Breast Cancer Fund * California Professional Firefighters * Center for Environmental Health * Commonweal Biomonitoring Resource Center * Consumer Federation of California * Earthjustice * Environmental Working Group * Green Science Policy Institute * Natural Resources Defense Council * Trauma Foundation

October 21, 2014

Submitted online via CalSAFER

Re: Safer Consumer Products Draft Priority Product Work Plan

On behalf of the undersigned organizations, thank you for the opportunity to comment on the Department of Toxic Substance Control's Draft Priority Product Work Plan for the Safer Consumer Products Program. We have no financial interest in any of the products or chemicals which may be the subject of these comments.

Californians for Toxic-Free Fire Safety is a diverse coalition of groups dedicated to improving public health and safety by advocating for non-toxic alternatives to hazardous and untested chemicals. Our coalition participated in the recent process to update California's furniture flammability standard.

We commend the Department on the work plan and are supportive of the broad product categories and potential chemicals of interest named. Through a transparent process, the Department utilized multiple scientifically sound approaches to evaluate and name product categories and candidate chemicals for the work plan. We believe that a strategy of focusing on certain classes of chemicals across multiple products might make best use of the Department's resources and have the most significant impacts for protecting Californians' health and environment. Flame retardant exposure creates significant health risks -- therefore, we request that the Department select flame retardant treated furniture and building materials as Priority Products. Our comments are summarized here and more details are provided below.

1. **The Department should include Household Beds/ Mattresses as an explicitly listed subcategory of the Household / Office Furniture/ Furnishings category.**
2. **Furniture: The Department should name household and office furniture containing flame retardant chemicals as a Priority Product.** Flame retardant use in furniture contributes to widespread exposures, sensitive sub-populations including young children are especially vulnerable, and there is a need for alternatives analysis to evaluate replacement flame retardants when these chemicals are needed
3. **Building materials, flooring: The Department should investigate carpet padding containing flame retardant chemicals as a potential priority product.** Carpet padding is used over large areas in the indoor environment and workers are exposed to high levels of flame retardants from this product.

DETAILED COMMENTS

The US Environmental Protection Agency estimates that Americans spend 90% of their time indoors and that indoor air can have higher levels of pollutants compared to outdoor air[1]. Given this data, the indoor products below could have significant and widespread contributions to Americans' chemical exposures.

1. **The Department should include Household Beds/ Mattresses as an explicitly listed subcategory of the Household / Office Furniture/ Furnishings category.**

The draft Work Plan category Household /Office Furniture/Furnishings (GPC Segment 75000000) currently lists Bedding (GPC Class 75020200),Fabric/Textile Furnishings (GPC Family 75020000) and Household/ Office Seating (GPC Class 75010200) as included subcategories. Household Beds/Mattresses (GPC Class 75010400) should also be included as an explicitly listed subcategory. Mattresses, including children's mattresses[2], have been found to be treated with flame retardants and/ or with perfluorinated chemicals.

2. Furniture: The Department should name household and office furniture containing flame retardant chemicals as a Priority Product.

Recent updates to California's residential furniture flammability standard, Technical Bulletin 117-2013, are expected to improve fire safety while also offering manufacturers compliance options that do not rely on the use of flame retardant chemicals[3]. However, flame retardant chemicals are not prohibited as a compliance option. Surveys reveal that some companies are moving away from the use of flame retardant chemicals while others are not, indicating that use of flame retardants in furniture is ongoing[4,5].

Human Health

Historically, as human health impacts of specific flame retardants have been documented, these harmful flame retardants are phased out. Use then shifts to other chemically similar flame retardants, many of which present toxicity concerns and/ or have inadequate testing to demonstrate they are safe[6].

PBDEs (polybrominated diphenyl ethers) are linked to decreased fertility[7], hormone disruption[8,9], lowered IQ[10–12] and hyperactivity[12,13] in humans. In animal studies, these chemicals causes reproductive, thyroid, hormonal, developmental and neurological disorders[14]. They were phased out of use starting in 2005.

