Presentations of Panelists and Written Comments

Public Meeting on Petition Regarding Additive Organohalogen Flame Retardants

Wednesday, December 9, 2015

Public Meeting on the Petition Regarding Additive Organohalogen Flame Retardants
U.S. Consumer Product Safety Commission
Bethesda, MD
December 9, 2015

EST	Panel		Presenter	Affiliation	Status
9:00 AM	Opening Remarks		Chairman Elliot F. Kaye		
9:05 AM	Panel 1	1	Linda Birnbaum, Ph.D.	NIEHS/National Toxicology Program	in person
9:15 AM	Panel 1 Questions		Commission		
9:45 AM	Panel 2	2	William Wallace	Consumers Union	in person
		3	Eve Gartner	Earthjustice Northeast Office	in person
		4	Simona Balan, Ph.D.	Green Science Policy Institute	in person
		5	Arlene Blum, Ph.D.	Green Science Policy Institute	phone
		6	Miriam Diamond, Ph.D.	University of Toronto	phone
10:10 AM	Panel 2 Questions		Commission		
10:35 AM	----- B r e a k -----				
10:45 AM	Panel 3	7	Jennifer Lowery, MD, FAAP	American Academy of Pediatrics	in person
		8	Patrick Morrison	International Association of Fire Fighters	in person
		9	Luis Torres	League of United Latin American Citizens	in person
		10	Maureen Swanson, MPA	Learning Disabilities Association of America	in person
		11	Daniel Penchina	The Raben Group/Breast Cancer Fund	in person
11:10 AM	Panel 3 Questions		Commission		
11:40 AM	Panel 4	12	Robert Simon	American Chemistry Council/North American Flame Retardant Alliance	in person
		13	Michael Walls	American Chemistry Council	in person
		14	Matthew S. Blais, Ph.D.	Southwest Research Institute	in person
		15	Thomas Osimitz, Ph.D.	Science Strategies	in person
		16	Chris Cleet, QEP	Information Technology Industry Council and the Consumer Technology Association	in person
		17	Timothy Reilly	Clariant Corporation	in person
12:10 PM	Panel 4 Questions		Commission		
12:35 PM	----- L u n c h B r e a k -----				
1:20 PM	Panel 5	18	Rachel Weintraub	Consumer Federation of America	in person
		19	Katie Huffling, RN, MS, CNM	Alliance of Nurses for Family Environments	in person
		20	Kathleen A. Curtis, LPN	Clean and Healthy New York	in person
		21	Jeff Gearhart	Ecology Center/American Sustainable Business Council	in person
		22	Bryan McGannon	American Sustainable Business Council	in person
1:45 PM	Panel 5 Questions		Commission		
2:10 PM	----- B r e a k -----				
2:20 PM	Panel 6	23	Vytenis Babrauskas, Ph.D.	Fire Science and Technology, Inc.	in person
		24	Donald Lucas, Ph.D.	Lawrence Berkeley National Laboratory	in person
		25	Jennifer Sass, Ph.D.	Natural Resources Defense Council	in person
		26	Daniel Rosenberg	Natural Resources Defense Council	in person
		27	Veena Singla, Ph.D.	Natural Resources Defense Council	phone
		28	Holly Davies, Ph.D.	Washington State Department of Ecology	phone
2:50 PM	Panel 6 Questions		Commission		
3:15 PM	Closing Remarks		Commission		
3:30 PM	Adjourn				

Panel 1

Linda S. Birnbaum, Ph.D.
Director, National Institute of Environmental Health Sciences
and the National Toxicology Program

Statement for the Consumer Product Safety Commission
December 9, 2015
Public Hearing on Organohalogen Flame Retardants

Statement of
Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S.
Director
National Institute of Environmental Health Sciences
National Institutes of Health
and
Director
National Toxicology Program
U.S. Department of Health and Human Services

Good Morning, Commissioners. I am Linda Birnbaum, the Director of the National Institute of Environmental Health Sciences and Director of the National Toxicology Program. I am also a Principal Investigator in the National Institutes of Health intramural research program. For the last 14 years, my research has focused on understanding the environmental health effects of flame retardants, and I am considered a subject matter expert in this area. I am honored to be invited to testify at today's hearing by the Consumer Product Safety Commission Chairman, Elliot Kaye.

Synthetic polymers (e.g., plastics, foams) are generally considered to be more flammable than natural substances (e.g., cellulose); consequently, flame retardants have been added to many modern consumer products and building materials for the purpose of reducing the risk and hazard of fire. Flame retardants containing bromine and/or chlorine have often been preferred for specific applications due to their efficiency and thermal stability. Halogens, particularly bromine, interfere with fire chemistry by forming radical species that compete with propagation of the combustion cycle.

