



Regulating PFASs in Food Packaging: One at a time or all at once?

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Food Packaging Forum Workshop, October 8, 2021

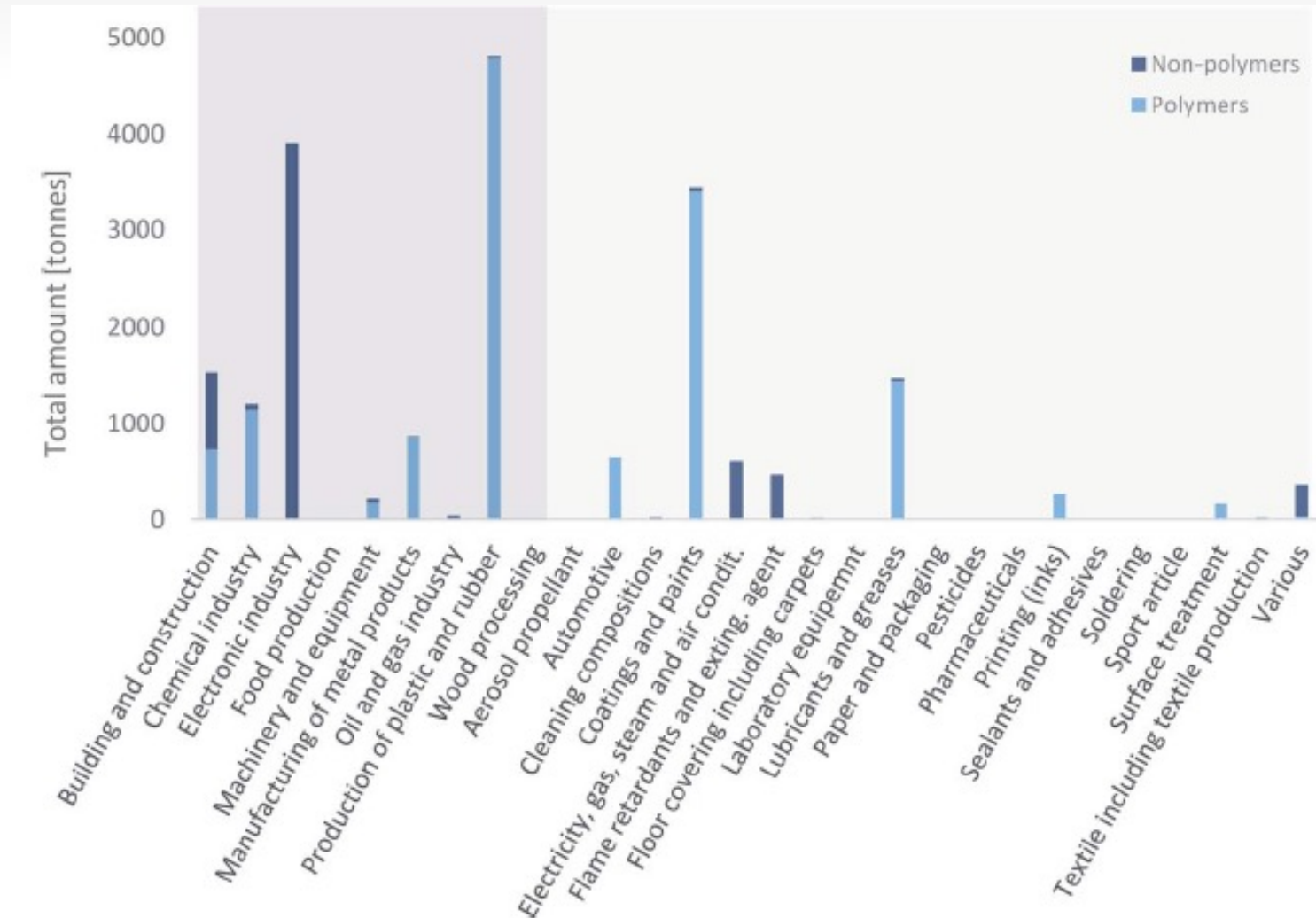


Department of Toxic Substances Control

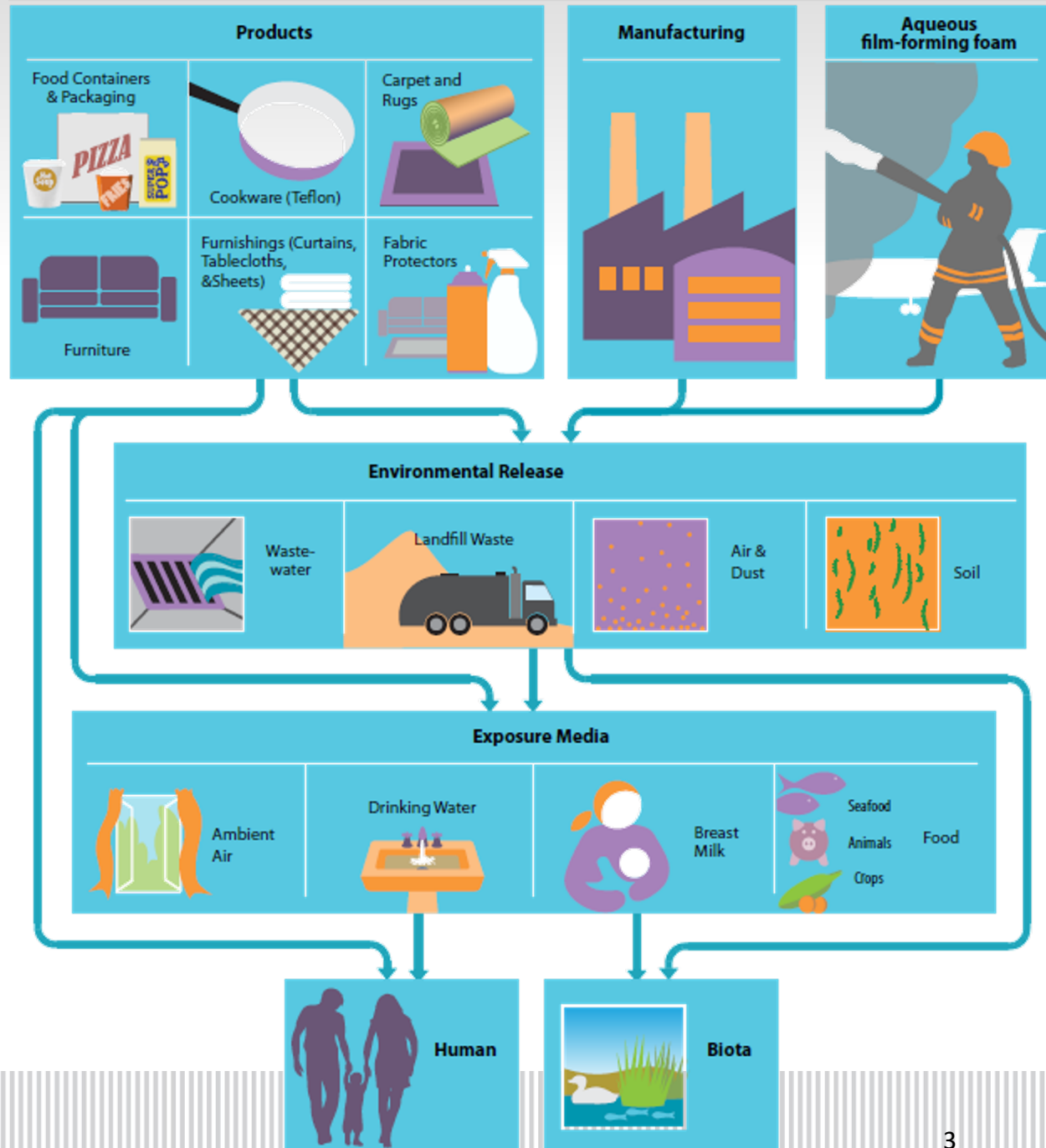


Cal/EPA

PFASs have over 200 uses!



