Getting Ahead of Emerging Contaminants with the Class Concept

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& Arlene Blum
Green Science Policy Institute

May 21, 2019
Principal 1: Prevention

It is better to prevent waste than to treat or clean up waste after it has been created.
Pathways to the Environment

From: California DTSC: Product-Chemical Profile for PFAS in Carpets and Rugs
U.S. Toxic Substances Control Act (1976)

62,000 previous chemicals “grandfathered in”

23,000 new chemicals
- 15% health & env. data
- 18% some env. data

Michael Wilson, Green Chemistry in California: http://coeh.berkeley.edu/news/06_wilson_policy.htm

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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
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
TRIS-Treated Children's Garments Banned

April, 1977

Chlorinated Tris replaced Brominated Tris

• Removed from pajamas in 1978
• Used in furniture until 2012

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Regrettable Substitution

Decabromodiphenyl ether
Concerns:
• Persistence
• Bioaccumulation
• Toxicity

Decabromodiphenyl ethane
Concerns:
• Persistence
• Bioaccumulation
• Toxicity
Evaluating tens of thousands of individual chemicals is unworkable
BUT ADDRESSING SIX GROUPS OF CHEMICALS OF CONCERN IS MANAGEABLE
The Six Classes

1. Highly Fluorinated
2. Antimicrobials
3. Flame Retardants
4. Bisphenols + Phthalates
5. Some Solvents
6. Certain Metals

VIEW and SHARE: www.SixClasses.org
Is it necessary?

Is it worth it?

Is there a safer alternative?
Outline

How is the class concept being used to address PFAS

— By large purchasers?
— By retailers & manufacturers?
— By regulators?
PFAS

PFOS

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\text{O} & \text{SO} & \end{array}
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PFOA

\[
\begin{array}{c}
\text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} & \text{F} \\
\text{O} & \text{OH} & \end{array}
\]

Carbon-Fluorine bond strength:
- Leads to oil and water repellency
- “Forever chemicals” -- last for geologic time!

Courtesy: Dr. Jennifer Field
PFAS in Drinking Water

Hydrological units with detectable PFASs

Industrial sites
Military fire training areas

Percentage with detectable PFASs

AFFF certified airports
Wastewater treatment plants

PFASs exposure is a health concern

Exposure linked to health risks:
Cancer, elevated cholesterol, obesity, immune suppression, and endocrine disruption

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

Courtesy: Cindy Hu, Harvard University
The example of PFOA & PFOS:

- 1975-1976: Organofluorines discovered in blood of general population and production workers; 3M determines it is likely PFOA
- 1978: Immunotoxicity of PFOA & PFOS observed in monkeys
- 1981: PFOA found in umbilical cord blood when female worker gives birth
- 1992: Leukocyte cell count changes in PFOA production workers
- 1998: PFOS found in blood from the general population
- 2000: 3M announces voluntary phaseout of PFOS
- 2010-2015: DuPont & others finish phaseout of PFOA

Ref: Grandjean, 2018 EH
Industrial Transition

Long-chain PFAS

Concerns:
- Extreme persistence
- Bioaccumulation
- Toxicity

Short-chain PFAS

- “Favorable toxicological profile”¹
- “Safe for intended use”²

2. _https://fluorocouncil.com/fluorotechnology/terminology/
AGC – THE FIRST COMPANY TO FULLY CONVERT TO PFOA-FREE* WATER AND OIL REPELLENT

AsahiGuard® E Series is a fluorinated water and oil repellent providing sustainable alternatives for many applications, including paper packaging, textiles, apparel, non-wovens, natural and synthetic leathers and home furnishings based on proven AGC C6 chemistry. AsahiGuard E-Series offers high performance

- “C6 polymers are proven safe for their intended use”
- “Evaluated by regulators, showing they are safe and effective”
- “C6 polymers cannot break down to C8”

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https://www.agcce.com/asahiguard-e-series/
Is C6 a safer substitute for C8?

**C8**

Concerns:
- Extreme persistence
- Bioaccumulation
- Toxicity

**C6**

Concerns:
- Extreme persistence
- Build-up in plants
- Suspected toxicity
- More mobile
- Remediation more difficult
PFAS

4730 in commerce (OECD, 2018)

240 in fire-fighting foam and contaminated ground water

18 measured by EPA Method 537.1

6 included in UCMR3

2 with federal Health Advisories
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

Ref: Blum, et al., EHP, 2015.
Chemicals in Your Popcorn?

JUNE 4, 2015

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.
Large Purchasers
**BULLETIN**

**Topic:** Prohibition of Highly Fluorinated Chemicals (Fluorochemicals)

**Date Issued:** January 07, 2016

**Contact:** Jennifer MacDaniel

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**BRIEF DESCRIPTION OF CHANGE:**

Effective immediately, specification of fluorochemical additives or treatments for fabric, furniture, finishes, and building materials are prohibited on any Kaiser Permanente project. This prohibition includes all Main Loan Fund, PM&R and Expense projects.
San Francisco City Carpet Regulation
March 2018

NO
PFAS
Flame Retardants
Antimicrobials
(among other sustainability provisions)
Purchasing: **Material Buyer’s Club**

- Require transparency from manufacturers
- Utilize collective purchasing power to create a demand for healthier products and materials
Policy: NY, Portland, etc.

