SAFER CONSUMER PRODUCTS

Managing PFASs with Class-Based and Essential Use Approaches

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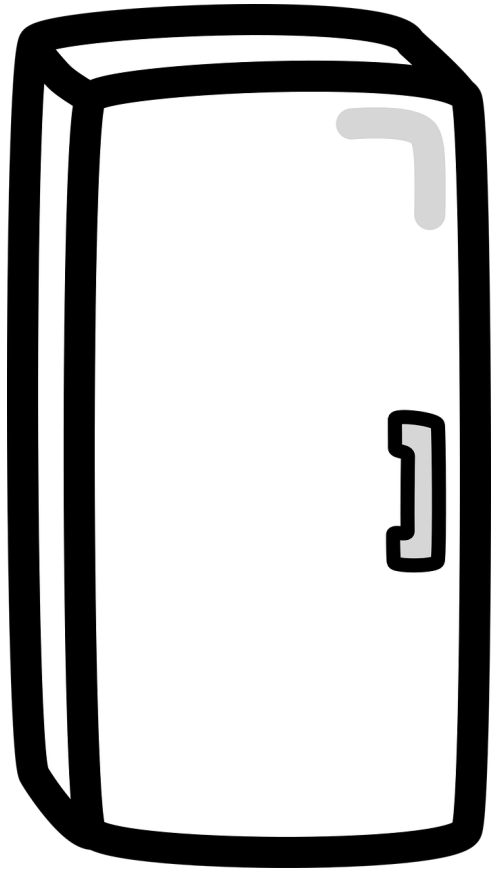
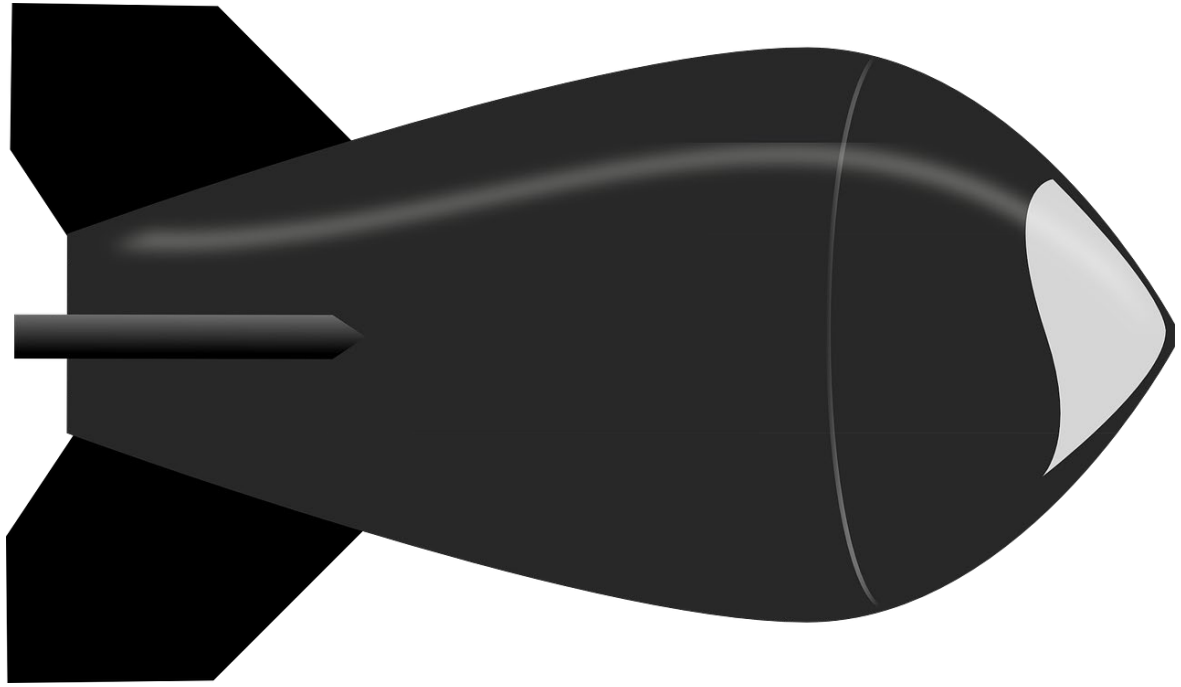
Department of Toxic Substances Control

Cal/EPA

From a refrigerant and an atomic bomb…





…to hundreds of consumer products

“Forever chemicals”

