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Fluorotechnology Is Critical to Modern Life: The FluoroCouncil Counterpoint to the Madrid Statement

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The Madrid Statement (Blum et al. 2015) is a listing of policy recommendations that its authors would apply to a broad universe of poly- and perfluoroalkyl substances (PFASs). The FluoroCouncil could support many of these policy recommendations if they were limited to long-chain PFASs. However, the application of these recommendations to a broad universe of PFASs simply cannot be supported.

The core weakness of the document is the absence of a compelling rationale for the sweeping scope of those recommendations. Specifically, the Madrid Statement fails as a policy statement in the following areas:

1. It does not acknowledge the fact that fluorotechnology is essential technology for many aspects of modern life, a critical consideration for adoption of any social policy on PFASs.
2. It ignores a large body of scientific information demonstrating important differences between the health and environmental impacts of long-chain and short-chain PFASs. The U.S. Environmental Protection Agency (EPA) and other regulators have approved numerous short-chain alternatives to replace long-chain PFASs. Data in non-human primates indicate shorter-chain perfluoroalkyl carboxylic acids (PFCAs) are less toxic than long-chain PFCAs and have substantially shorter half-lives than perfluorooctanoic acid (PFOA) in particular (U.S. EPA 2015a).
3. It does not recognize the substantial and continuing efforts by industry and governments to replace long-chain substances with alternatives that limit environmental impacts while continuing to provide the unique benefits of PFAS chemistry. These efforts continue, but more work is needed by all parties to complete this transition.

In our daily life we rely on fluorotechnology, mostly without noticing, because it uniquely enhances the functionality and durability of things we take for granted, such as airplanes, automobiles, and cell phones. PFASs are designed for specific end uses, and therefore all PFAS chemistry is not the same. In fact, the term "PFAS" describes a large class of chemistries. Although FluoroCouncil member companies do not participate in all these chemistries, we have expertise in two types of chemistries that are important to everyday life: fluoropolymers and fluorotelomers.

Fluoropolymers have unmatched thermal and chemical stability, providing strength, resilience, and durability for the reliable function of a variety of products and industries. Chemical and pharmaceutical manufacturers rely on this technology in linings for pipes, valves, and tanks to allow safe and clean production of products we use and consume every day. Aircraft, trucks, buses, and cars utilize high-reliability, durable, lightweight tubing and hoses made from fluoropolymers that reduce overall weight and prevent evaporation of fuel vapors, reducing greenhouse gas emissions and increasing fuel efficiency. In addition, fluoropolymers exhibit unique dielectric properties that enable high-speed data transfer for wireless communications in smart phones and other devices.

Fluorotelomer-based polymers provide protective surface finishes for textiles such as surgical gowns and drapes that shield against fluid-borne pathogens, protecting patients and health care workers. These products are also used on uniforms to protect chemical workers, military personnel, and firefighters, as well as on outerwear and gear for outdoor enthusiasts, so that all can return home safely. The unique property of water and oil repellency is also utilized in specialized paper and paperboard applications to prevent burns from hot oil in food preparation and to protect food from spoilage. One key use for fluorotelomer-based surfactants is in firefighting foams. These foams extinguish aircraft and oilfield fires faster and provide more protection from reignition than any other medium, saving lives of first responders, military personnel, and others while also protecting property. More information on the uses and benefits of fluorotechnology is available on the FluoroCouncil website (http://www.fluorocouncil.org).

Given this range of important societal benefits offered by fluorotechnology, policy measures on PFASs need to be strongly supported by rigorous risk assessment based on all relevant data.

In response to public concerns that arose over PFOA and perfluorooctanesulfonic acid (PFOS) more than a decade ago, the FluoroCouncil member companies developed new products, including PFASs based on short chains, which provide comparable properties and benefits to long-chain products, often at similar concentrations, with improved health and environmental profiles.

For the past several years, FluoroCouncil member companies have engaged in an ambitious program to develop robust scientific data on these alternative products, the raw materials used to produce them, and their degradation products. Although a broad scientific discussion continues regarding how much science is needed to assess these short-chain products, significant toxicity and environmental data have been provided to regulators globally for systematic chemical review processes. Some of these data have been published in the scientific literature.

