SAFER CONSUMER PRODUCTS

Assessing PFAS persistence and environmental mobility

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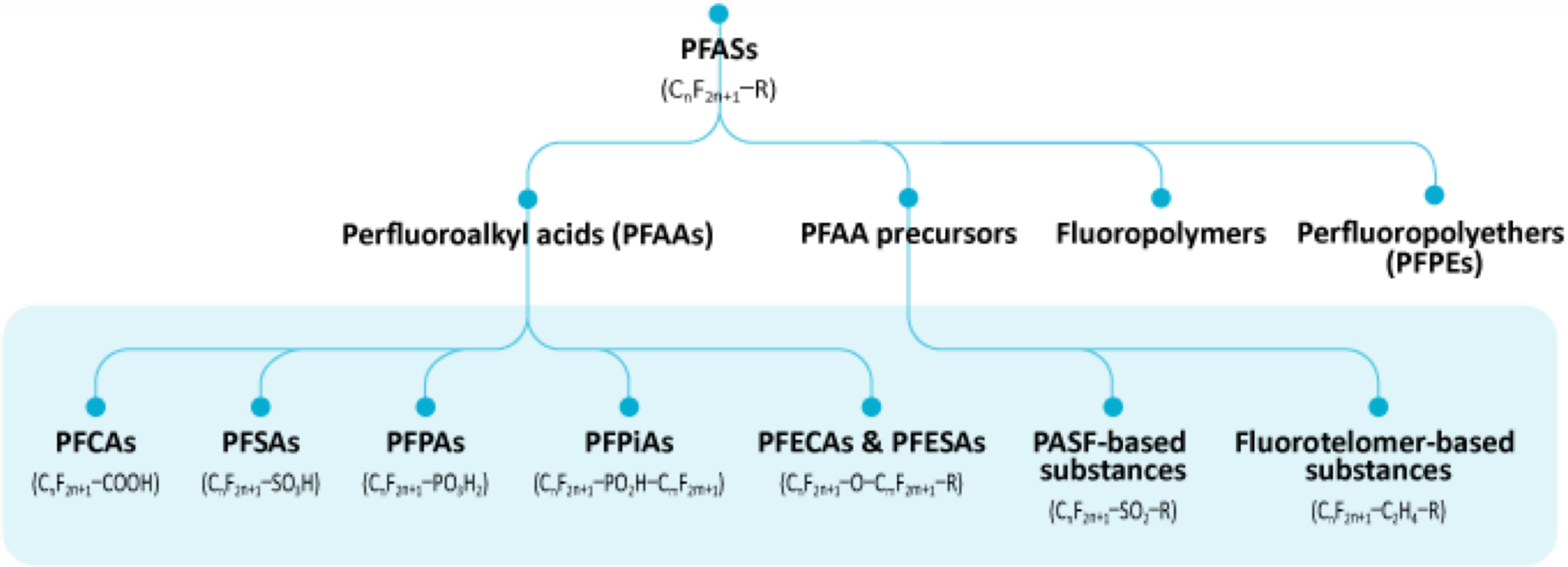
Can PFASs be grouped according to their properties?