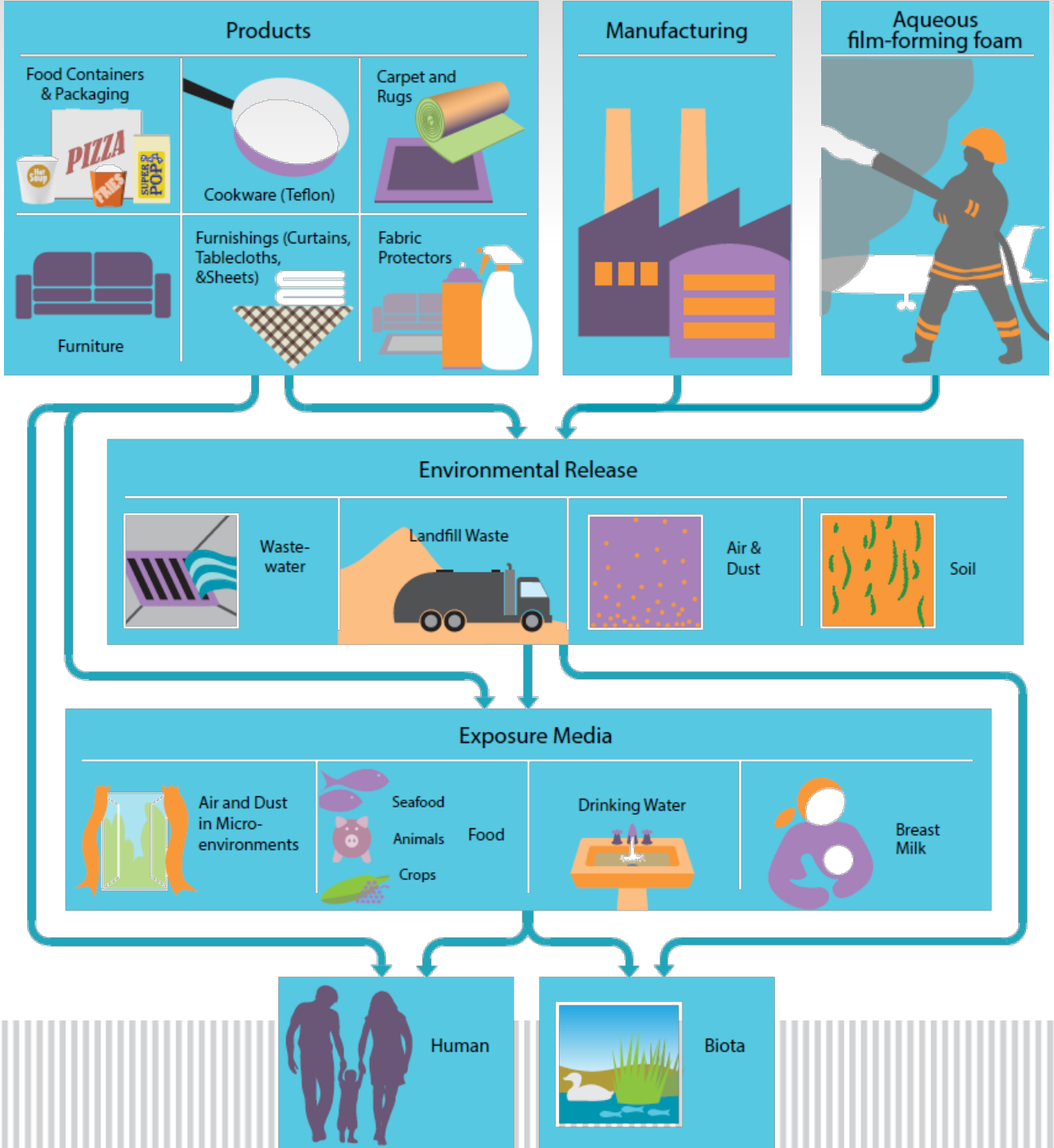
$$^{\delta+}C - F^{\delta-}$$

One of the strongest bonds in chemistry, leads to environmental persistence

PFASs are widespread in…

- Environmental media (indoors and outdoors)
- Plants, animals, and humans
- Human food and drinking water

PFAS exposure is highly complex



PFASs can be grouped into 4 main subclasses:

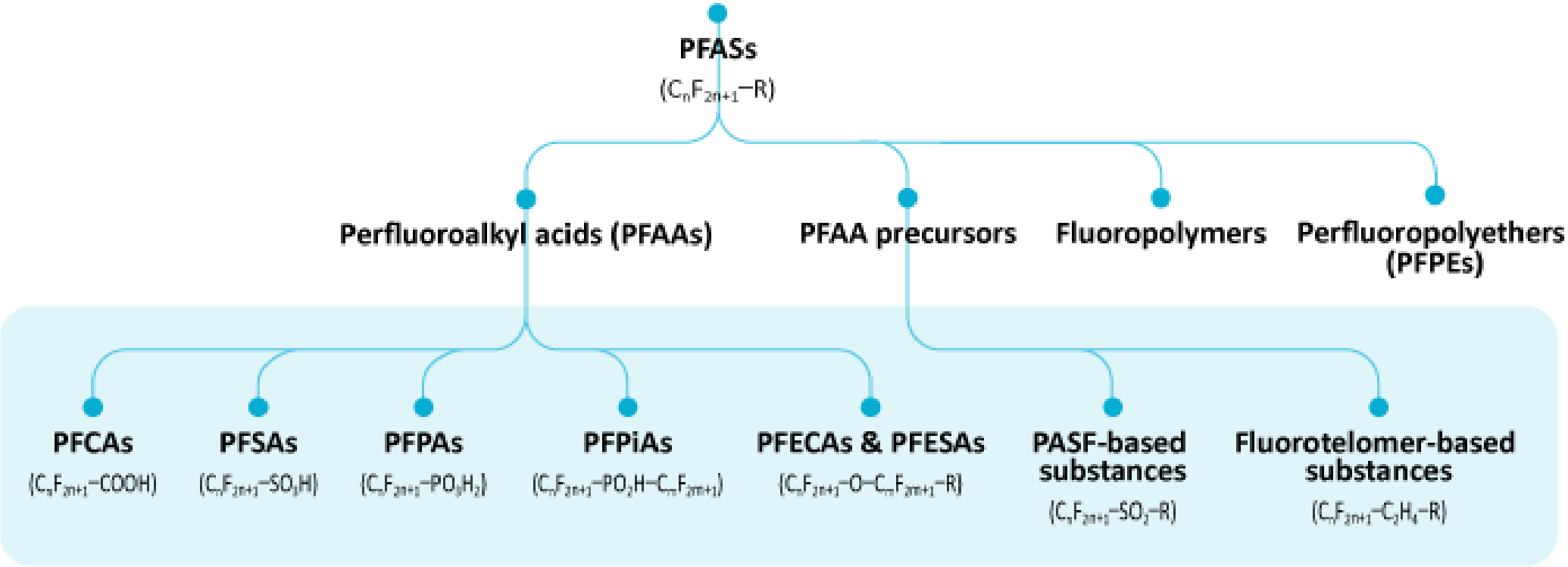


Image adapted from Wang et al. (2017) ES&T 51(5):2508-18

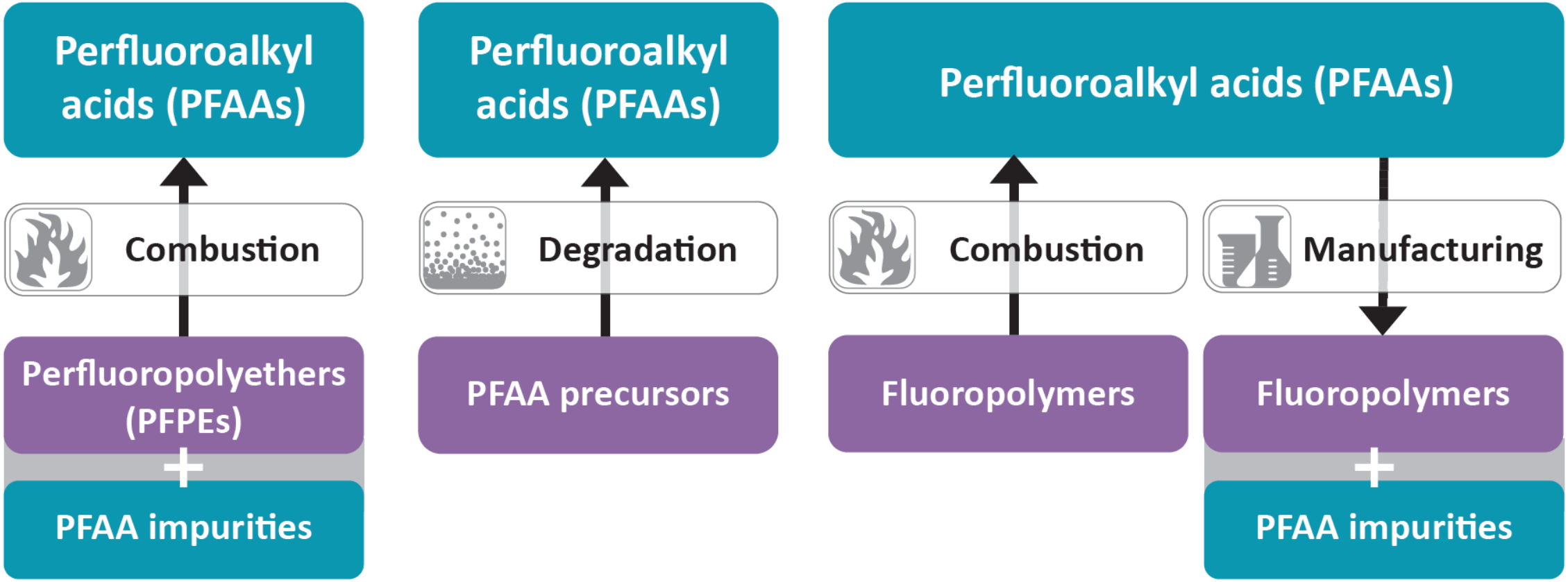
Most of the research has focused on PFAAs

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

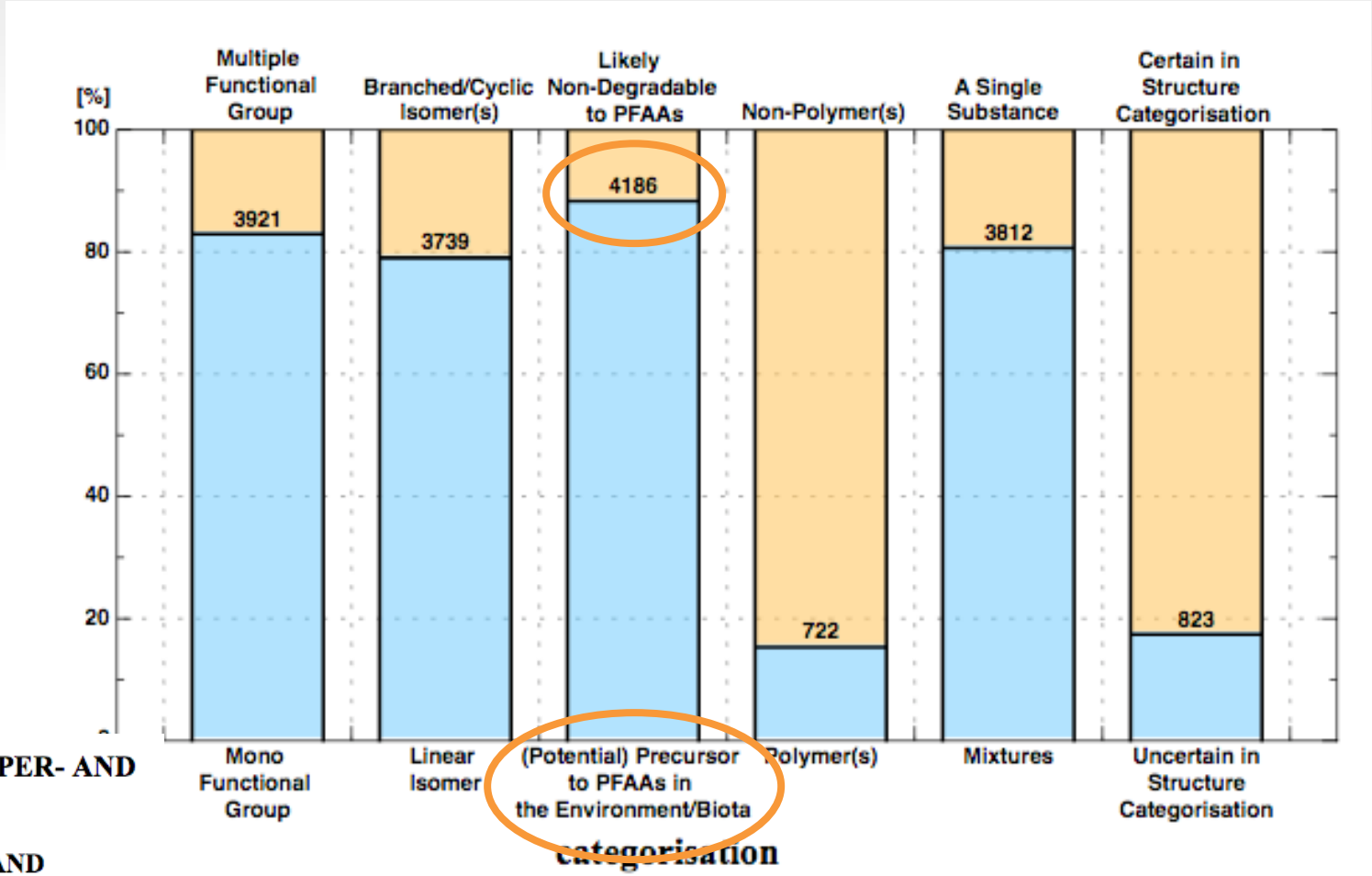
- Environmental persistence
- Mobility in the environment
- Bioaccumulation
- Lactational and transplacental transfer