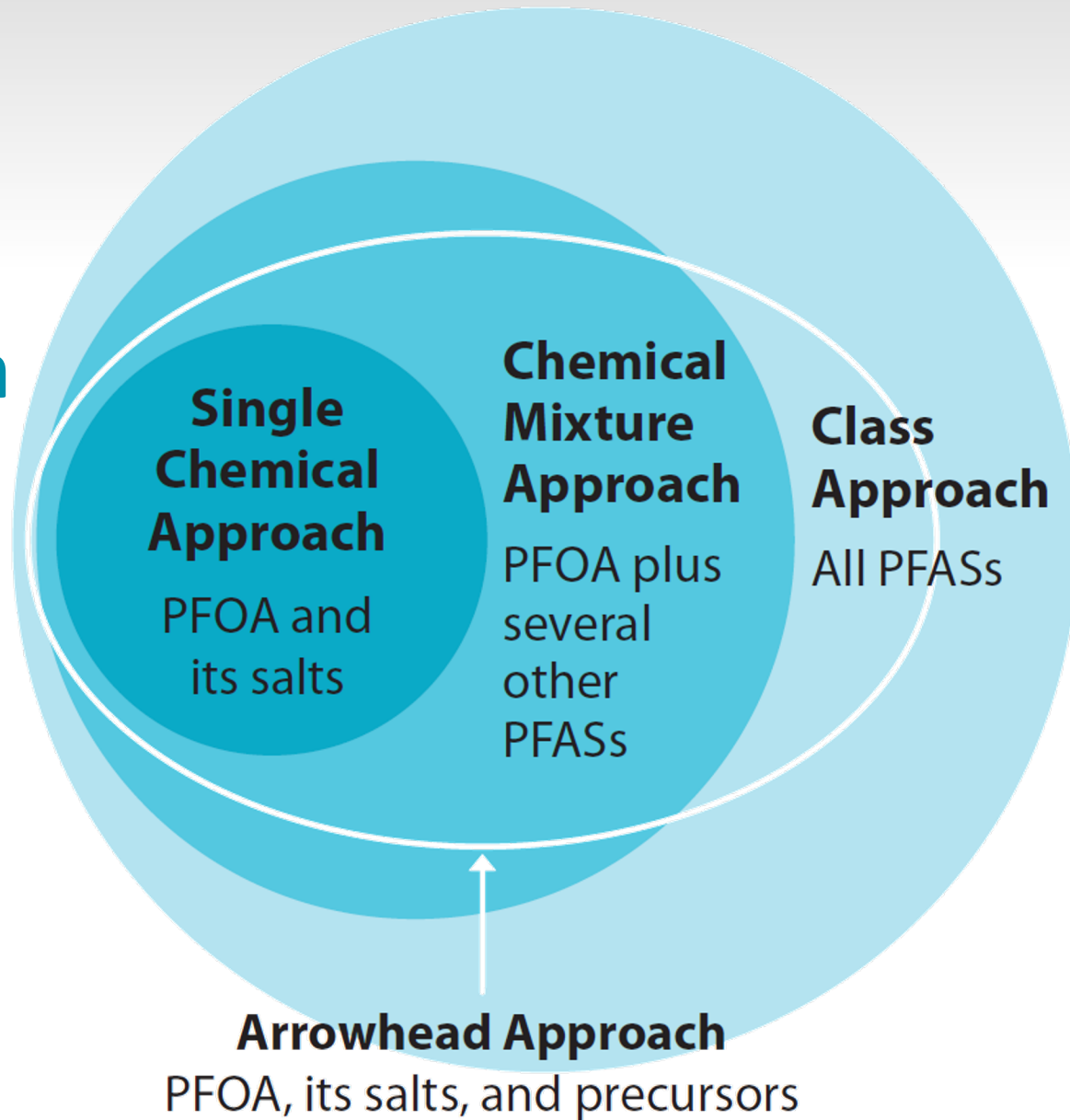
PFAS exposure is complex



So what do we do about this?



