

I, Kim Harley, 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, Kim Harley PhD, am Associate Adjunct Professor in Maternal and Child Health and Associate Director for Health Effects, Center for Environmental Research and Children's Health at UC Berkeley. I am an environmental epidemiologist by training, and my research interests include the reproductive effects of PBDEs, prenatal exposure to environmental contaminants and the effects of endocrine disrupting compounds on birth outcome, fertility and the onset of puberty. I have been working in this field for 14 years and have attached my CV and list of publications.

2. I am one of the researchers running the CHAMACOS Study, a longitudinal birth cohort study investigating the role of chemicals and other environmental factors in the health of low-income, Mexican-American children living in the Salinas Valley of California. In 1999-2000, we enrolled 601 pregnant women living in Salinas and monitored the women and their children's health for the past 14 years. We carried out detailed physical exams and neurodevelopmental tests on the children every 1 to 2 years. At the time the mothers were pregnant, the organohalogen Penta PBDE mixture was the predominant flame retardant used in furniture. We found a strong positive correlation between the levels of flame retardants in pregnant mothers' bodies and the length of time they had lived in California¹. We also found a significant increase of over 26% in total PBDE levels among women who had three or more pieces of upholstered furniture in their homes, suggesting that indoor contamination was contributing to this exposure.² The levels of flame retardants in the blood of these Latino children, who were all born in California, were among the highest levels ever published³, three times higher than their mothers during pregnancy, and seven times higher than children living in Mexico⁴. The PBDE levels in children were positively correlated with the total PBDE levels in maternal serum during pregnancy, duration of exclusive breastfeeding, and absence of a safe place to play in their neighborhood.⁵ In terms of health effects, we found that the women with higher levels of flame retardants in their blood: (i) took significantly longer to get pregnant, i.e. had reduced fecundability⁶; (2) had babies with lower birth weight (over 100 g decrease in birth weight for every 10 fold increase in PBDE levels)⁷; and (iii) had lower thyroid hormone levels during pregnancy⁸, which may have implications for both maternal health and development of the fetus. We also assessed the development of over 300 children and found that, by the time they were 5 to 7 years old, their mother's flame retardant exposure during pregnancy was associated with lower IQ (a decrease by 6 points on average), attention problems, and impaired

fine motor coordination, particularly in the non-dominant hand⁹. Thus, pregnant women's exposure to PBDEs is of concern because it may have long-term adverse effects on the children.

3. Other scientific studies of completely different populations found similar adverse health effects, including alterations in thyroid hormone during pregnancy^{10,11}, decreased birth weight¹², and impaired neurodevelopment, cognitive and behavioral performance in children^{13,14,15,16,17,18,19}. Other studies also found associations between PBDEs and decreased semen quality²⁰, hormonal changes in men^{21,22,23}, cryptorchidism (undescended testicles, which increases the risk of infertility and testicular cancer later in life)^{24,25}, and early puberty in girls²⁶. These human studies are corroborated by several studies on rats and mice showing adverse neurodevelopmental effects^{27,28,29,30,31,32,33,34,35,36,37,38,39,40,41} and adverse reproductive effects, including alterations in sex hormone levels, reduced sperm count and changes in the structure of the ovaries^{42,43,44,45,46,47}.

4. Our published studies on pregnant women and children relate to the Penta BDE mixture, which was the predominant chemical used to meet TB117 in 2000 when the study began. According to the Center for Disease Control biomonitoring studies, 97% of the US population has PBDEs in their blood. This is because additive organohalogen flame retardants such as PBDEs migrate out of consumer products into dust and get into people's bodies.

5. Now Penta BDE has been replaced in upholstered furniture by other organohalogen flame retardant chemicals such as chlorinated Tris and FireMaster 550, both found in 100% of California homes and childcare facilities tested⁴⁸. Chlorinated tris has been listed as a carcinogen by the state of California under Proposition 65⁴⁹ and recently banned in several states⁵⁰, which exemplifies the problem of regrettable substitution. Human studies are also starting to show effects of some of these other organohalogen flame retardants on thyroid hormone levels⁵¹, and animal studies have found adverse reproductive and developmental^{52,53,54,55,56}, neurobehavioral^{57,58,59} and endocrine^{60,61,62,63,64} effects.

6. Based on my research on the impacts of PBDE flame retardants on the health of pregnant women and their children and the increasing evidence of harm from the replacement flame retardants, it is my professional opinion that all organohalogen flame retardants may pose similar risks, especially to fetuses and young children. To protect the health of our population, including the most vulnerable pregnant women and children, I support this petition to ban certain household products containing additive organohalogen flame retardants. This ban is necessary to avoid exposure of pregnant women and children to this class that includes chemicals that I studied and found to be harmful to human health.

Yours sincerely,



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