May 31, 2019

Ms. Kara Steward
Department of Ecology/
Hazardous Waste & Toxics Reduction Program
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RE: Comments on WA PFAS CAP Chapters & Preliminary Recommendations (posted 5/1/19).

Dear Ms. Steward,

To you and your team, thank you for all of the hard work you are doing to develop Washington's PFAS Chemical Action Plan (CAP), which will define your PFAS program in the future. I attended your webinar on May 15th and understand the challenges of moving this project to completion.

We recognize the value of this effort and want to help support a PFAS CAP that is achievable, can maximize the protection of public health and the environment, and provides a positive outcome for the State and its citizens. We recently reviewed all ten Chapters and the Preliminary Recommendations (posted 5/1/2019), and would like to share some key points/comments that we feel are important to improve the accuracy and clarity of your documents and the overall success of your program.

1. We felt that the approach taken in the Biosolids Chapter was particularly meaningful and balances the impact and risk concerns, and we suggest an approach like this for all of the documents and Preliminary Recommendation. This chapter represents a very practical approach and appears to deliver the best overall potential impact (high return on your effort to keep people and the environment safe) while reducing the unintended impact to highly valuable materials that have a lower potential for negative implications to health and environment.

2. Utilizing the term "PFAS" to describe a group of chemicals (over 4,000) to regulate, is too broad, and suggests that the substances have similar properties and pose similar risks and impacts to public health and the environment. It is disappointing that the Preliminary Recommendations, pg2 states "the scope of this CAP includes the entire class of PFAS, degradation products, and available substitutes", when much of the focus in the ten Chapters is regarding the impact from the non-polymeric PFAS, such as Perfluoroalkyl Acids ("PFAAs"). It is important that there is clarification to separate fluoropolymers as a distinct class from the broad group of PFAS. Fluoropolymers include polymers like PTFE, FEP, PFA which have been demonstrated to meet the OECD criteria for polymers of low concern. Reference below: 2018 Henry et al and OECD, 2009). These materials have high molecular weight, are too large to be bioavailable, are inert, extremely stable, do not degrade in the environment, are not mobile, and are safe for the end-user. In the Chemistry Chapter, pg3 Table 1, you correctly

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describe Fluoropolymers as consisting of a "carbon-only polymer backbone with fluorine atoms directly attached", that is, there is no functional group, "head", to detach, making this polymer extremely stable. Including fluoropolymers, like PTFE, in your CAP will do little to protect human health or the environment. Please consider using language that is chemically specific to avoid including fluoropolymers in Washington State CAP, such as perfluoroalkyl acids (PFAAs) or if the broad term PFAS must be used, consider adding adjectives to limit the scope, such as "some PFAS" or "Non-Polymer PFAS" to help readers focus on specific concerns, risks and efforts to reduce the impact. See your Ecology Chapter, Chemistry, Table1, pg3 PFAS Chemical Family, which can also help define/explain chemical classes of environmental concern.

3. When considering product alternatives ("PFAS-free") it is extremely important to thoroughly evaluate the impact of the alternatives as well as the potential loss of functionality to society. In our view, product life cycle assessment (LCA, such as outlined in ISO 14001) is a valuable tool in such an evaluation of alternatives. Important factors in addition to an LCA include: the performance of the alternative and the unintended consequences that could result if the final product does not perform as intended, the cost and/or risk to society if the product can no longer be produced at all, and the potential impact to human health and environment of the alternatives.

4. Specific comments on sections.

Chapter	Section	Page	Comment	Justification
Fate & Transport	4.0	6	"~~Polymers are a special class of PFAS to consider when looking at transformation and hazard~~. There are three different classes of polymeric PFAS to consider when looking at transformation and hazard: fluoropolymers, side-chain fluorinated polymers, and polymeric perfluoropolyethers. It is not only the polymer compound to consider, but also how the polymer backbone may degrade, and what unreacted monomers and catalysts may be present. There is evidence that bacteria or light can degrade some fluorotelomer based PFAS polymers, which are types of side-chain fluorinated polymers. This would release soluble monomer or other PFAS fragments to the environment with a half-life of decades to two centuries[16, 39–42]. However, this finding is still unsettled, due to alternate reports using different methods, which show a half-life of approximately 15,000 years for fluorotelomer-based acrylate polymers (a type of side-chain fluorinated polymer)." [43,44] ››› "If ~~PFAS~~ side-chain fluorinated polymers, which are often used as oil- and water-resistant treatment for consumer products, degrade, then they could be a potential source of PFAS emissions for decades or centuries if not properly disposed and contained in landfills[46]. One study suggests that degradation of side -chain fluorinated polymers could increase PFAS loading to the environment by 4-8 times in coming years[39].In addition to side-chain fluorinated polymer degradation as a potential source of PFAS, the ~~production~~ polymerization of PFAS polymer requires the use of monomers and, in some cases, non-polymer processing aids."	In support of the above listed, comment number 2: This is an example of the need to be specific so as not to confuse the reader.

Chapter	Section	Page	Comment	Justification
Sources & Uses	4.3	19	"Current treatments of textiles include fluoropolymer dispersions (like polytetrafluoroethylene or PTFE) used in industrial fabrics and professional apparel ~~highly porous fabrics like outdoor clothing and camping equipment~~; side-chain fluorinated polymers (like PASF or fluorotelomer-based acrylate polymers) used as surface treatments on textiles and leather."	In high performance outerwear that is intended to be highly porous or breathable, if PTFE were used, it would most likely be in a membrane form rather than a surface treatment.

Thank you for this opportunity to comment and if you have questions or need more information, please feel free to call or email me. Thank you again for all of your effort and support to this important topic.

Sincerely,

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References:

Henry, Barbara J. et al, 30 March, 2018; "A critical review of the application of polymer of low concern and regulatory criteria to fluoropolymers". https://setac.onlinelibrary.wiley.com/doi/abs/10.1002/ieam.4035.

OECD (Organisation for Economic Co-operation and Development), 2009; BOP bu Deloitte, 2015; globally accepted criteria for "Polymers of Low Concern" https://www.oecd.org/env/ehs/risk-assessment/42081261.pdf