Different approaches to PFAS regulation

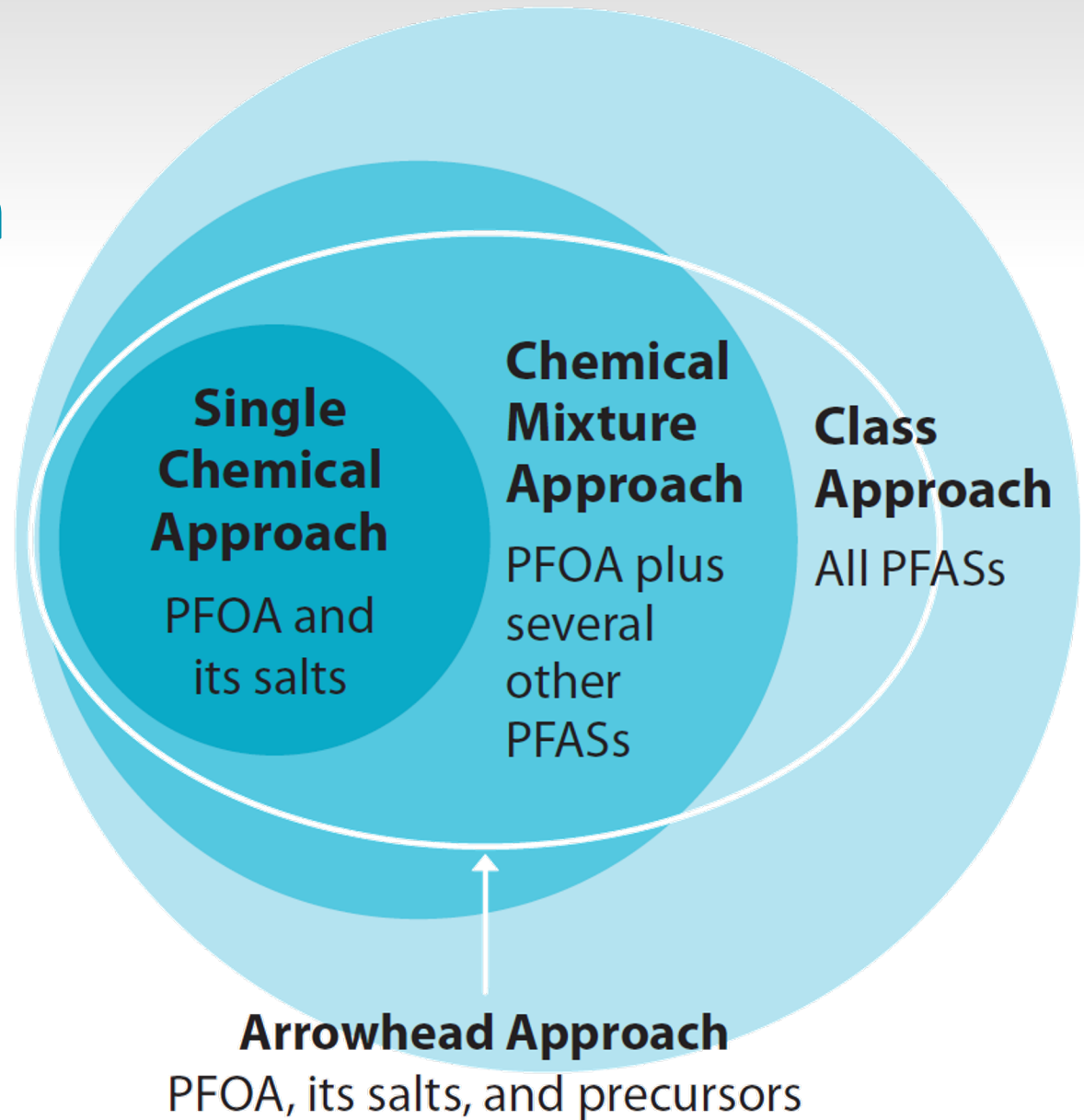


Chemicals in food packaging are regulated by the U.S. Food and Drugs Administration (FDA)