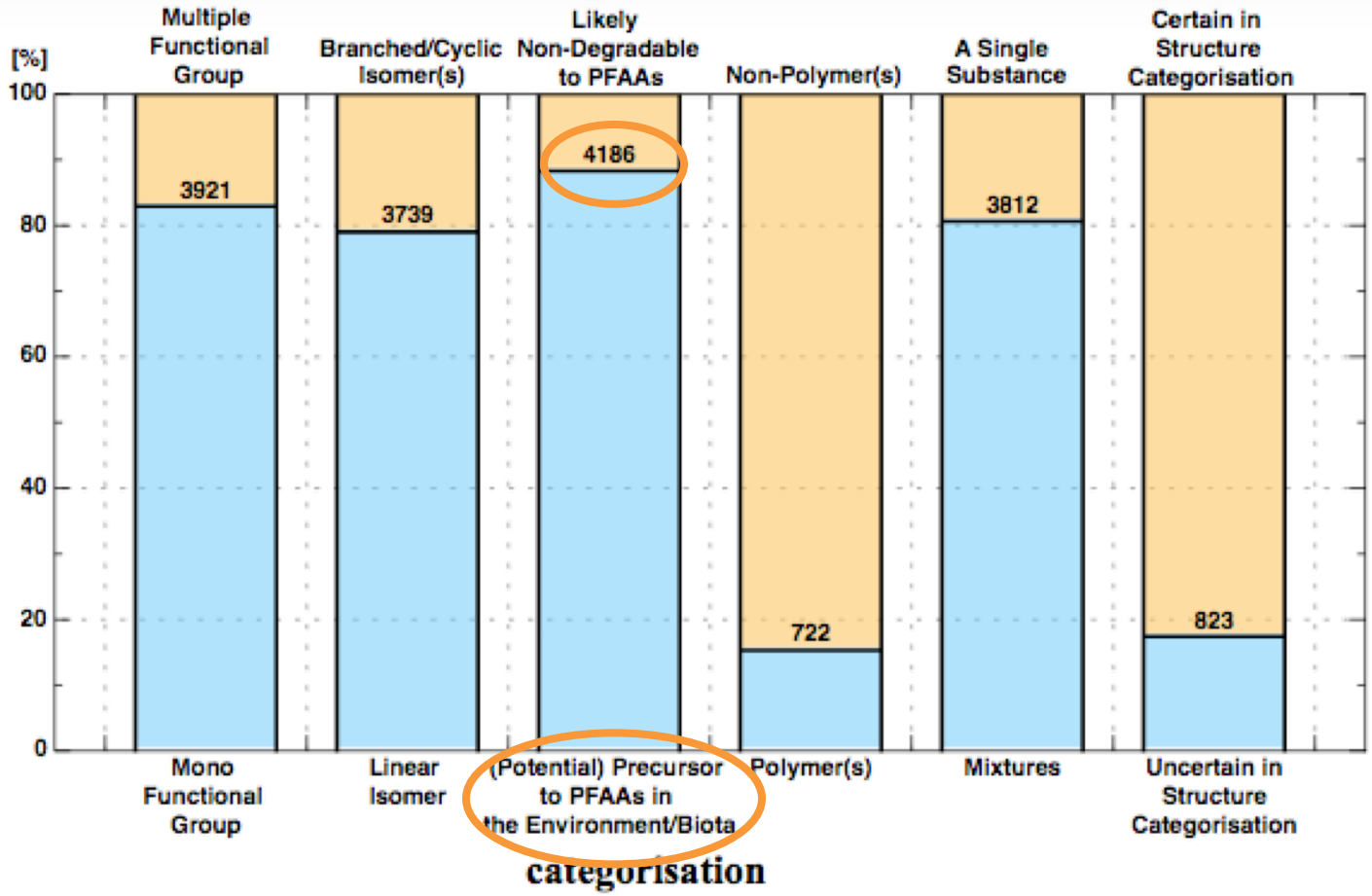
- Environmental persistence
- Bio-persistence
- Environmental mobility

The ~5,000 PFASs can be grouped into 4 subclasses:



Wang et al. (2017) Environ Sci Technol

Over 80 percent of PFASs may degrade to PFAAs



OECD
Organisation for Economic Co-operation and Development

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

The P-sufficient approach

- *“if a chemical is highly persistent, its continuous release will lead to continuously increasing contamination irrespective of the chemical's physical–chemical properties.”*

- *“these increasing concentrations will result in increasing probabilities of the occurrence of known and unknown effects and that, once adverse effects are identified, it will take decades, centuries or even longer to reverse contamination and therefore effects.”*

Cousins et al. (2019) Environ Sci: Processes Impacts

Biological persistence appears to vary with chain length

- Longer-chain PFASs are:
  - PFSAs with 6 or more perfluorinated carbons;
  - PFCAs, PFPAs, and PFPiAs with 7 or more perfluorinated carbons; and
  - their precursors.
- Key difference between longer- and shorter-chain PFASs is the biological half-life and bioaccumulation potential.
- The concept is less clear for fluorinated ethers (PFECAs, PFESAs).