We would welcome the opportunity to collaborate with the broader community to establish a publicly accessible website housing the available scientific literature references on short-chain PFASs. Our efforts in international fora to create a public reference database for this literature have not yet been successful. However, these products have undergone rigorous review in the registration processes of multiple government agencies and are approved for use. Any claim that there are minimal data publicly available on the hazards and risks of these substances is simply incorrect.

This robust set of published data as well as data submitted to regulatory authorities support the conclusion that the short-chain PFASs studied to date are not expected to harm human health or the environment. Although the structures of short-chain PFASs may be similar to their long-chain equivalents, data show the short-chain chemistry in general is very different from the long-chain chemistry. For example, short-chain substances are eliminated more rapidly from the body and are less toxic than long-chain substances (Borg et al. 2013; ENVIRON International Corp. 2014; Gannon et al. 2011; Han et al. 2012; Iwai and Hoberman 2014; Martin et al. 2003a, 2003b; Russell et al. 2013).

Any assessment of the alternatives to long-chain PFASs must be based on all the relevant factors that have historically guided risk assessment, including the cornerstone considerations of a substance's hazard and exposure potential. Some critiques of PFASs have relied solely on the fact that these substances are persistent in the environment, a feature that is often closely related to their technological strengths as durable materials. Decisions on the societal acceptability of strategic materials such as PFASs cannot be wisely made on a single attribute such as persistence.

If the Madrid Statement had been directed at long-chain PFASs rather than the larger universe of substances it addresses, the FluoroCouncil would have been supportive of many of the policy measures described. Nearly a decade ago, in response to questions about the presence of long-chain PFCAs and their precursors in the environment and in living systems, FluoroCouncil members were among the industry leaders that took action. In 2006 the FluoroCouncil member companies voluntarily committed to a global phaseout of long-chain products and related plant emissions by the end of 2015. This program, known as the U.S. EPA 2010/2015 PFOA Stewardship Program, has resulted in dramatic reductions in environmental emissions from manufacturing and products, concurrent with development and introduction of short-chain alternatives (U.S. EPA 2015b). A similar program was successfully implemented in cooperation with Environment Canada and Health Canada (Environment Canada 2013). Demonstrable success of these programs has been shown in the reduction of measurable levels of long-chain PFCAs in the environment and in living systems (Centers for Disease Control and Prevention 2014; Health Canada 2013). This was achieved well ahead of regulation.

The global elimination of long-chain PFASs should be a common goal shared by the FluoroCouncil members, governments, and a wide range of other stakeholders. The FluoroCouncil has strongly advocated for science-based regulation of long-chain PFASs. To truly address these priority chemicals, it is critical that regulatory authorities and other stakeholders focus on eliminating the production and use of products and articles made from or containing long-chain PFASs. Completing that transition should be the centerpiece of policy on PFASs.

The members of the FluoroCouncil have engaged in stewardship activities for several years and recognize the value of continually enhancing their chemistries and products while being mindful of the environment, health, and safety. We remain ready to engage with governments and other stakeholders in refining our approach. We believe there may be opportunities for constructive dialogue in the following areas:

1. Strategies to complete the transition away from long-chain PFASs, a clear area of common ground.
2. Identification of areas that warrant further information development and risk assessment.
3. Actions that can foster additional stewardship activities within the supply chain, such as the guidance document on best environmental practices in textile manufacturing recently issued by the FluoroCouncil (FluoroCouncil 2014).
4. Best methods for sharing with all stakeholders, including the scientific community, information on PFASs that is relevant to the health and environmental impact of fluorotechnology.

In pursuing these or any other topics of mutual interest, it will be important that all stakeholders recognize that policy on PFASs must necessarily consider the importance of fluorotechnology in many areas of society. Any policy discussion should be based on well-established risk assessment principles that weigh the hazard and exposure potential of specific substances and should include the implementation of best practices to reduce the potential for exposure while preserving the essential societal benefits of fluorotechnology.

The author is employed by the American Chemistry Council and manages the FluoroCouncil, a global organization representing the world's leading fluorotechnology companies, with a primary focus on fluoropolymers and fluorotelomer-based performance products. The members of the FluoroCouncil are Archroma Management LLC, Arkema France, Asahi Glass Co., Ltd., Daikin Industries, Ltd., DuPont Company, and Solvay Specialty Polymers.

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