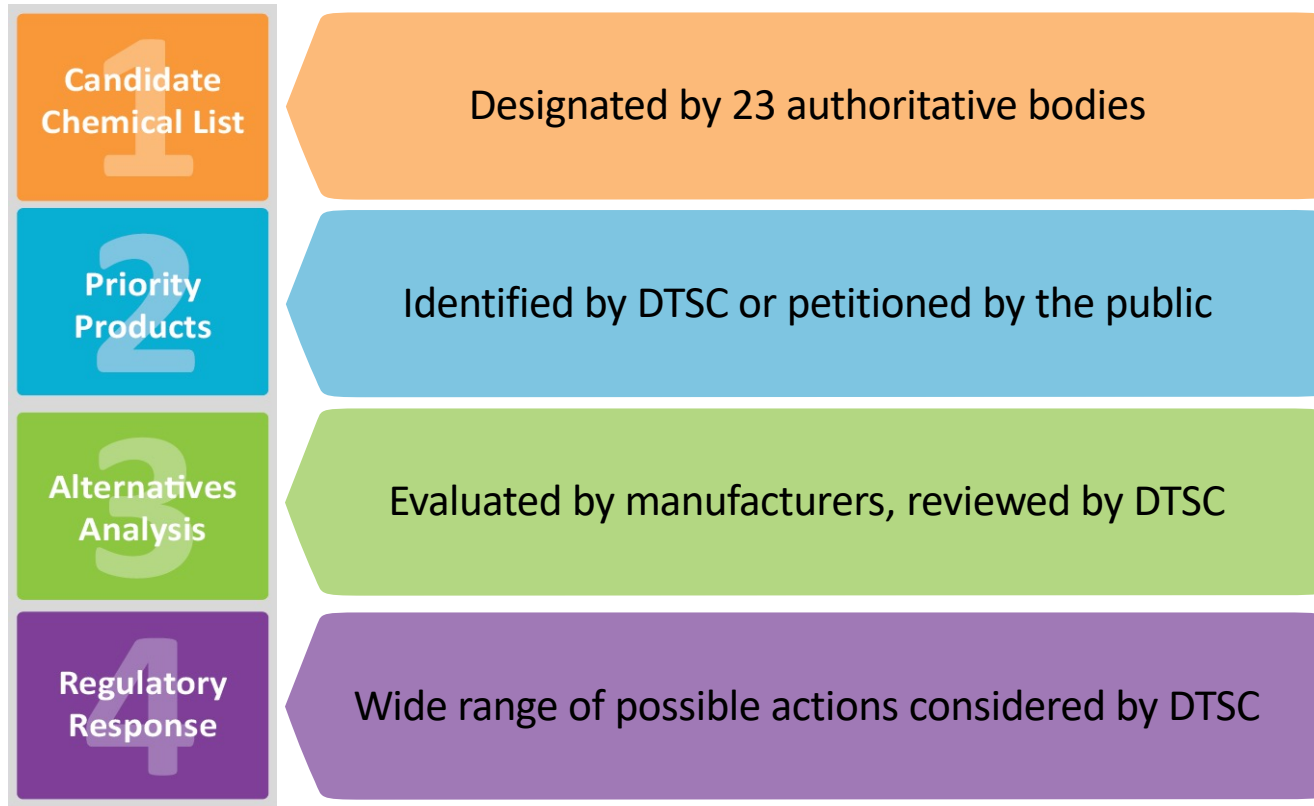
- FDA has authorized 28 food contact notifications (FCNs) for 17 distinct PFAS chemistries from 6 manufacturers.
 - As of November 2016, FDA phased out all uses of long-chain PFASs in food contact applications.
- In July 2020, FDA announced a three-year voluntary phaseout of certain short-chain PFASs due to concerns over the **biopersistence** and **toxicity** of a 6:2 FTOH metabolite, 5:3 FTCA.
 - Will still leave 13 FCNs for 6 PFAS chemistries from 3 manufacturers.