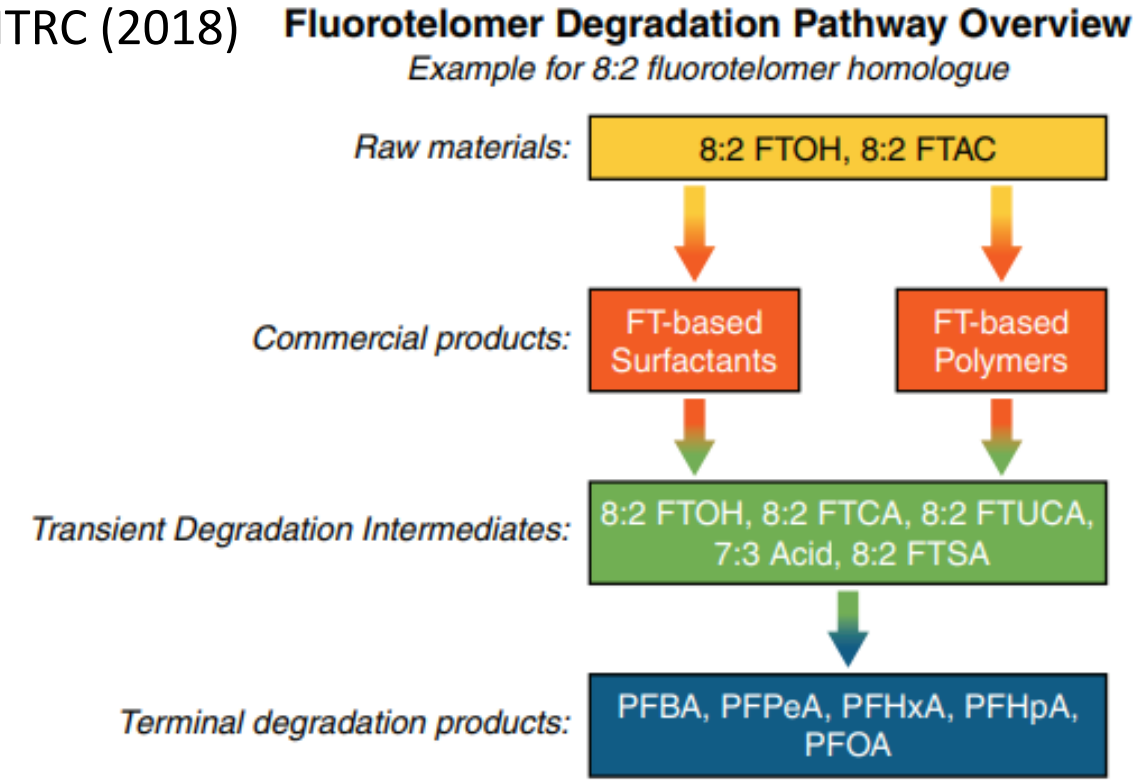
Table 1-1. Summary of Estimated Elimination Half-lives for Select Perfluoroalkyls

	Humans	Nonhuman primates	Rats[a]	Mice[a]
PFOA	8 years (Olsen et al. 2007a)	20.1–32.6 days (Butenhoff et al. 2004c)	Males: 44–322 hours Females: 1.9–16.2 hours	
PFOS	5.4 years (Olsen et al. 2007a)	110–170 days (Chang et al. 2012; Seacat et al. 2002)	179–1,968 hours	731–1,027 hours
PFHxS	8.5 years (Olsen et al. 2007a)	87–141 days (Sundström et al. 2012)	Males: 382–688 hours Females: 1.03–41.28 hours	597–643 hours
PFBuS	665 hours (Olsen et al. 2009)	8.0–95.2 hours (Chengelis et al. 2009; Olsen et al. 2009)	2.1–7.42 hours	
PFBA	72 hours (Chang et al. 2008b)	40.3–41.0 hours (Chang et al. 2008b)	1.03–9.22 hours	2.79–13.34 hours

ATSDR (2018)

Intermediates may have higher biopersistence than their precursors and final degradation products

ITRC (2018)

