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U.S. Consumer Product Safety Commission

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To Whom It May Concern:

I, Roland Weber, am writing this statement in support of the Petition to the CPSC to regulate four categories of household products containing non-polymeric additive organohalogen flame retardants.

1. I am an independent consultant working mainly for UN Organizations for the implementation of the Stockholm Convention on global elimination of persistent organic pollutants (POPs). I am also a visiting Professor at Tsinghua University, China. I received my Masters in Chemistry (1993) and my Ph.D. (1996) from the University of Tuebingen, Germany. My Ph.D. thesis was entitled "Synthesis, Analysis, Toxicology and Occurrence of fluorinated and chlorinated-fluorinated Dioxins, Dibenzofurans and Biphenyls". Since then I have carried out research, and since 2003 also consulting, in the field of dioxins/furans and other unintentionally and intentionally produced POPs. I have attached a copy of my curriculum vitae and a list of my scientific publications on halogenated dioxins, furans and other unintentionally formed POPs.

2. Polyhalogenated dibenzo-p-dioxins und dibenzofurans (dioxins and furans) are structurally-similar groups of chemicals containing benzene rings and halogens (chlorine or bromine). They have no industrial use, but are unintentional by-products of incomplete combustion and of various industrial processes, including the manufacture of some chemicals.

3. Dioxins and furans are likely human carcinogens and have been linked – at very low doses – to a wide range of other adverse health effects, including immune suppression, enzyme induction, thyroid hormone and vitamin A perturbations, antiestrogenicity, teratogenicity, and neurobehavioral deficits (US EPA, Van den Berg et al. 2013, WHO 1998). Additionally, they are highly persistent and bioaccumulative. They all have similar structures and a common mechanism of action, which accounts for their similar biological effects. The harmful effects of chlorinated dioxins and furans have been recognized by the Stockholm Convention, which recommends reducing and/or eliminating the unintentional releases of these chemicals. Brominated dioxins and furans are not currently regulated by any international authority, but have similar toxicities to their chlorinated counterparts (Van den Berg et al. 2013).

4. Dioxins and furans are unintentional byproducts of the production of halogenated aromatic compounds (i.e. compounds containing halogens and benzene rings), a group that includes many of the commonly used organohalogen flame retardants. As a result, they occur as impurities in commercial organohalogen flame retardants. For instance, brominated dioxins and furans have been found as contaminants in commercial brominated flame retardants, such as polybrominated diphenyl ethers (PBDEs),

decabromobiphenyl, 1,2-bis(tribromophenoxy)ethane, tetrabromobisphenol A (TBBPA), and bromophenols (WHO 1998, Ren et al. 2011).

5. Levels of dioxin and furan contamination in some organohalogen flame retardants increase during a product's life span, suggesting that dioxins and furans can form during the normal use of products containing these organohalogen flame retardants. For instance, additive organohalogenated flame retardant decaBDE in plastics such as those used in TV casings have been shown to form brominated furans when exposed to sunlight during normal use (Kajiwara et al. 2008). Similarly, polybrominated dibenzofurans (PBDFs) can be formed in treated textiles (Kajiwara et al. 2013). Thus, normal usage of household products containing organohalogen flame retardants that are dioxin precursors is potentially a major source of dioxins and furans found in indoor air and dust (Suzuki et al. 2010; Tue et al. 2013).

6. House and office dust originating from normal wear and tear of common household products such as polyurethane foam, TV sets, computers and other electronic and electrical equipment or textiles containing organohalogen flame retardants that are dioxin precursors is a source of direct human exposure to polybrominated dibenzodioxins (PBDDs) and PBDFs (Brorstrom-Lunden et al. 2010; Suzuki et al. 2010; Tue et al. 2013). Levels measured in Japanese house dust were sufficient to contribute to a major share of daily dioxin toxic equivalencies (TEQ)-exposure for toddlers (Suzuki et al. 2007).

7. All chlorinated and brominated aromatic compounds (i.e. compounds containing benzene rings) are dioxin/furan precursors

under thermal treatments below 850°C, which includes accidental household fires (Weber & Kuch 2003, Weber 2007). Furthermore, any chlorine/bromine present in consumer products during their low temperature combustion can lead to the formation of dioxin and furans (McKay 2002, Ikeguchi & Tanaka 2001; Weber et al. 2002, Weber & Kuch 2003). Thus, the presence of any organohalogen flame retardants in consumer products during accidental household fires can lead to the formation of dioxins and furans (Weber & Kuch 2003). This increases the risk of harm to humans, particularly to firefighters who are exposed to these chemicals on the job.

8. In summary, dioxins and furans (i) have been found as impurities in organohalogen flame retardants in consumer products, (ii) can form from certain aromatic organohalogen flame retardants during the normal use of household products containing them, and (iii) can form from all organhalogen flame retardants when products containing them burn during household fires. The EPA, the WHO and Stockholm Convention have determined that some of these dioxins and furans present serious health risks.

9. Therefore, my professional opinion is that the use of organohalogen flame retardant chemicals in the four categories of household products covered by this petition should be stopped, as the human health risks associated with dioxin and furan impurities or their unintentional formation due to organohalogen flame retardants are severe. I am happy to answer any questions, and provide further documentation as needed.

Yours sincerely,

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