As a consequence of use, many halogenated flame retardants are now found in the environment, and they have been detected in wildlife and humans. They have the ability to accumulate in biological fluids and tissues, and toxicological and epidemiological evaluations indicate that they are potential human toxicants. Included among the flame retardants that may be human toxicants are the polybrominated diphenyl ethers (PBDEs). As a flame retardant, PBDEs are mixed into products without being chemically bonded (reacted) to the matrix of the products. Such additive flame retardants have much greater potential to leach into the environment than reactive flame retardants. Once in the environment, they are more likely to present exposure concerns for humans and wildlife. PBDEs are present in household and office dust, are absorbed following exposure, and accumulate in human fluids and tissues. Toxicity in rodent models includes effects on endocrine disruption such as thyroid hormone homeostasis, modulation of estrogen and androgen signaling, effects on obesity and diabetes, altered fertility, and neurotoxicity. Epidemiology studies have documented many of these same effects in humans.

Fetuses, nursing infants, and young children may be at highest risk due to critical developmental windows of susceptibility and/or potential for exposure.

There are 209 possible congeners of PBDEs, and three different molecular weight formulations have been used as commercial flame retardants. Two of the commercial mixtures have been shown to be carcinogens in both rats and mice. The extent of absorption, internal dose, and toxicity are largely determined by congener differences in bromine number and substitution patterns. Congeners of the lowest molecular weight mixture, used largely in polyurethane foam, are readily absorbed and are prevalent in human tissues and fluids. The major congener of the highest molecular weight mixture, used primarily in heavy textiles and heavy plastic casings for electronic equipment, is poorly absorbed, but persists in the environment. Concern over persistence and toxicity has led to removal of all PBDE commercial formulations from production in the United States and bans in Canada, Europe, and Japan.

The lower molecular weight PBDEs have been listed for elimination under the Stockholm Convention of Persistent Organic Pollutants and Deca BDE is currently proposed for listing as well. Another high volume brominated flame retardant also listed for elimination under this international treaty is hexabromocyclododecane (HBCD). HBCD is also a persistent and additive flame retardant and is found in the environment, wildlife, and people. Mechanistic and animal studies have indicated it is an endocrine disruptor, is toxic to the liver, and causes adverse neurodevelopmental effects.

Tetrabromobisphenol A (TBBPA) is an example of a halogenated flame retardant with a biological fate that is different from that of HBCD and PBDEs. TBBPA is a reactive, high production volume chemical bonded to resins of circuit boards. An advantage of this application is the low potential for TBBPA to leach into the environment. Although readily absorbed following exposure, TBBPA is rapidly conjugated and excreted, resulting in low bioavailability and little potential to accumulate in tissues. Recently however, the use of TBBPA in an additive mode has increased. Current research is assessing whether there may be adverse effects due to greater levels of exposure for both humans and wildlife, continuous exposures, and epidemiological studies detecting TBBPA in human serum and the milk of lactating women in the United States, Europe, and Asia. Thus far, animal studies have shown it to be a carcinogen in rats and mice and to cause endocrine disruption. Studies are underway to assess the potential for TBBPA to cause developmental effects in rats at low doses. This work will lead to a better understanding of the health risks of TBBPA to humans.

Some brominated and chlorinated organophosphate flame retardants have been known for over 30 years to be animal carcinogens. Recent studies have shown that some of these are also developmental neurotoxicants.

Alternate halogenated flame retardants include a TBBPA derivative (TBBPA-DBPE), a tetrabromobenzoate (TBB), a tetrabromophthalate (TBPH), and decabromodiphenyl ethane (DBDPE). TBB and TBPH are often used in a commercial mixture, Firemaster 550 (FM550), which is used as an additive flame retardant. A small study in animals has

demonstrated endocrine disruption and neurobehavioral impacts of developmental exposure to FM550. Both TBB and TBPH have been found in house dust, and a metabolite of TBB has been found in human urine. TBBPA-DBPE, TBPH, and DBDPE, which are environmentally persistent and found in wildlife, are poorly absorbed, whereas TBB is well-absorbed, rapidly metabolized, and eliminated. Toxicological studies are underway to characterize the risk of exposure for these and other novel halogenated flame retardants.

In conclusion, the halogenated flame retardants for which there is data have been shown to be environmentally and/or biologically persistent and toxic in animals. Many have also been shown to have impacts in human populations. When used in an additive mode, over time they leach into the environment, and they have been detected in humans. Use in a reactive mode or in polymers reduces the opportunity for exposure, and hence, reduces risk.

Thank you for the opportunity to comment. I am happy to answer questions.

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Panel 2