Chlorinated Tris or TDCPP was a major replacement for pentaBDE. This chemical was removed from children's sleepwear in the 1970s because it changes DNA[15]. It was listed as a carcinogen under California's Proposition 65 in 2011[16], and flame retardant manufacturers announced they would phase out uses of chlorinated Tris in home furniture and baby products in 2013[17].

Firemaster 550 is a major replacement for pentaBDE and chlorinated Tris. It is a mixture of four other flame retardants which are known to be toxic or lack adequate toxicity information[18–20]. Pilot studies link low level exposures to heart defects, endocrine disruption, obesity and anxiety in animals[21,22].

Halogen-free replacements for phased-out flame retardants are also not proven safe. Some halogen-free alternatives show neurotoxicity and ecotoxicity while others have little information available[23,24].

A number of flame retardants impact similar pathways and health outcomes (thyroid hormone signaling; neurodevelopment) and raise concerns for cumulative effects. In animal studies, prenatal exposure to flame retardant mixtures at levels found in indoor dust causes developmental abnormalities[25].

Flame retardants migrate out of products, collect in dust and end up in people[26–28]. Contact with the contaminated dust is a major way the chemicals enter people's bodies. Young children have three to five times higher levels of flame retardants in their bodies compared to their mothers because they crawl,

play on the floor, and put their hands in their mouths [29,30]. Children are also more vulnerable to the toxic effects of flame retardants because their brains and bodies are still developing.

Low-income households and children of color are disproportionately impacted by flame retardants and have higher levels of flame retardants compared to the general population[27,31–35].

First Responders
When there is a fire, the presence of flame retardant chemicals can result in more toxic smoke containing cancer-causing chemicals like dioxins and furans,[36,37] putting firefighters in particular at increased risk. In the course of performing their work-related duties, firefighters are exposed to flame retardants and their carcinogenic by-products, which can penetrate protective gear. Firefighters suffer from elevated rates of cancer and flame retardant-related exposures may pose significant health risks[38].

Environment and Disposal
Flame retardants are found ubiquitously in air and water; many are global contaminants and bioaccumulate in wildlife. Replacement flame retardants are predicted to have similar persistence and bioaccumulation profiles[23,39]. Wastewater discharges of organophosphorous flame retardants are connected to indoor flame retardant uses, making these emerging chemicals of concern in water resources [40,41]. Disposal of furniture also contributes to environmental contamination[42].

Alternatives
The classes of brominated, chlorinated and non-halogenated aromatic phosphate flame retardant chemicals are all Safer Consumer Products Candidate Chemicals. The documented substitution problem described above where one toxic flame retardant is replaced with another toxic flame retardant indicates a need for alternatives analysis. Safer alternatives exist and companies are already using them—namely, the use of smolder resistant cover fabrics and barrier materials that are free of flame retardant chemicals.

3. Building materials, flooring: The Department should investigate carpet padding containing flame retardant chemicals as a potential priority product.

Carpet padding containing flame retardants should be researched as a potential priority product. Carpet padding made of recycled polyurethane foam often contains flame retardants due to the flame retardant content of the input material[43]. We are not aware of any standards or regulations that would require the use of flame retardants in carpet padding materials.

Due to the large indoor area of homes, offices, schools and other buildings covered in carpeting, this could be a significant source of flame retardant chemical emissions to indoor air[44]. Workers that recycle polyurethane foam and workers who install carpet padding have high, potentially unsafe levels of exposure to flame retardants[45].

Thank you for your consideration of these comments. We look forward to the finalization of the work plan, and working with the Department in the Priority Product selection process.