US cities act on chemicals of concern in furniture

New York sets procurement rule, San Francisco and Portland sign green purchasing pledge

26 May 2017 / Biocides, Built environment, PFCs, Phthalates, United States

Several US cities and a state are making efforts to restrict or discourage the use of substances of concern in furniture.

New York State recently adopted a green procurement specification restricting the chemicals permitted in furniture purchased by state agencies and public authorities.

Policy: New York

• New York State single use food containers & packaging
  "...products purchased ...on State contracts shall not contain perfluorinated chemicals (PFCs)...."
Retailers & Manufacturers
Microwave Popcorn Bags

• High PFAS concentrations 1-4

• Coop Denmark - halted popcorn sales in 2015 due to PFAS

• RESULT: PFAS-free popcorn bags

IKEA
2015: Phasing PFAS out from all products worldwide

- Huge range of products
- Stores around the world
- Large, complex supply chain
- Frying pans
Carpet Industry
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<th>IKEA</th>
<th>H&amp;M</th>
<th>Crate&amp;Barrel</th>
<th>LEVI STRAUSS &amp; CO.</th>
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<td>MANGO</td>
<td>BURBERRY LONDON</td>
<td>ZARA</td>
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Regulators

Challenges to class-based regulations:

• Does the law authorize it?
  • e.g., RCRA

• Lawsuits
Firefighting foam (AFFF)

76% of sites likely related to firefighting foam use

- Military sites
- Airports
- Fire training
- Past fires

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Northeastern U. and EWG Site Tracker, 10/4/18
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.
Washington State’s Ban on PFAS in Firefighting Foam

(HB 2793/SB 6413)

• Signed into law on March 27, 2018
• Bans sale of firefighting foam containing any PFAS beginning July 1, 2020
• The states of CT, GA, KY, MA, MN, NY have similar bills this year

More info https://toxicfreefuture.org/key-issues/legislative-priorities-2018/
Washington State’s Healthy Food Packaging Act Passes House & Senate

February 28, 2018

Bans paper food packaging containing any PFAS

The states of CT, IA, MA, NJ, NY, RI, & VT have similar bills now.

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

February 15, 2018

The California Dept. of Toxic Substances Control is proposing to list carpets & rugs containing any PFAS as priority products for regulation.
Drinking water: Europe

• Proposal to amend the Drinking Water Directive to add limits for:
  • Any individual PFAS -> 100 ng/L
  • Total PFAS -> 500 ng/L

• How to measure?

Drinking water: US

Maximum Contaminant Levels (MCLs):

Adopted:
- NJ: PFNA (13 ng/L)

Proposed:
- NH: PFOA, PFOS, PFHxS, PFNA, & (PFOA+PFOS)
- VT: PFOA, PFOS, PFHxS, PFNA, PFHpA
- MI: PFOA, PFOS, PFHxS, PFNA, PFBS
- MA, WA...
Drinking water: US

EPA’s Per- and Polyfluoroalkyl Substances (PFAS) Action Plan
Congressional PFAS Task Force

• Launched 1/24/19
• Goals
  • Educate
  • Legislate
  • Elevate
  • Appropriate

• Members:
  Lujan (NM-03)  Dingell (MI-12)  Bergman (MI-01)
  King (NY-03)  Turner (OH-10)  Dean (PA-04)
  McGovern (MA-02)  Boyle (PA-02)  Delgado (NY-19)
  Upton (MI-06)  Walberg (MI-07)  Levin (MI-09)
  Huizenga (MI-02)  Lawrence (MI-14)  Stevens (MI-11)
  Bergman (MI-01)  Slotkin (MI-08)
  Dean (PA-04)  Tlaib (MI-13)
  Delgado (NY-19)  Maloney (NY-18)
  Levin (MI-09)  Pappas (NH-04)
  Stevens (MI-11)

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PFAS Action Act
H.R. 535, filed 1/14/19

• Sponsor: Rep. Dingell
• Cosponsors: Reps. Upton, Kildee, Wild, Khanna, Delgado & Pocan
• Would require EPA to designate all PFAS as hazardous substances under CERCLA (the Superfund law) within one year.
Protect Drinking Water from PFAS Act
H.R. 2377, filed 4/29/19

• Sponsor: Rep. Boyle
• Cosponsors: Reps. Pallone, Tonko, Kildee & Fitzpatrick
• Would require EPA to set an MCL for all PFAS chemicals within two years.
Final Thoughts

“With so many PFAS compounds, we cannot test our way out of this.”

- Linda Birnbaum
  Director, NTP & NIEHS
  Senate hearing, 9/26/18
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
For monthly e-newsletters, give Tom your card or sign our mailing list.

www.GreenSciencePolicy.org
Scientific publications on PFAS

Grandjean, Environ. Health, 2018
DuPont PFOA: 5000

DuPont PFOA: 1000

U.S. EPA PFOA: 400

U.S. EPA PFOA: 70

New Jersey PFOA: 14

New York PFOA: 10

Drinking Water Health Guidelines
The concept of essential use for determining when uses of PFASs can be phased out

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