Protect Children, Fire Fighters, and the Great Lakes

Limit Toxic Flame-Retardants

Michigan Network for CHILDREN'S Environmental HEALTH

Fighting fires does not have to have toxic consequences. PBDEs, flame-retardants that are rapidly accumulating in our bodies and the Great Lakes, have been found to be toxic to animals and may threaten our own health. Safe, affordable alternatives are available. Support HB 4699 to ban deca-BDE in all products sold in Michigan by 2014.

ARE TOXIC FLAME-RETARDANTS THE NEXT PCBs?

- PBDEs – polybrominated diphenyl ethers, commonly used as flame-retardants – are added to textiles, foam products, and plastics to make them difficult to burn.[1, 2] There are three commercial forms of PBDEs: penta-BDE, octa-BDE, and deca-BDE. Deca-BDE is often added to drapes, carpets, furniture upholstery, and the plastic casings of electronics.[3, 4]
- In 2004, the **Michigan Legislature banned** manufacturing, processing and distribution of materials containing more than 0.1% **penta-BDE or octa-BDE**.[5] However, under certain circumstances, **deca can break down into more toxic forms of PBDEs**, including the banned octa-BDE.[6, 7, 8, 9, 10]
- Deca continues to be used heavily in the United States. Over 40% of all deca produced worldwide is used in North America.[11]
- PBDEs are **structurally very similar to PCBs**, chemicals once favored by industry but ultimately banned in the 1970s because of their high toxicity. Like PCBs, PBDEs are **extremely persistent in the environment** and can accumulate in the fatty tissues of living organisms.[12]

TOXIC LEVELS ARE RISING

- PBDE levels "in human tissues in North America have **increased significantly over time**, and are much higher compared to levels in Europe or Japan."[13]
- Limited studies indicate that **children accumulate higher levels of PBDEs than adults**.[14]
- Lake Michigan salmon were found to contain PBDEs at levels above 100 parts per billion, **"one of the world's highest concentrations for salmon in open water."**[15] PBDE levels in Great Lakes walleye and lake trout **rose exponentially from 1980 to 2000, doubling every 3-4 years**.[16]
- Workers who recycle, repair, and maintain computers have comparatively high levels of PBDEs.[17]
- A 2002-2003 study of breast milk samples from 20 healthy, first-time mothers from across the country found PBDEs in every breast milk sample tested -- a total of 35 different PBDEs. The average level of the fire retardants in the milk was 75 times the average found in recent European studies. Two of the women were found to have the highest levels ever reported in human beings worldwide (>700 ppb milk fat). The woman with the third highest level of the 20 women studied was the Michigan participant; with 235 ppb total PBDEs in her breast milk.[18]
- In a 2009 biomonitoring study of health professionals across the country, all participants were found to have some PBDEs in their bodies. The two participating physicians from Michigan were found to have 18 and 24 different PBDEs in their blood. One had detectable levels of deca-BDE in his blood, and was the only participant in whom BDE-151 was found.[19]

HEALTH IMPACTS

- Learning and Memory: Children with higher concentrations of PBDEs in their umbilical cord blood at birth scored lower on tests of mental and physical development at 1-4 and 6 years. Prenatal exposure to ambient levels of flame

retardant compounds called polybrominated diphenlyl ethers (PBDEs) are associated with adverse neurodevelopment effects in young children.[20] Exposure to deca-BDE in mice and rats during brain development "can give rise to **irreversible changes in adult brain function**."[21]

- Reproductive: Rats exposed to PBDEs experienced a **delayed onset of puberty** and reproductive development.[22]
- Cancer: Rodents who ate deca-BDE developed **liver tumors**, causing the U.S. Environmental Protection Agency to classify deca as a "possible human carcinogen."[23]
- Thyroid: PBDEs can disrupt homeostatic thyroid levels in mice.[24] Decreased concentrations of the thyroid hormone can lead to **decreased IQ** in offspring.[25]

FIRE ORGANIZATIONS SUPPORT BANNING PBDEs

- **The Michigan Association of Fire Chiefs supports** phasing out PBDEs because they "have been identified as having adverse physiological and development impacts on humans," "there are readily available substitute products that do not exhibit these effects," and "when PBDE compounds are exposed to fire they burn and release dense fumes and a highly corrosive gas know as hydrogen bromide which expose firefighters to additional chemical hazards."[26]
- **The International Association of Fire Fighters (IAFF) supports banning brominated flame retardants** as "a step in the right direction for improving the health and safety of our fire fighters." IAFF states: "Many studies involving fire fighters exposed to these and other toxic gases during active fire fighting, overhaul, and long term exposure from these chemicals penetrating gear, have found that **fire fighters have a much greater risk of contracting cancer, heart and lung disease**, and other debilitating diseases. While we support the concept of flame retardant chemicals, **there are alternatives that do not contain bromine or chlorine and are much safer for fire fighters than PBDEs**."[27,28]