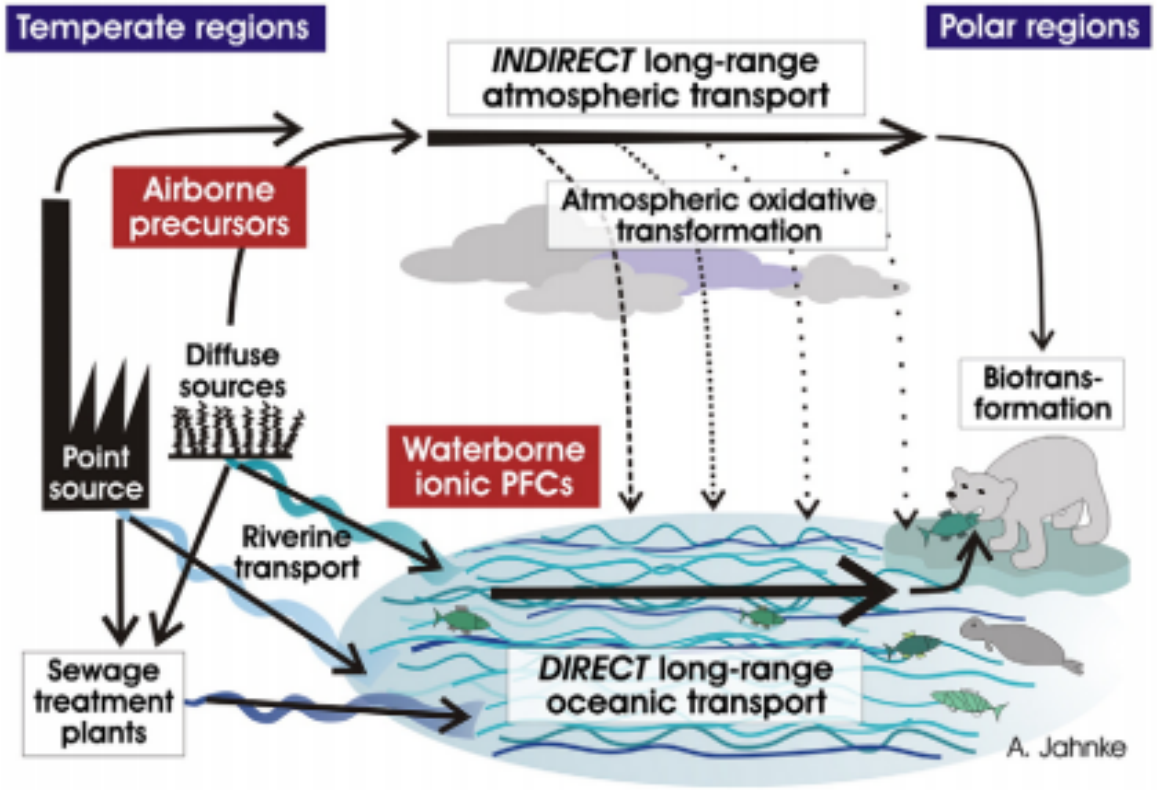


5:3 FTCA, a metabolite of 6:2 FTOH, has highest internal exposure and slowest clearance based on pharmacokinetic data from rat and human studies (Kabadi et al. 2018).

PFASs are widespread in…

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

PFASs undergo long-range transport via atmospheric and oceanic currents, shorter-chains more mobile