Sincerely,

Janet Nudelman
Breast Cancer Fund

Lou Paulson, President
California Professional Firefighters

Judy Levin, MSW
Center for Environmental Health

Richard Holober
Consumer Federation of California

Sharyle Patton
Commonweal Biomonitoring Resource Center

Irene Gutierrez
Earthjustice

Renee Sharp, MS
Environmental Working Group

Arlene Blum, PhD
Green Science Policy Institute

Veena Singla, PhD
Natural Resources Defense Council

Andrew McGuire
Trauma Foundation at San Francisco General Hospital

REFERENCES

1. US EPA. Buildings and Their Impact on the Environment: A Statistical Summary [Internet]. US Environmental Protection Agency; 2009. Available from: http://www.epa.gov/greenbuilding/pubs/gbstats.pdf
2. Stapleton HM, Klosterhaus S, Keller A, Ferguson PL, van Bergen S, Cooper E, et al. Identification of flame retardants in polyurethane foam collected from baby products. Environmental science & technology. 2011 Jun;45(12):5323–31.
3. BEARHFTI. New Flammability Standards for Upholstered Furniture and Articles Exempt from Flammability Standards: Initial Statement of Reasons. Sacramento, CA: California Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; 2013.
4. Safer Sofas: How do Major Furniture Stores Compare? [Internet]. Natural Resources Defense Council; 2014 Sep. Report No.: FS:14-08-C. Available from: http://www.nrdc.org/health/flame-retardants/files/safer-sofas-FS.pdf
5. Flame Retardant-Free Office Furniture [Internet]. Center for Environmental Health; 2014. Available from: http://www.ceh.org/wp-content/uploads/survey-results.pdf
6. Stapleton HM, Sharma S, Getzinger G, Ferguson PL, Gabriel M, Webster TF, et al. Novel and High Volume Use Flame Retardants in US Couches Reflective of the 2005 PentaBDE Phase Out. Environmental Science & Technology [Internet]. 2012 Nov; Available from: http://dx.doi.org/10.1021/es303471d

7. Harley KG, Marks AR, Chevrier J, Bradman A, Sjödin A, Eskenazi B. PBDE concentrations in women's serum and fecundability. Environmental health perspectives. 2010 May;118(5):699–704.
8. Chevrier J, Harley KG, Bradman A, Gharbi M, Sjödin A, Eskenazi B. Polybrominated diphenyl ether (PBDE) flame retardants and thyroid hormone during pregnancy. Environmental health perspectives. 2010 Oct;118(10):1444–9.
9. Meeker JD, Johnson PI, Camann D, Hauser R. Polybrominated diphenyl ether (PBDE) concentrations in house dust are related to hormone levels in men. The Science of the total environment. 2009 May;407(10):3425–9.
10. Herbstman JB, Sjödin A, Kurzon M, Lederman SA, Jones RS, Rauh V, et al. Prenatal exposure to PBDEs and neurodevelopment. Environmental health perspectives. 2010 May;118(5):712–9.
11. Eskenazi B, Chevrier J, Rauch SA, Kogut K, Harley KG, Johnson C, et al. In Utero and Childhood Polybrominated Diphenyl Ether (PBDE) Exposures and Neurodevelopment in the CHAMACOS Study. Environmental health perspectives. 2012;(November).
12. Chen A, Yolton K, Rauch SA, Webster GM, Hornung R, Sjödin A, et al. Prenatal Polybrominated Diphenyl Ether Exposures and Neurodevelopment in U.S. Children through 5 Years of Age: The HOME Study. Environmental Health Perspectives [Internet]. 2014 May 28 [cited 2014 Jul 17]; Available from: http://ehp.niehs.nih.gov/1307562
13. Roze E, Meijer L, Bakker A, Van Braeckel KNJA, Sauer PJJ, Bos AF. Prenatal exposure to organohalogens, including brominated flame retardants, influences motor, cognitive, and behavioral performance at school age. Environmental health perspectives. 2009 Dec;117(12):1953–8.
14. Shaw SD, Blum A, Weber R, Kannan K, Rich D, Lucas D, et al. Halogenated flame retardants: do the fire safety benefits justify the risks? Reviews on environmental health. 2010;25(4):261–305.
15. Gold MD, Blum A, Ames BN. Another flame retardant, tris-(1,3-dichloro-2-propyl)-phosphate, and its expected metabolites are mutagens. Science (New York, NY). 1978 May 19;200(4343):785–7.
16. OEHHA. OEHHA Proposition 65 tris(1,3-dichloro-2-propyl) phosphate (TDCPP) [Internet]. Office of Environmental Health Hazard Assessment. 2011 [cited 2012 Jul 20]. Available from: http://oehha.ca.gov/prop65/prop65_list/102811list.html
17. ICL Industrial Products. ICL to Increase Production of Polymeric Flame Retardant at West Virginia Facility [Internet]. PR Newswire; 2012 [cited 2014 Jul 17]. Available from: http://www.prnewswire.com/news-releases/icl-to-increase-production-of-polymeric-flame-retardant-at-west-virginia-facility-179095971.html
18. Bearr JS, Stapleton HM, Mitchelmore CL. Accumulation and DNA damage in fathead minnows (Pimephales promelas) exposed to 2 brominated flame-retardant mixtures, Firemaster 550 and Firemaster BZ-54. Environmental toxicology and chemistry / SETAC. 2010 Mar;29(3):722–9.
19. Chemtura. Material Safety Data Sheet #694. 2006. p. Product: Durad 150.
20. US EPA. Furniture flame retardancy partnership: environmental profiles of chemical flame-retardant alternatives for low-density polyurethane foam. U.S. Environmental Protection Agency; 2005. p. 4.2–4.5.
21. Patisaul HB, Roberts SC, Mabrey N, McCaffrey KA, Gear RB, Braun J, et al. Accumulation and Endocrine Disrupting Effects of the Flame Retardant Mixture Firemaster(®) 550 in Rats: An Exploratory Assessment. Journal of biochemical and molecular toxicology. 2012 Nov 8;
22. McGee SP, Konstantinov A, Stapleton HM, Volz DC. Aryl phosphate esters within a major PentaBDE replacement product induce cardiotoxicity in developing zebrafish embryos: potential role of the aryl hydrocarbon receptor. Toxicological sciences : an official journal of the Society of Toxicology. 2013 May;133(1):144–56.