- Phytotoxicity and wildlife developmental, reproductive, and survival impairment
- Proteinophilic
- Can cross the blood-brain barrier

“All roads lead to PFAAs”



Over 80 percent of PFASs may degrade to PFAAs



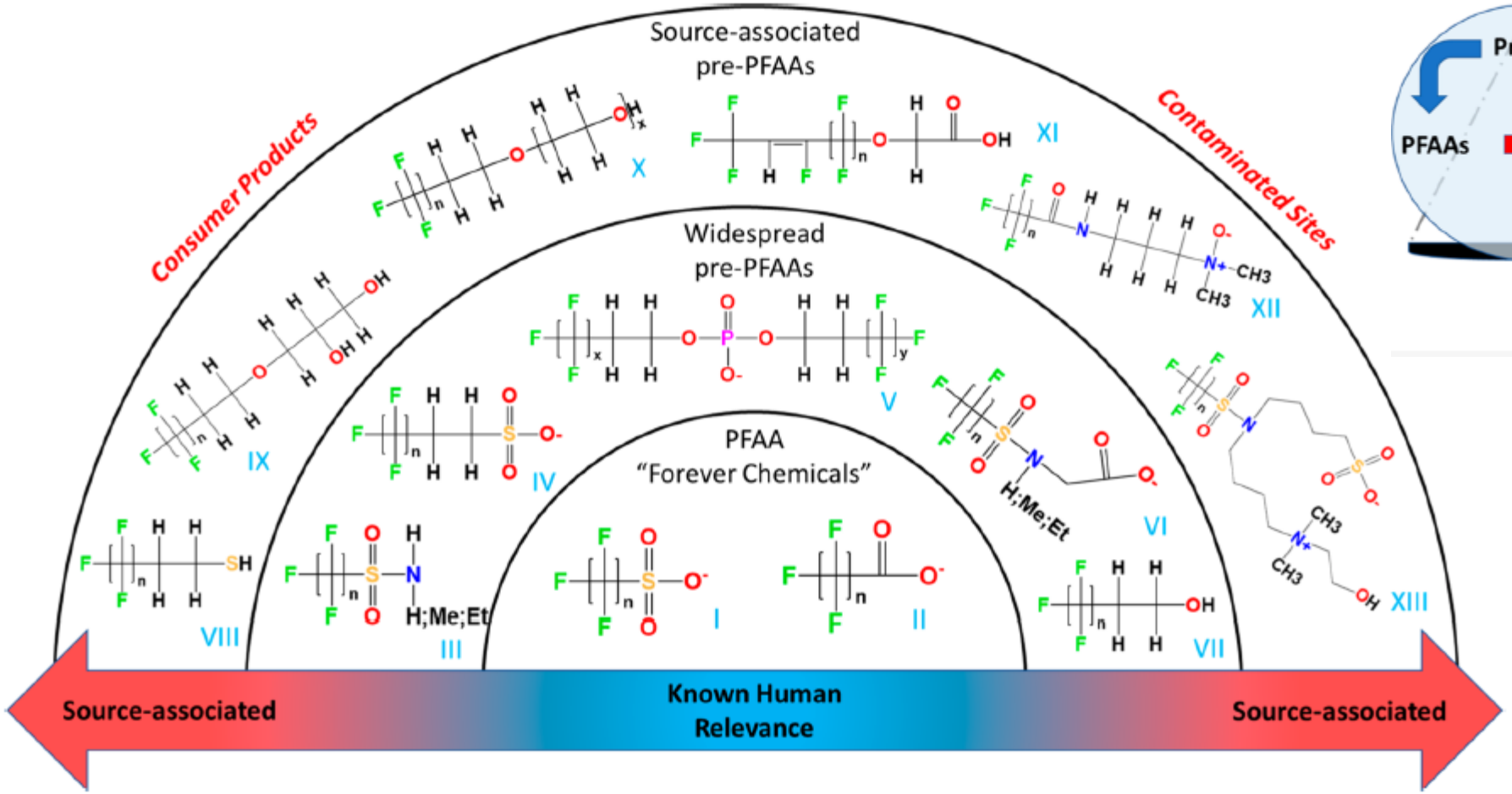
Organisation for Economic Co-operation and Development

