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RE: External Scientific Peer Review

PROPOSED ADOPTION OF TREATMENTS CONTAINING PERFLUOROALKYL OR POLYFLUOROALKYL SUBSTANCES FOR USE ON COVERTED TEXTILES OR LEATHER AS A PRIORITY PRODUCT

This review relates to the proposed regulation in the State of California by the Department of Toxic Substances Control (DTSC) to adopt *treatments containing perfluoroalkyl or polyfluoroalkyl substances for use on converted textiles or leathers* as a Priority Product under the California Safer Consumer Products (SCP) regulatory framework. The review of this proposal is considered as an addendum to the 2019 proposal relating to the adoption of Carpets and Rugs with Perfluoroalkyl or Polyfluoroalkyl Substances as a Priority Product.

As part of this regulatory process, the DTSC is required to ensure that all product chemical combinations proposed as Priority Products meet the following criteria:

- There is potential for exposure to the Candidate Chemical(s) in the product, and
- Exposures may contribute to or cause significant or widespread adverse impacts to people or the environment.

My expertise in the field for nearly 20 years, is directly relevant to the determination of the fate, transport and sources of perfluoroalkyl and polyfluoroalkyl substances (PFASs) in the environment. Thus, this review focusses on Conclusion 1 outlined in the proposed regulation:

Conclusion 1:
Humans and biota may be exposed to members of the class of perfluoroalkyl and polyfluoroalkyl substances (PFASs) including perfluoroalkyl acids (PFAAs) through the manufacturing, normal use, handling, recycling, or disposal of treatments containing PFASs for use on converted textiles and leathers, as well as disposal of the treated textile or leather products themselves.

This reviewer deems that the scientific portion of the proposed regulation as it pertains to Conclusion 1 is based on sound scientific knowledge, methods and practices. The extensive and highly comprehensive literature review compiled by DTSC and summarized in the report, "Product-Chemical Profile for Treatments Containing Perfluoroalkyl or Polyfluoroalkyl Substances for Use on Converted Textiles or Leathers"

outlines nearly two decades worth of scientific peer reviewed studies as well as industry and regulatory reports examining investigations into the physical properties, transport, sources and fate of these persistent contaminants. The basis of this regulation included a strong focus on data from recent studies and included new data published since the Product Chemical Profile in the 2019 Review for Carpets and Rugs were completed. Many of these studies have been performed by leading scientists in the field of PFASs research. As stated in the previous review, these investigators have extensive publication record, amounting to years of work generating much needed data on these chemicals since the field began to gain ground in the early 2000.

DTSC's decision to use a chemical class approach in this proposed regulation is consistent with the earlier proposal for carpets and rugs. Clear and ample justification was provided in this approach and is considered a comprehensive, proactive and forward-thinking management and regulatory strategy by this reviewer. The current industrial practices that involve limited reporting of chemical formulations of these treatment products make chemical specific actions impossible. The Profile effectively highlights the crucial characteristic shared by all PFASs, namely the presence of the highly stable Carbon-Fluorine bonds. This is the primary determinant that renders these chemicals persistent in the environment is critical in understanding the risk of exposure to humans and biota. If all these compounds do not breakdown, they linger for variable amounts of time making it highly likely for humans to encounter them through various activities in their lifetime. The staggering report by the Organisation for Economic Cooperation and Development (OECD) that identified 4,730 chemicals related to individual PFASs and commercial mixtures available in the global market has not been disputed and continues to challenge the research community in their attempts to elucidate their structures and properties even with advanced analytical techniques and instrumentation.

The supporting points identified for Conclusion 1 outlined by the DTSC are all based on available sound scientific data and/or reliable information provided by industry. Some specific recommendations/points are discussed in the succeeding paragraphs.

The Profile is clear to point out that the main PFASs used in formulations of treatments are the subgroup "side-chain fluorinated polymers" additionally identified as fluorinated acrylate, methacrylate, urethane, oxetane polymers. The Profile later mentions that these polymers have been shown to degrade slowly in the environment and highly cited studies show variable rates of biodegradation. It is suggested that the profile be amended to include a figure of this subclass as they not effectively represented in Figure 1 of the Profile that shows the structures of the General PFASs Classification.