23. Waaijers SL, Kong D, Hendriks HS, de Wit CA, Cousins IT, Westerink RHS, et al. Persistence, Bioaccumulation, and Toxicity of Halogen-Free Flame Retardants. Whitacre DM, editor. Reviews of Environmental Contamination and Toxicology. New York, NY: Springer New York; 2013;222:1–71.
24. US EPA. Flame retardants used in flexible polyurethane foam: an alternatives assessment update. Design for the Environment; 2014 Jun. Report No.: EPA 744-D-14-001.
25. Berger RG, Lefèvre PLC, Ernest SR, Wade MG, Ma Y-Q, Rawn DFK, et al. Exposure to an environmentally relevant mixture of brominated flame retardants affects fetal development in Sprague-Dawley rats. Toxicology. 2014 Jun;320:56–66.
26. Zota AR, Rudel RA, Morello-Frosch RA, Brody JG. Elevated house dust and serum concentrations of PBDEs in California: unintended consequences of furniture flammability standards? Environmental science & technology. 2008 Nov;42(21):8158–64.
27. Stapleton HM, Eagle S, Sjödin A, Webster TF. Serum PBDEs in a North Carolina Toddler Cohort: Associations with Handwipes, House Dust, and Socioeconomic Variables. Environmental Health Perspectives [Internet]. 2012 May;120(7). Available from: http://ehp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info:doi/10.1289/ehp.1104802
28. Bradman A, Castorina R, Gaspar F, Nishioka M, Colón M, Weathers W, et al. Flame retardant exposures in California early childhood education environments. Chemosphere. 2014 May 12;
29. Lunder S, Hovander L, Athanassiadis I, Bergman A. Significantly higher polybrominated diphenyl ether levels in young U.S. children than in their mothers. Environmental Science & Technology. 2010 Jul;44(13):5256–62.
30. Butt C, Congleton J, Hoffman K, Fang M, Stapleton HM. Metabolites of Organophosphate Flame Retardants and 2-Ethylhexyl Tetrabromobenzoate (EH-TBB) in Urine from Paired Mothers and Toddlers. Environ Sci Technol [Internet]. 2014 Aug 4 [cited 2014 Aug 4]; Available from: http://dx.doi.org/10.1021/es5025299
31. Adamkiewicz G, Zota AR, Fabian MP, Chahine T, Julien R, Spengler JD, et al. Moving environmental justice indoors: understanding structural influences on residential exposure patterns in low-income communities. American journal of public health. 2011 Dec;101 Suppl:S238–45.
32. Zota AR, Adamkiewicz G, Morello-Frosch RA. Are PBDEs an environmental equity concern? Exposure disparities by socioeconomic status. Environmental science & technology. 2010 Aug;44(15):5691–2.
33. Quirós-Alcalá L, Bradman A, Nishioka M, Harnly ME, Hubbard A, McKone TE, et al. Concentrations and loadings of polybrominated diphenyl ethers in dust from low-income households in California. Environment international. 2011 Apr;37(3):592–6.
34. Bradman A, Castorina R, Sjödin A, Fenster L, Jones RS, Harley KG, et al. Factors Associated with Serum Polybrominated Diphenyl Ether (PBDE) Levels Among School-Age Children in the CHAMACOS Cohort. Environmental science & technology. 2012 Jul;46(13):7373–81.
35. Windham GC, Pinney SM, Sjodin A, Lum R, Jones RS, Needham LL, et al. Body burdens of brominated flame retardants and other persistent organo-halogenated compounds and their descriptors in US girls. Environmental research. 2010 Apr;110(3):251–7.
36. Ebert J, Bahadir M. Formation of PBDD/F from flame-retarded plastic materials under thermal stress. Environment international. 2003 Sep;29(6):711–6.
37. Weber R, Kuch B. Relevance of BFRs and thermal conditions on the formation pathways of brominated and brominated-chlorinated dibenzodioxins and dibenzofurans. Environment international. 2003 Sep;29(6):699–710.
38. Shaw SD, Berger ML, Harris JH, Yun SH, Wu Q, Liao C, et al. Persistent organic pollutants including polychlorinated and polybrominated dibenzo-p-dioxins and dibenzofurans in firefighters from Northern California. Chemosphere. 2013 Jun;91(10):1386–94.