Why take a class approach to PFAS regulation?



The Safer Consumer Products (SCP) regulatory framework



All PFASs* became Candidate Chemicals under the SCP regulations in 2015

The class is on the
Priority Chemicals list for



Krowech G et al. (2016) Environ Health Perspect 124(12): A219-226

*As defined in Buck et al. (2011) Integr. Environ. Assess. Manag. 7(4):513-41

SCP's product-chemical prioritization follows a narrative standard



There are potential **exposures** to a Candidate Chemical in the product

AND

One or more exposures have the potential to contribute to or cause **significant or widespread adverse impacts**



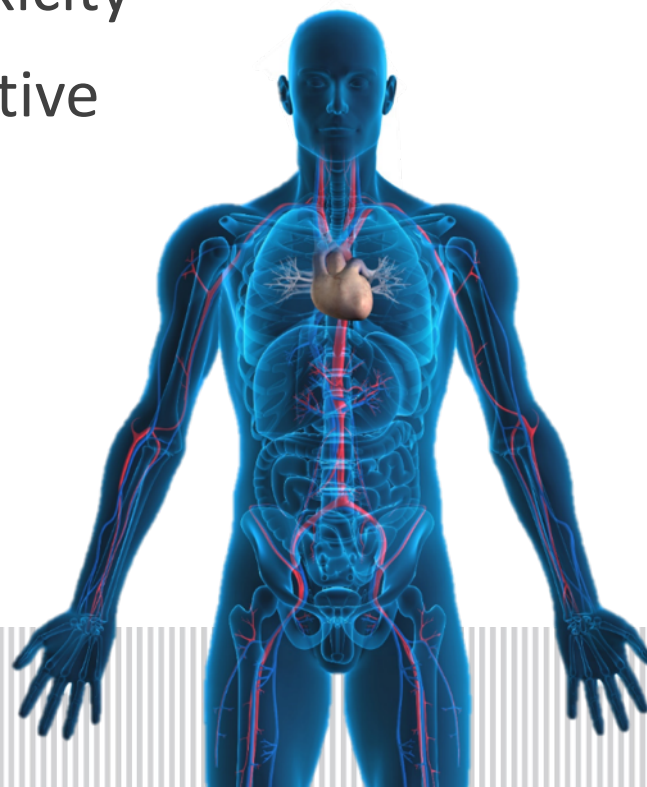
PFAS exposure potential hazard traits

- Environmental persistence
- Mobility in the environment
- Bioaccumulation
- Lactational and transplacental transfer



PFAS toxicological hazard traits

- Carcinogenicity
- Cardiovascular toxicity
- Developmental toxicity
- Endocrine toxicity
- Hepatotoxicity
- Immunotoxicity
- Nephrotoxicity
- Ocular toxicity
- Reproductive toxicity