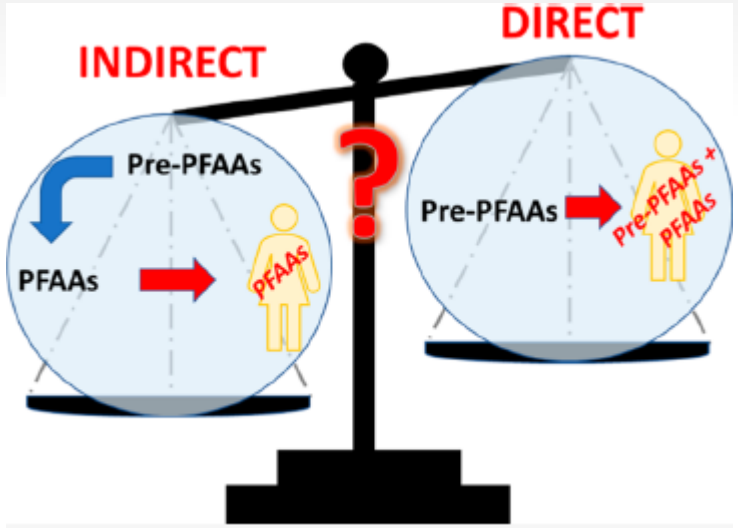
TOWARD A NEW COMPREHENSIVE GLOBAL DATABASE OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFASs):

SUMMARY REPORT ON UPDATING THE OECD 2007 LIST OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFASs)

http://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/

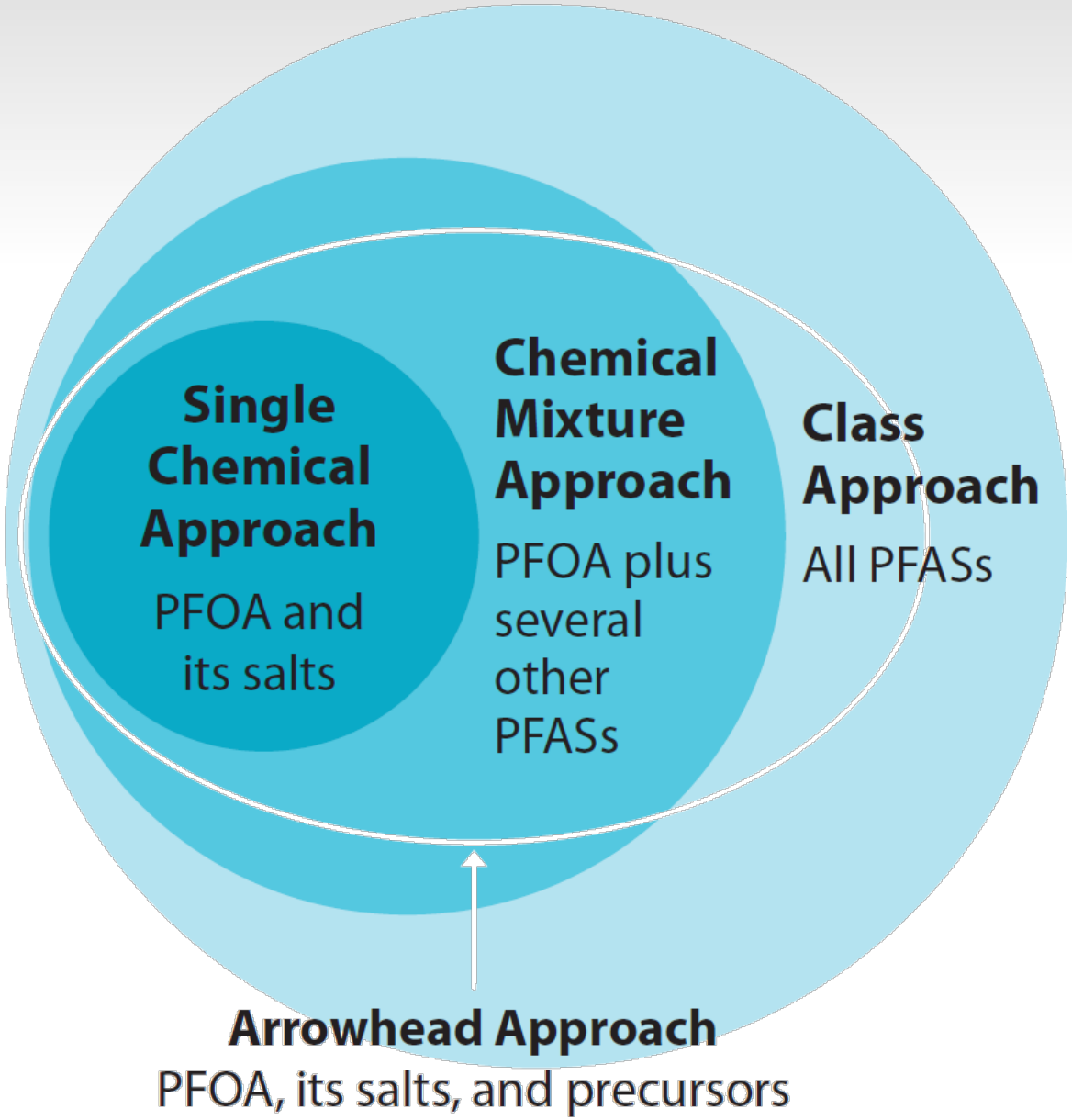
PFAA precursors play a key role in exposure