39. Ezechiáš M, Covino S, Cajthaml T. Ecotoxicity and biodegradability of new brominated flame retardants: A review. Ecotoxicol Environ Saf. 2014 Sep 17;110C:153–67.
40. Schreder ED, La Guardia MJ. Flame Retardant Transfers from US Households (Dust and Laundry Wastewater) to the Aquatic Environment. Environmental Science & Technology [Internet]. 2014 [cited 2014 Sep 22]; Available from: http://pubs.acs.org/doi/abs/10.1021/es502227h
41. Wei G-L, Li D-Q, Zhuo M-N, Liao Y-S, Xie Z-Y, Guo T-L, et al. Organophosphorus flame retardants and plasticizers: Sources, occurrence, toxicity and human exposure. Environ Pollut. 2014 Oct 4;196C:29–46.
42. Stubbings WA, Harrad S. Extent and mechanisms of brominated flame retardant emissions from waste soft furnishings and fabrics: A critical review. Environ Int. 2014 Oct;71:164–75.
43. DiGangi J, Strakova J. A survey of PBDEs in recycled carpet padding. IPEN (International POPs Elimination Network [Internet]. 2011 [cited 2014 Oct 14]; Available from: https://cela.ca/sites/cela.ca/files/POPs-in-recyled-carpet-padding-23-April-2011.pdf
44. Zhang X, Diamond ML, Ibarra C, Harrad S. Multimedia modeling of polybrominated diphenyl ether emissions and fate indoors. Environmental science & technology. 2009 Apr;43(8):2845–50.
45. Stapleton HM, Sjödin A, Jones RS, Niehüser S, Zhang Y, Patterson DG. Serum levels of polybrominated diphenyl ethers (PBDEs) in foam recyclers and carpet installers working in the United States. Environmental science & technology. 2008 May;42(9):3453–8.