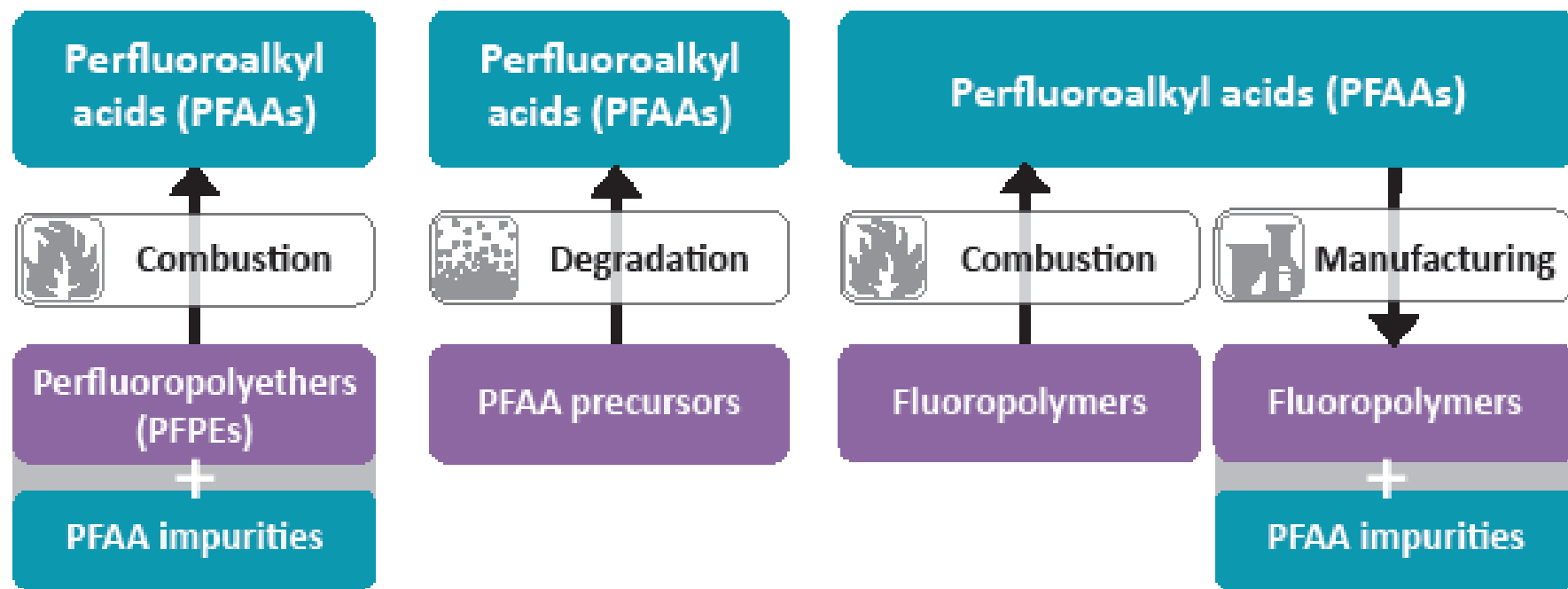


PFAS environmental hazard traits

- Phytotoxicity
- Wildlife developmental, reproductive, and survival impairment



PFASs or their degradation, reaction, or metabolism products are highly persistent



The P-sufficient approach

- “if a chemical is **highly persistent**, its continuous release will lead to **continuously increasing contamination** (...) [and] result in **increasing probabilities of the occurrence of known and unknown effects**.” (Cousins et al. 2019)
- “Because persistence is an inherent property of a chemical in the environment that results in increased exposure to the chemical and consequently potential for health risks, **it can appropriately be identified as a hazard trait**.” (OEHHA 2012)



Vol. 129, No. 2 | Commentary

Regulating PFAS as a Chemical Class under the California Safer Consumer Products Program

Simona Andreea Bălan , Vivek Chander Mathrani, Dennis Fengmao Guo, and André Maurice AlgaziPublished: 17 February 2021 | CID: 025001 | <https://doi.org/10.1289/EHP7431> Sections  PDF Tools  Share

Abstract

Background: Perfluoroalkyl and polyfluoroalkyl substances (PFAS) are a group of manmade chemicals containing at least one fully fluorinated carbon atom. The widespread use, large number, and diverse chemical structures of PFAS pose challenges to any sufficiently protective regulation, emissions reduction, and remediation at contaminated sites. Regulating only a subset of PFAS has led to their replacement with other members of the class with similar hazards, that is, regrettable substitutions. Regulations that focus solely on perfluoroalkyl acids (PFAAs) are ineffective, given that nearly all other PFAS can generate PFAAs in the environment.