McDonough et al. (2022) https://doi.org/10.1021/acs.est.2c00254

Different approaches to PFAS regulation



ehp Environmental Health Perspectives

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 Algazi

Published: 17 February 2021 | CID: 025001 | https://doi.org/10.1289/EHP7431

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

The SCP regulatory framework

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**

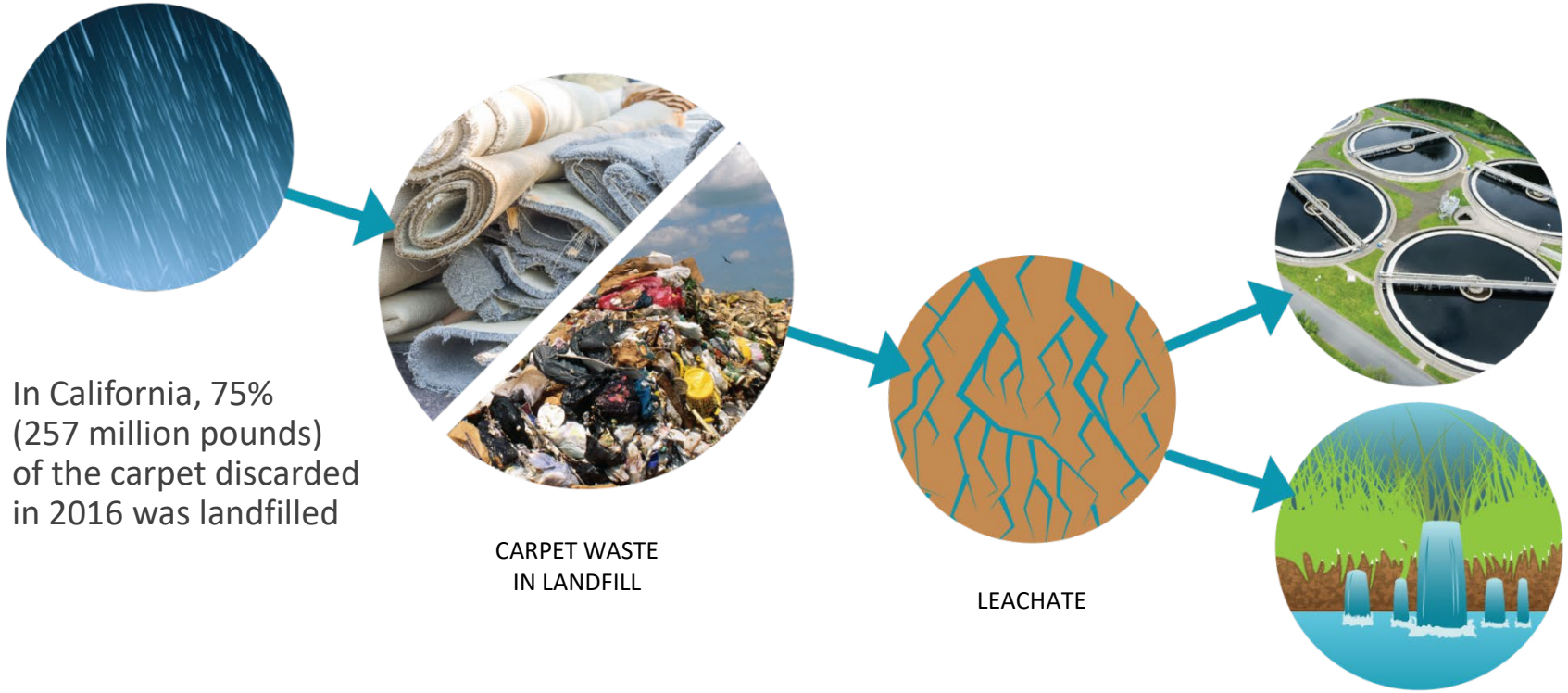
The P-sufficient approach

- "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)

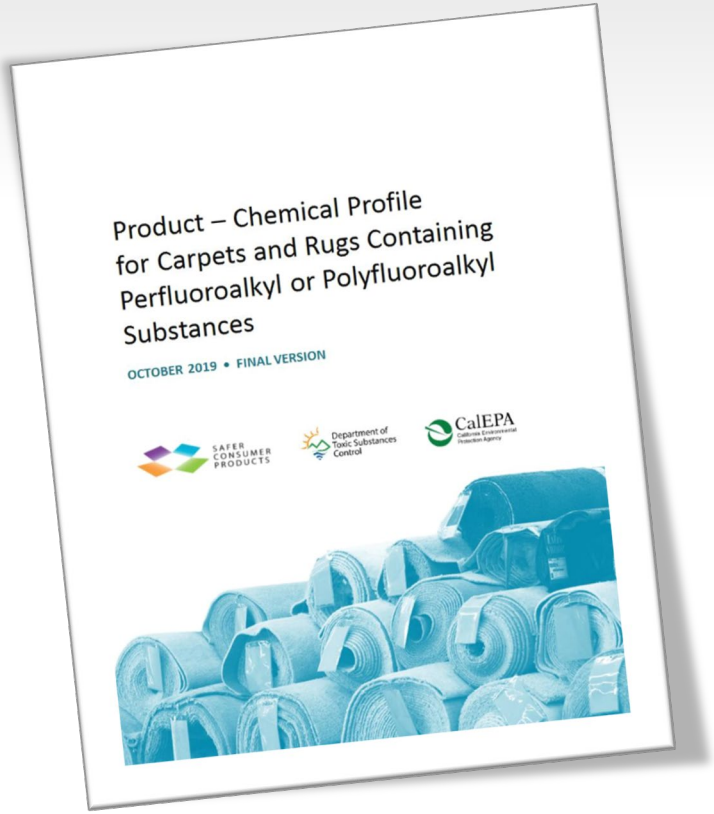
- "Because persistence is an inherent property of a chemical in the environment that results in increased exposure to the chemical and consequently potential for health risks, **it can appropriately be identified as a hazard trait**." (OEHHA 2012)

https://pubs.rsc.org/en/content/articlelanding/2019/em/c8em00515j
https://oehha.ca.gov/media/downloads/risk-assessment/gcfsor011912.pdf