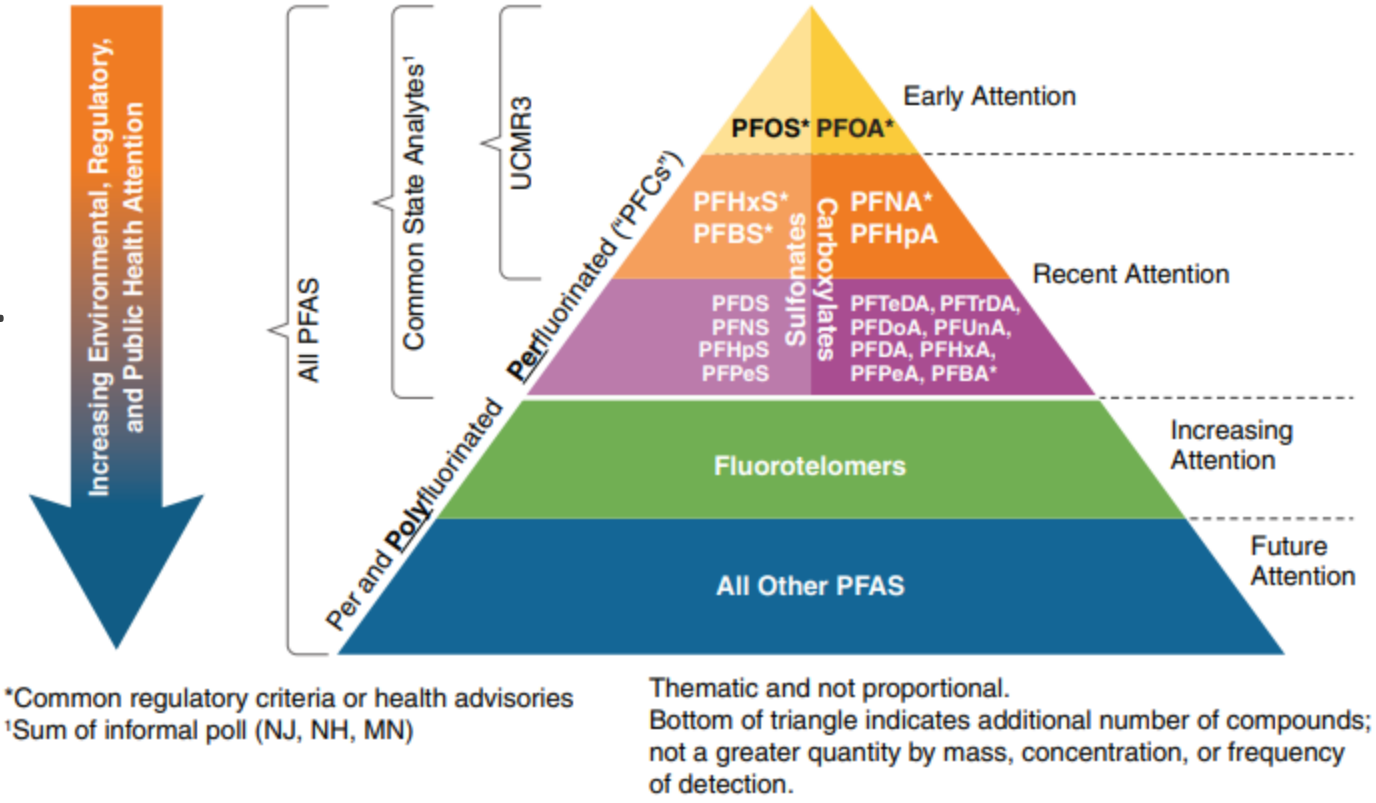


Butt et al. (2010) Sci Tot Environ (schematic by Annika Jahnke)

Most PFASs cannot be measured with current methods

- Between 2009 and 2017, 455 new PFASs were detected in environmental media and commercial products (Xiao 2017).

- Most PFASs (>95% in some environmental samples) cannot be quantified due to lack of analytical methods.



ITRC (2018) *(source: J. Hale, Kleinfelder)*

The California Code of Regulation identifies several so-called “exposure potential” hazard traits

- Environmental persistence
- Mobility in the environment
- Bioaccumulation

The California Code of Regulation identifies several so-called “exposure potential” hazard traits

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

Safer Consumer Products Key Prioritization Principles

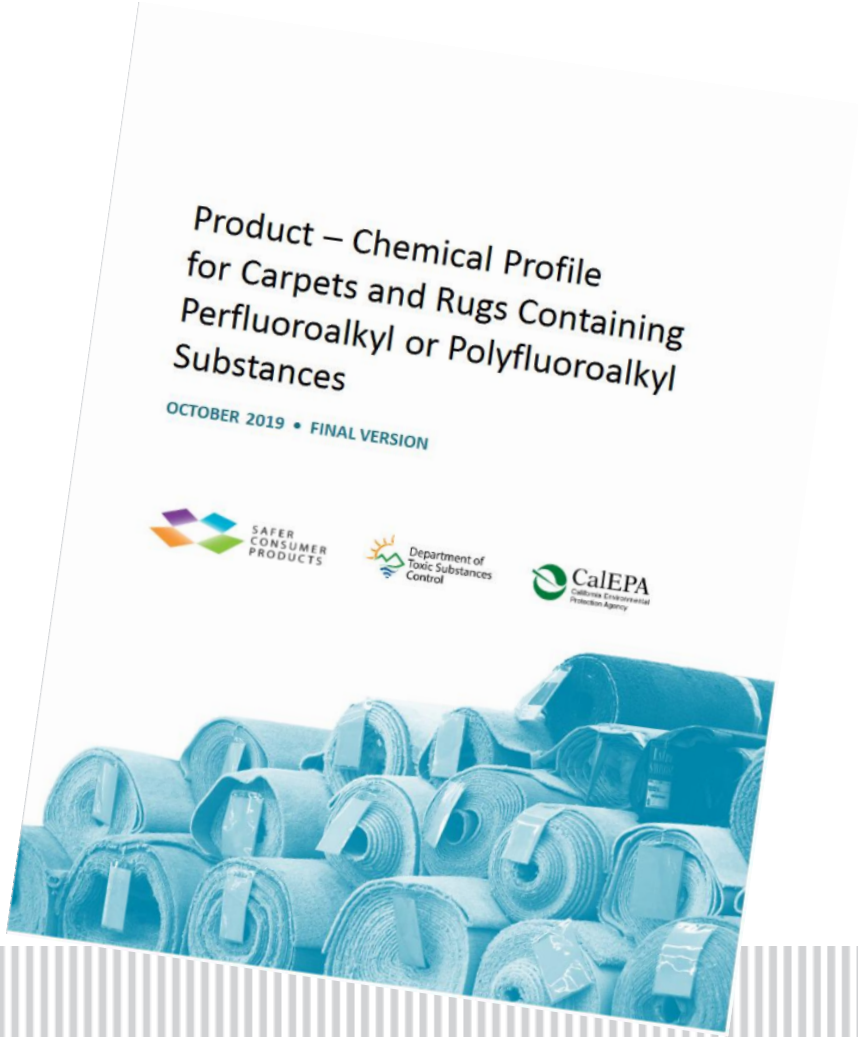
There are potential **exposures** to a Candidate Chemical in the product