As Conclusion 1 is centered on the premise that humans and biota are likely to be exposed to PFASs, solid evidence from numerous scientific investigations (and cited in the Profile) that inhalation of air and dust contaminated with PFASs contribute significantly to this probable exposure. It was also mentioned in the Rationale section of

the Profile (Page 8) that *direct contact* by children and infants from carpets, rugs, upholstery, clothing, shoes, and other consumer products could be a major source of exposure. It was unclear whether the Profile has included data from studies investigating the likelihood of dermal routes of exposure. Recent studies by Poothoong et al. 2019 in the Environmental Science and Technology as well as Abercrombie et al. 2020 in the journal Environmental Chemistry and Toxicology presents some of this data.

In the discussion of the Relevant Physical Chemical Properties (Section 3), PFECAs and PFESAs were stated to share similar characteristics as PFAAs despite their structural differences. They were also described as being similarly mobile in the environment as the longer chain PFASs. It is important to note that this is based on modelling studies and not on direct measurement or observation from the Goomis et al. 2015 publication.

The various "treatments containing PFASs for use on converted textiles of leathers" covered by the proposed regulation is stated to include: cleaner, protectant, spot remover, water proofer or water repellant. Data on the market share of each of these products is lacking or weakly outlined in the Profile. Data on estimated sales or number of products available to consumers will be helpful in assessing the extent of potential exposure to consumer as it will illuminate the widespread use of these products.

Source tracing studies for PFASs have been challenging and limited. In Section 4 of the Profile within the discussion of the potential exposure to PFASs through product use (page 430), a 2009 EPA study where 13 consumer product categories and 116 household products was highlighted that concluded many PFASs detected in household dust can be attributed to the use of treatment products applied to converted textiles and leathers such as carpeting, apparel and upholstery. Unable to verify the reference for this study, it is unclear how this conclusion was achieved.

Since the scope of the regulation does not include treatments "marketed or sold exclusively for use at industrial facilities" the mention of the impact of Chinese textile industry on Page 47 requires some context. The study refers to an estimated 10,000 metric tons of finishing treatments containing fluorinated chemicals from these exported products globally. It may be worthwhile to indicate that this regulation will not reduce the impact of these products on exposure, it may only decrease the potential aggregate exposures on humans and biota. Providing clarity on the scope of the regulation and the importance of aggregate effects perhaps is warranted. Making a clear point of how widespread the sources of exposure to humans and biota are from these chemicals is critical, that decreasing the exposure from treatments is only one approach as chemicals will like still be released from these pretreated imported products coming into the state of California.

The Profile contains substantive evidence from numerous studies pointing to ingestion of contaminated food and drinking water as the largest contributor of PFAAs, the terminal metabolite of many PFASs, to the overall human body burden. Many of these

peer reviewed studies show variable concentrations of PFASs in food from Europe and Asia. The Profile states that even though these are non-US based data, that "levels are expected to be similar in the US, including California". It needs to be clarified however that even though concentrations of PFASs in foods could be similar, the exposure rates or levels between US in comparison to Europe and Asia could be significantly different from contaminated food due to varied diet intake and eating patterns.

Several studies have been published in the past 2 years that quantified the presence of PFASs in drinking water. These were well documented in the Product-Chemical Profile. Exposure to PFASs from drinking water have thus been identified as another significant routes of exposure to humans especially in areas impacted by direct sources such as military installations, airports, manufacturing facilities etc. Some of these studies however have reported really low levels and concentrations reported have been close to detection limits of the EPA standards method for drinking water analysis. Without a federal mandated minimum contamination level (MCL) in drinking water for these chemicals, different states are setting their own recommended levels that are much lower than the EPA health advisory limit of 70 ng/L, the lower levels however are becoming challenging as it is pushing towards the limits of quantitation and detection of the only validated method for PFAS drinking water analyses.

Conclusion and Big Picture Comments:

Substantive, sound scientific data, methods and practices were used in formulating the overall conclusions outlined by DTSC in their proposed regulation of naming *treatments containing perfluoroalkyl or polyfluoroalkyl substances for use on converted textiles or leathers* as a Priority Product. This Product-Chemical Profile thoroughly addressed all scientific issues relevant to the scientific basis of the proposed regulation. It also addressed environmental justice issues that is relevant to the issues of PFAS exposure to these chemicals that was lacking in the 2019 proposal for Carpets and Rugs. Many of the comments from the review of that earlier proposal was also incorporated here.