Priority Product as of July 1, 2021: Carpets and Rugs with PFASs



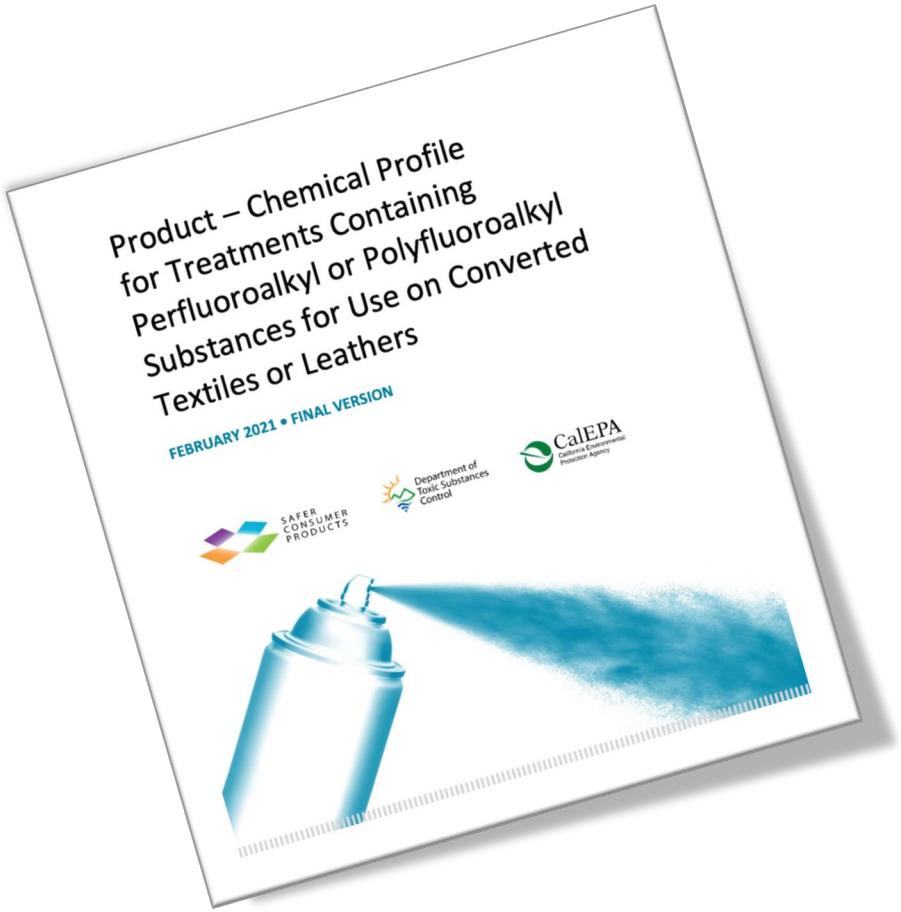
In California, 75% (257 million pounds) of the carpet discarded in 2016 was landfilled



https://calsafer.dtsc.ca.gov/cms/commentpackage/?rid=12751

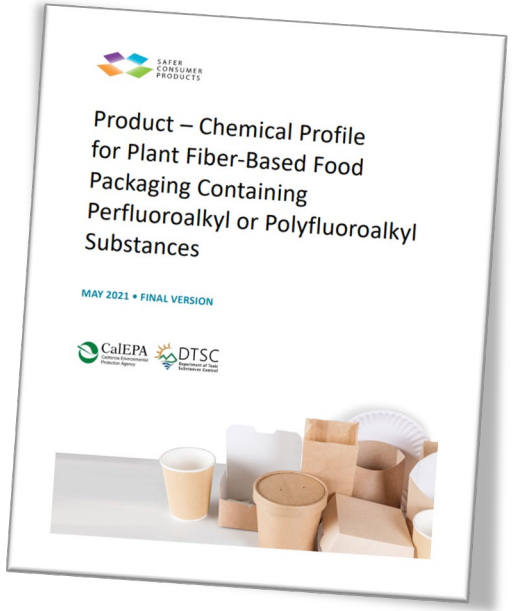
Priority Product as of April 1, 2022

Treatments with PFASs for use on converted textiles or leathers



https://calsafer.dtsc.ca.gov/cms/commentpackage/?rid=12759

AB 1200 (Ting) bans plant fiber-based food packaging with intentionally added PFASs as of January 1, 2023

