizers of the [American Home Furnishings Alliance](http://www.ahfa.us/) (AHFA) invited NIEHS and National Toxicology Program (NTP) Director Linda Birnbaum, Ph.D., to speak at its annual regulatory summit Sept. 15 in Hickory, North Carolina. Birnbaum's involvement in the sold-out event provided a chance to connect with an important industry in North Carolina, which is home to NIEHS.

Birnbaum gave the lunchtime presentation during a meeting packed with sessions on regulatory requirements, product liability, and textile treatments. In her talk, "Health Effects of Textile Treatments and the Science of Finding Alternatives," Birnbaum discussed the long-term effects of certain chemicals and the issues to consider when looking for safer alternatives.

"We know that chemicals used to add stain resistance, water repellency, and antimicrobial attributes to certain consumer products have drawn the attention of some environmental and health groups, and the summit was an ideal forum for Dr. Birnbaum to introduce our industry to this discussion," said AHFA Vice President of Regulatory Affairs, Bill Perdue.



Birnbaum, a long-time resident of North Carolina, was pleased to share environmental health information with representatives of an important industry in the state. (Photo courtesy of Michele Morris, AHFA)

Dr. Birnbaum Plays a Role

Perspectives Editorial

A Section 508-conformant HTML version of this article is available at <http://dx.doi.org/10.1289/ehp.1509944>.

Alternatives to PFASs: Perspectives on the Science

<http://dx.doi.org/10.1289/ehp.1509944>

Poly- and perfluoroalkyl acids (PFASs) are ubiquitous in our lives. These chemicals are used as surfactants and as water and oil repellents in a variety of consumer products such as cosmetics, food packaging, furnishings, and clothing. Since their initial marketing more than 60 years ago, extensive research has demonstrated that the long-chain PFASs are highly persistent, bioaccumulative, and toxic (Buck et al. 2011). As a result, they are being phased out in many countries. However, controversy has emerged regarding the safety of the most common alternatives, the short-chain PFASs.

In the Madrid Statement on Poly- and Perfluoroalkyl Substances (PFASs), Blum et al. (2015) question the use of the entire class of PFASs, including short-chain fluorinated alternatives. Authored by 14 experts on the health effects, environmental fate, and policy issues concerning PFASs, the Madrid Statement documents the scientific consensus about the extreme environmental persistence, bioaccumulation, and potential toxicity of the overall class of PFASs (Blum et al. 2015). The statement defines a roadmap for scientists, governments, product manufacturers, purchasing organizations, and consumers to work together to limit the production and use of PFASs glob-



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straightforward replacement strategies may be cost effective in the short term. However, manufacturers may yet incur costs if the closely related alternative is

later found to be as toxic as its predecessor. In fact, there are now multi-stakeholder efforts to improve the choice of alternatives to chemicals of concern (Birnbaum 2013; National Research Council 2014).

It has been difficult to find substitutes that match the function and performance level of PFASs. The chemical and thermal stability of PFASs as well as their hydrophobic and oleophobic properties provide unique material benefits (Buck et al. 2011). Significant innovation is thus required to find functional nonfluorinated alternatives to PFASs. The U.S. Environmental Protection Agency (EPA) recently recognized such innovation by awarding its 2014 Designing Greener Chemicals Award to a halogen-free firefighting foam (U.S. EPA 2014).

The growing global field of chemical alternatives assessment (CAA) provides tools and strategies for identifying compounds,

Northeastern sponsors Highly Fluorinated Compounds-Social and Scientific Discovery Conference

June 14-15, 2017



Highly Fluorinated Compounds – Social and Scientific Discovery

June 14th-15th 2017
Northeastern University, Boston

About the conference

This two-day conference in Boston will address the social, scientific, political, economic, and environmental health issues raised by per- and polyfluoroalkyl substances (PFASs). It will examine both ubiquitous exposure in consumer products and discrete historic and recent contamination discoveries in drinking water and soil around the world.

Confirmed Speakers

Keynote Speaker

Dr. Linda Birnbaum, Director of the National Institute of Environmental Health Sciences

Andrew Lindstrom
U.S. Environmental Protection
Agency

Ken Cook
Environmental Working Group

Rob Bilott
Taft Stettinius & Hollister LLP;
Counsel on DuPont litigation

Andrea Amico
Testing for Pease

Richard Clapp
University of Massachusetts-Lowell

Callie Lyons
Author of *Stain-Resistant, Nonstick,
Waterproof, and Lethal: The Hidden
Dangers of C8*

Sharon Lerner
The Intercept

Frank Bove
Agency for Toxic Substances and
Disease Registry

Partial speaker list only. In addition to the speakers and panels, there will be workshops for community members and smaller discussions.

For full details and to register please go to www.northeastern.edu/environmentalhealth/



This event is funded by
the National Institute of
Environmental Health
Sciences and sponsored
by our partners.