AND

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

Proposed Priority Product: Carpets and rugs containing PFASs

Rulemaking start planned for early 2020.

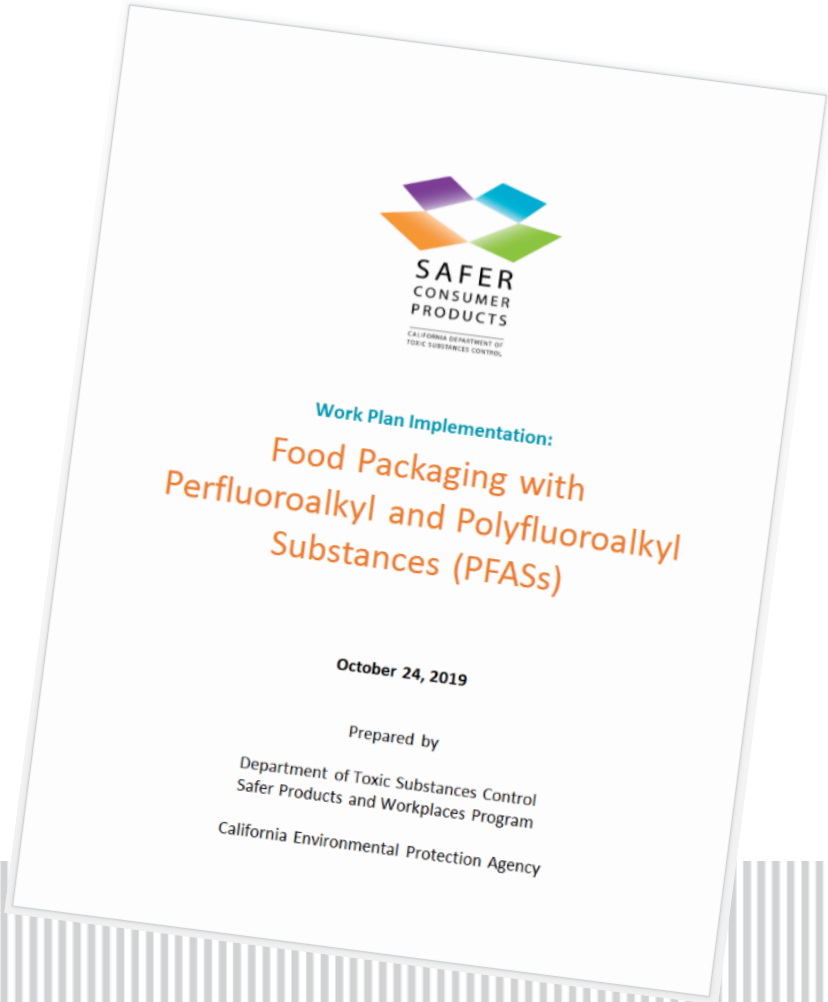


Proposed Priority Product: Treatments containing PFASs for use on converted textiles or leathers

Draft Profile posted and public comment period through December 31st.

Considered for Priority Product selection: Food packaging containing PFASs

- Background document published October 24, 2019.
- Public comment period through January 14, 2020.
- Workshop January 14, 2020.



Thank you!

Contact me: Andre.Algazi@dtsc.ca.gov

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