Objectives: In this commentary, we present the rationale adopted by the State of California's Department of Toxic Substances Control (DTSC) for regulating PFAS as a class in certain consumer products.

Discussion: We at the California DTSC propose regulating certain consumer products if they contain any member of the class of PFAS because: *a)* all PFAS, or their degradation, reaction, or metabolism products, display at least one common hazard trait according to the California Code of Regulations, namely environmental persistence; and *b)* certain key PFAS that are the degradation, reaction or metabolism products, or impurities of nearly all other PFAS display additional hazard traits, including toxicity; are widespread in the environment, humans, and biota; and will continue to cause adverse impacts for as long as any PFAS continue to be used. Regulating PFAS as a class is thus logical, necessary, and forward-thinking. This technical position may be helpful to other regulatory agencies in comprehensively addressing this large class of chemicals with common hazard traits.

<https://doi.org/10.1289/EHP7431>

Proposed Priority Product: Plant fiber-based food packaging containing PFASs



Other proposed regulation:

- CalRecycle proposing to require all state owned and operated food service facilities to only use food service packaging that is reusable, recyclable, or compostable
- Food service packaging items made from plastic or fiber and that is recyclable or compostable **shall not contain PFASs (<100 ppm total F)**

Hot off the press (Oct. 5): Governor signs ban

AB 1200 bans the distribution and sale of plant fiber-based food packaging with intentionally added PFASs as of January 1, 2023.

- PFAS defined as **“a class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom.”**
- Covers PFASs that are intentionally by the manufacturer to **“have a functional or technical effect in the product”** or that are present **“in a product or component at or above 100 ppm”** total organic fluorine.
- Also, as of January 1, 2024, requires labeling of cookware containing one or more intentionally added chemicals present on DTSC’s Candidate Chemicals list (in the handle or food contact surfaces).



Legislation in other states

2018

Washington bans food packaging containing intentionally-added PFASs as of January 1, 2022, **provided the state Department of Ecology identifies safer alternatives.**

2020

New York bans food packaging containing intentionally added PFASs as of January 1, 2023, **regardless of the availability of alternatives.**

Maine bans food packaging with intentionally added PFASs **as soon as its Department of Environmental Protection identifies safer alternatives.**

2019

Vermont bans intentionally added PFASs in several products, including food packaging as of July 1, 2023.

Connecticut bans food packaging with PFASs as of December 31, 2023.

2021

... and potentially many more to come

How can we tell if food packaging is PFAS-free?

Method Type	Advantages	Limitations
Total fluorine / total organic fluorine (TOF)	• Only way to confirm the absence of any PFAS • Fast and inexpensive	• Not specific to PFASs
Targeted analysis	• Confirms presence of PFASs	• Limited to a subset of PFASs (up to ~70), none of which are intentionally used in food packaging
Total oxidizable precursor (TOP) assay	• Confirms presence of PFASs • Captures precursors that cannot be directly detected	• Doesn't capture all PFASs • More difficult and expensive
Non-targeted analysis	• Confirms presence of PFASs • Can detect up to >2,000 PFASs	• Most difficult and expensive



Example total fluorine methods

Method	Advantages	Limitations
PIGE (particle-induced gamma emission spectroscopy)	• Fast and inexpensive • Non-destructive • Optimal detection limit (~40 ppm)	• Not commercially available • Not specific to PFASs
CIC (combustion ion chromatography)	• Commercially available • Low detection limit (~0.1 ppm)	• Not specific to PFASs • Destructive
XRF (x-ray fluorescence)	• Fast and inexpensive • Non-destructive • Potentially portable	• High detection limit (~1,000 ppm)
LIBS (laser-induced breakdown spectroscopy)	• Fast and inexpensive • Portable	• High detection limit • Microdestructive



Re-envisioning food packaging



Thank you!

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