Registration Fees:

\$25 for community members and students
\$50 for researchers, professionals and general
public

Handouts available with full
conference schedule

Publications and works in progress

- **Alissa Cordner, Lauren Richter, Phil Brown. 2016. “Can Chemical-class Approaches Replace Chemical-by-Chemical Strategies? Lessons from Recent FDA Regulatory Action on Perfluorinated Compounds.” *Environmental Science & Technology* 50(23): 12584-12591.**
- **Matthew Judge, Phil Brown, Julia Brody, Ruthann Rudel, and Serena Ryan, “The Exposure Experience: Participant Responses to a Biomonitoring Study of Perfluorooctanoic Acid (PFOA).” *Journal of Health and Social Behavior*. 2016 57: 333-350**

In progress

- **The Non-Stick Science of Non-Stick Chemicals: Forty Years of Research and (In)Action on Fluorinated Compounds**
- **Risky Business? Manufacturer, Retailer, and Consumer Campaigns to Reduce Emerging Chemical Exposure**
- **From Community to Courtroom: Litigation and Environmental Justice in the Case of PFAS Contamination**
- **PFASs Past and Present: PFASs as Re-Emerging Contaminants**
- **Strategic Science Production**
- **PFAS Research and Potential Funding Effects**

**Comparing classes of “emerging
contaminants”:**

**Social and scientific discovery around
flame retardants**

Multisectoral Alliances: Flame Retardant Regulation

- Academic and regulatory scientists
- Scientist-advocates
- Environmental and health social movement organizations
- State and federal legislators and regulators
- Federal funding institutions
- Supply chain manufacturers
- Firefighters and fire safety experts
- Healthy hospitals and health care advocates
- Journalists

Cordner and Brown – 2013
Environmental Sociology article “A
Multisector Alliance Approach to
Environmental Social Movements

EWG's Guide to PBDEs

What are PBDEs?

Chemical fire retardants are common in consumer products, particularly in highly flammable synthetic materials. Some of the most common are brominated fire retardants (BFRs), including PBDEs.

Where are PBDEs found?

PBDEs are most likely to be found in polyurethane foam products manufactured before 2005 – like upholstered furniture, mattresses, and pillows – and electronics. Therefore you'll probably find them in dozens of products in your home and office, from the padding below your carpet, to your bed, couch, cell phone and television.

What problems are associated with PBDEs?

PBDEs are found in the bodies of nearly every American. Laboratory studies show that exposure to minute doses of PBDEs at critical points in development can damage reproductive systems and cause deficits in motor skills, learning, memory and hearing, as well as changes in behavior. In addition, they persist in the environment and therefore bioaccumulate in people.

HOW TO AVOID PBDEs

IN ELECTRONICS:

The form of PBDEs known as Deca is banned in 3 states, but is still used in many electronic products.

- Identify Deca-containing items around your house, such as: TVs, cell phones, computers, fax machines, remote controls, video equipment, printers, photocopiers, toner cartridges, scanners, electronic components, automobile fabrics, kitchen appliances, fans, heaters or hair dryers, and water heaters.
- Prevent young children from touching and especially mouthing these fire-retardant items as much as possible (like your cell phone or remote) and wash their hands prior to eating.
- Shop PBDE-free. Many companies have committed to avoid using PBDEs – ask before you buy and choose PBDE-free products.

IN FOAM:

- Inspect foam items. Replace items with a ripped cover or foam that is misshapen and breaking down. If you can't replace these items, try to keep the covers intact. Beware of older items like car seats and mattress pads where the foam is not completely encased in a protective fabric.
- Use a vacuum fitted with a HEPA filter. These vacuums trap small particles more efficiently and will likely remove more contaminants and other allergens from your home. High-efficiency HEPA-filter air cleaners may also reduce particle-bound contaminants in your house.
- Do not reupholster foam furniture yourself. The reupholstering process increases exposure risk. Even those items without PBDEs might contain other, poorly studied fire retardants with potentially harmful effects.
- Remove old carpet with care. The padding may contain PBDEs. Keep your work area isolated from the rest of your home. Clean up with a HEPA-filter vacuum and mop to pick up as many of the small particles as possible.
- When purchasing new products, ask the manufacturers what type of fire retardants they use. PBDEs aren't used in new foam, but you'll also want to avoid products with brominated fire retardants, and opt for less flammable fabrics and materials, like leather, wool and cotton. Be aware that "natural" latex foam will also contain fire retardants.



ENVIRONMENTAL WORKING GROUP

ewg.org/pbdefree



Multisectoral Alliance Potential: PFAS

- Academic and regulatory scientists
- Scientist-advocates
- Active military and veterans
- Environmental and health social movement organizations
- Water utilities
- State and federal legislators and regulators
- Federal funding institutions
- Supply chain manufacturers
- Lawyers
- Journalists



Our engagement – Flame Retardants

- Sign San Antonio Statement published in December 2010 issue of *Environmental Health Perspectives* –signed by over 200 scientists from 30 countries
- Present at Green Science Policy Institute conference
- Work with national coalition to seek chemical reform
- Work with Boston area group working to reduce FR use in hospitals, universities, and other locations
- Give presentations to advocacy, scientific, and regulatory audiences
- Meet with Massachusetts fire safety officials to prompt them to follow California reform - success
- Testify at Boston City Council on regulatory reform - success
 - Sign Madrid Statement published May 2015 issue of *Environmental Health Perspectives* - Signed by over 230 scientists from 40 countries



Our engagement – PFAS

- Interview with Politico criticizing NYDOH report that minimizes risks and makes errors on health effects; respond critically to NYDOH requests for our comments on their report
- Write letter to NHDHHS to request they share data with Portsmouth residents
- Press ATSDR to collaborate on research
- Provide technical and social support to Portsmouth residents' group Testing for Pease
- Construct national database of contamination sites and share with communities, scientists, government, lawyers, environmental groups
- Present panel with affected residents and scientists at Toxics Action Center conference March 2016
- Meet with TAC afterward to plan further involvement
- Coordinate with TAC on research visits to Bennington VT and Westfield MA
- Organize national conference for June 2017



Indication of harm,

not proof of harm, is our call to action.

<http://www.northeastern.edu/environmentalhealth/>