SAFER ALTERNATIVES ARE WIDELY USED

- Many **electronics companies already or will soon meet fire safety standards without using deca-BDE** including Dell, HP, Toshiba, Apple, Sony, Panasonic, Phillips, and Samsung.[29]
- Mattress companies Sealy, Simmons, and Serta do not use deca-BDE in their products. IKEA sells only PBDE-free office furniture.[30]
- **Michigan-based La-Z-Boy Incorporated[31] and Steelcase Furniture[32] do not use deca-BDE in their products**.
- **Michigan-based Herman Miller states that deca-BDE is an "unhealthy/dangerous fire retardant chemical and one that is definitely not used in our product offering**." Their reasoning includes that deca-BDE "has been traced in animals like polar bears, fish" and "has appeared in mother's breast milk."[33]

BANS GAINING MOMENTUM

- Michigan and nine other states already regulate the use of penta-BDE and octa-BDE.[34] Industries voluntarily withdrew the manufacture of penta-BDE by 2005 because of evidence that the chemical may be toxic and traces were found in breast milk.[35]
- Washington State and Maine recently banned deca for many uses.[36]
- The **Michigan Interdepartmental Toxics Steering Group recommends "legislation banning Deca-BDE**…contingent on the availability of a safe alternative."[37]

Health, medical, and environmental organizations that support HB 4699 (partial list):

American Academy of Pediatrics (Michigan Chapter)

Arab Community Center for Economic and Social Services (ACCESS)

Association for Children's Mental Health

Autism Society of Michigan

Citizens for Alternatives to Chemical Contamination

Clean Water Action

Clean Water Fund

Clinton County Family Resource Center

Detroiters Working for Environmental Justice

East Michigan Environmental Action Council (EMEAC)

MICHIGAN LEGISLATORS CAN PROTECT CHILDREN, FIRE FIGHTERS AND OUR GREAT LAKES FROM DECA-BDE!

Support HB 4699 to ban deca-BDE in all products sold in Michigan by 2014.[38]

Bolding added by the Michigan Network for Children's Environmental Health.

Ecology Center

Environment Michigan

Healthy Homes Coalition of West Michigan

Learning Disabilities Association of Michigan

Local Motion

Michigan Chapter of the National Association of Pediatric Nurse Practitioners

Michigan Coalition for Children and Families

Michigan Environmental Council

MI League of Conservation Voters Education Fund

Michigan Nurses Association

Science and Environmental Health Network

Sierra Club Michigan Chapter

Voices for Earth Justice

References:

1 Agency for Toxic Substances and Disease Registry (ATSDR). ToxFAQs. Polybrominated Diphenyl Ethers (PBDEs). September 2004. http://www.atsdr.cdc.gov/tfacts68-pbde.html. Accessed January 9, 2008.

2 Illinois Environmental Protection Agency. DecaBDE Study: A Review of the Available Research. A Report to the General Assembly and the Governor In Response to Public Act 94-100. January 2006. Pp 9. http://www.epa.state.il.us/reports/decabde-study/available-research-review.pdf. Accessed January 9, 2008.

3 Illinois Environmental Protection Agency. DecaBDE Study: A Review of the Available Research. A Report to the General Assembly and the Governor In Response to Public Act 94-100. January 2006. Pp 9. http://www.epa.state.il.us/reports/decabde-study/available-research-review.pdf. Accessed January 9, 2008.

4 Wilford BH Shoeib M Harner T et al. Polybrominated Diphenyl Ethers in Indoor Dust in Ottawa, Canada: Implications for Sources and Exposure. Environmental Science & Technology. 2005. Volume 39. Pp 7027-7035.

5 Michigan legislature webpage on SB 1458 and HB 4406. http://www.legislature.mi.gov/(S(aegvq255qicqbb45zaex3g45))/mileg.aspx?page=getObject&objectName=2004-SB-1458 and http://www.legislature.mi.gov/(S(aegvq255qicqbb45zaex3g45))/mileg.aspx?page=getObject&objectName=2003-HB-4406.

6 Ahn M Filley TR Jafvert Ct et al. Photodegradation of decabromodiphenyl ether adsorbed onto clay minerals, metal oxides, and sediment. Environmental Science & Technology. 2006. Volume 40. Number 1. Pp 215-220. http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/2006/40/i01/abs/es051415t.html. Accessed January 9, 2008.

7 Soderstrom G Sellstrom U de Wit CA et al. Photolytic Debromination of Decabromodiphenyl Ether (BDE 209). Environmental Science & Technology. 2004, 38, Pp 127-132.

8 Eriksson J Green N Maarsh G et al. Photochemical Decomposition of 15 Polybrominated Diphenyl Ether Congeners in Mathanol/Water. Environmental Science & Technology, 38, Pp 3119-3125, 2004.

9 He J Robrock KR Alvarez-Cohen L. Microbial Reductive Debromination of Polybrominated Diphenyl Ethers (PBDEs). Environmental Science & Technology, 2006, 40, Pp 4429-4434.

10 Wilford BH Shoeib M Harner T et al. Polybrominated Diphenyl Ethers in Indoor Dust in Ottawa, Canada: Implications for Sources and Exposure. Environmental Science & Technology. 2005. Volume 39. Pp 7027-7035.