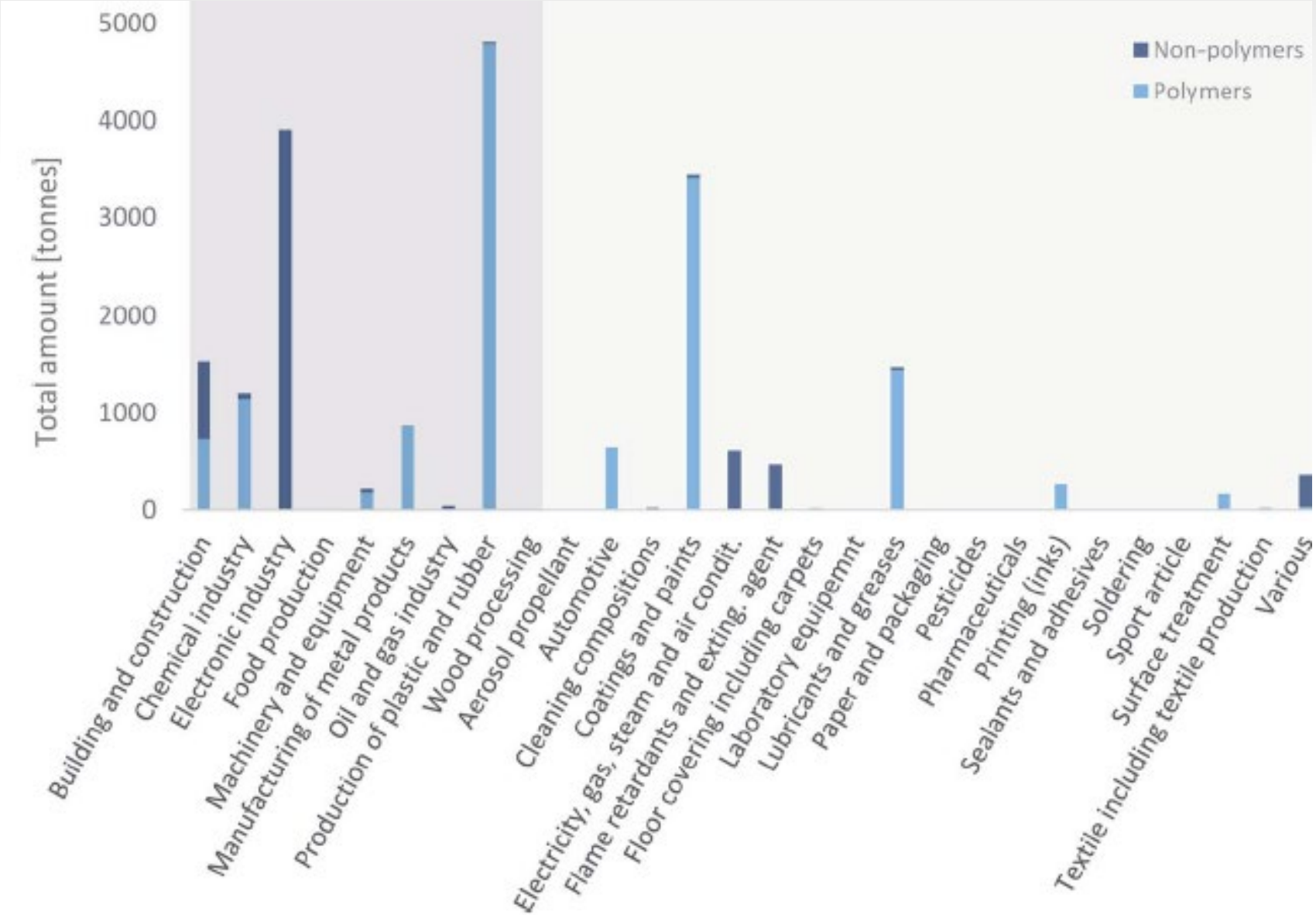


https://dtsc.ca.gov/scp/food-packaging-containing-pfass/

Other PFAS product bans in California

- Class B firefighting foam as of January 1, 2022 (SB 1044, Allen)
- Juvenile products as of July 1, 2023 (AB 652, Friedman)
- Textile articles as of January 1, 2025 (AB 1817, Ting & Garcia)
- Cosmetics as of January 1, 2025 (AB 2771, Friedman)

Are all these PFAS uses essential?



Glüge et al. (2020) Environ Sci: Processes Impacts 22:2345-73

The essential-use approach

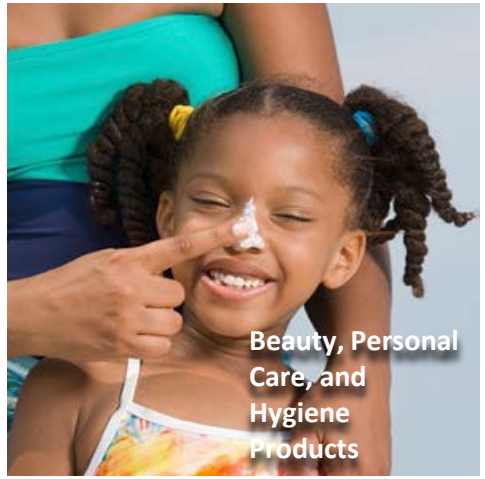
The use, function, or service provided by a chemical may be essential, but **not the chemical itself**!

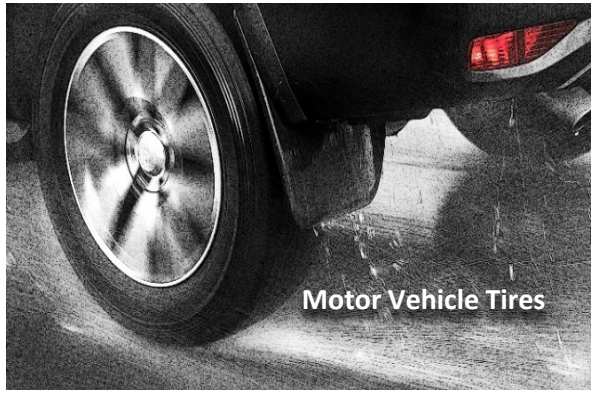
Category	Definition	PFAS examples
1	Uses that are not essential for health and safety, and the functioning of society. The use of substances is driven primarily by market opportunity.	Dental floss, water repellent surfer shorts, ski waxes
2	Uses that have come to be regarded as essential by society because they perform important functions, but where alternatives to the substances have now been developed that have equivalent functionality, which makes those uses of the substances no longer essential.	Most uses of AFFFs, certain water-resistant textiles.
3	Uses considered essential by society because they are necessary for health or safety or other highly important purposes *and* for which alternatives are not yet established.*	Certain medical devices, occupational protective clothing.

* This essentiality should not be considered permanent; rather, a constant pressure is needed to search for alternatives in order to move these uses into Category 2 above.

Cousins et al. (2019) Environ Sci: Processes Impacts 11:1803-15
Cousins et al. (2021) Environ Sci: Processes Impacts 23:1079-87

SCP's menu of options through 2023





https://dtsc.ca.gov/wp-content/uploads/sites/31/2021/04/Final-2021-2023-Priority-Product-Work-Plan.pdf

Thank you!

Contact me: simona.balan@dtsc.ca.gov

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