11 Illinois Environmental Protection Agency. DecaBDE Study: A Review of the Available Research. A Report to the General Assembly and the Governor In

Response to Public Act 94-100. January 2006. Pp 2. http://www.epa.state.il.us/reports/decabde-study/available-research-review.pdf. Accessed January 9, 2008.

[12] Bragigand V. Amiard-Triquet C. Parlier E. et al. Influence of Biological Factors on the Bioaccumulation of Polybrominated Diphenyl Ethers in Aquatic Food Webs from French Estuaries. Science of the Total Environment. Volume 368. Pp 615-626. 2006.

[13] Michigan Interdepartmental Toxics Steering Group. "Polybrominated Diphenyl Ethers: A Scientific Review with Risk Characterization and Recommendations." May 2008. http://www.michigan.gov/documents/deq/deq-tox-PBDEBackground_Paper-5-08_243976_7.pdf. Accessed September 18, 2008.

[14] Fischer D Hooper K Athanasiadou M et al. Children Show Highest Levels of Polybrominated Diphenyl Ethers in a California Family of Four: A Case Study. Environmental Health Perspectives. 2006. Volume 114. Pp 1581-1584. http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1626410. Accessed January 9, 2008.

[15] Fields, Scott. Great Lakes Resource at Risk. Environmental Health Perspectives. Volume 113. Number 3. March 2005. Pp. A164-A173. http://www.ehponline.org/docs/2005/113-3/toc.html. Accessed January 18, 2008.

[16] Zhu L Hites RA. Temporal Trends and Spatial Distributions of Brominated Flame Retardants in Archived Fishes from the Great Lakes. Environmental Science Technology. 2004. Volume 38. Number 10. Pp. 2779-2784. http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/2004/38/i10/abs/es035288h.html. Accessed January 9, 2008.

[17] Sjodin A Hagmar L Klasson-Wehler E. Flame Retardant Exposure: Polybrominated Diphenyl Ethers in Blood from Swedish Workers. Environmental Health Perspectives. Volume 107. Number 8. August 1999. Pp 643-648. http://www.ehponline.org/members/1999/107p643-648sjodin/sjodin-full.html. Accessed January 16, 2008.

[18] Environmental Working Group. Sept 2003. Toxic Fire Retardants (PBDEs) in Human Breast Milk. Accessed January 14, 2010, at: http://www.ewg.org/reports/mothersmilk.

[19] Wilding BC, Curtis K, Welker-Hood K. 2009. Hazardous Chemicals in Health Care: A Snapshot of Chemicals in Doctors and Nurses. Physicians for Social Responsibility.

[20] Herbstman J Sjodin A Kurzon M et al. Prenatal Exposure to PBDEs and Neurodevelopment. Environmental Health Perspectives. January 2010.

[21] Viberg H Fredriksson A Jakobsson E et al. Neurobehavioral Derangements in Adult Mice Receiving Decabrominated Diphenyl Ether (PBDE 209) during a Defined Period of Neonatal Brain Development. Toxicological Sciences. 2003. Volume 76. Pp 119 (Print 8). http://toxsci.oxfordjournals.org/cgi/reprint/76/1/112. Accessed January 16, 2008.

[22] Birnbaum L. Staskal D. Brominated Flame Retardants: Cause for Concern? Environmental Health Perspectives. Volume 112. Number 1. January 2004. (Print Pp 14). http://www.ehponline.org/members/2003/6559/6559.pdf. Accessed January 16, 2008.

[23] Agency for Toxic Substances and Disease Registry (ATSDR) ToxFAQs. Polybrominated Diphenyl Ethers (PBDEs). September 2004. http://www.atsdr.cdc.gov/tfacts68-pbde.html. Accessed January 16, 2008.

[24] Zhou T Taylor MM DeVito MJ et al. Developmental Exposure to Brominated Diphenyl Ethers Results in Thyroid Hormone Disruption. Toxicological Sciences. Volume 66. Page 105. 2002. http://toxsci.oxfordjournals.org/cgi/reprint/66/1/105. Accessed January 16, 2008.

[25] Birnbaum L. Staskal D. Brominated Flame Retardants: Cause for Concern? Environmental Health Perspectives. Volume 112. Number 1. January 2004. (Print Pp 14). http://www.ehponline.org/members/2003/6559/6559.pdf. Accessed July 27, 2007.

[26] Michigan Association of Fire Chiefs Position Statement on Michigan House Bill 4465.

[27] Letter from Richard Duffy, Assistant to the General President of the International Association of Fire Fighters (IAFF), to Kelly Fox, President of the Washington State Council of Fire Fighters, on behalf of IAFF. January 26, 2007.

[28] Letter from Richard Duffy, Assistant to the General President of the International Association of Fire Fighters (IAFF), to Matthew Vinci, President, Professional Fire Fighters of Vermont. March 23, 2009.

[29] Clean Production Action. DecaBDE and BFR Substitution in the Electronics Industry: Leading Manufacturers are Moving Away from Bromine Chemistry in Computers and Televisions. November 2006. http://www.safer-products.org/downloads/Electronics%20BFR%20Fact%20Sheet.pdf. Accessed January 16, 2008.

[30] Greiner T. Alternatives to DecaBDE in Electronics and Textile Products. Pure Strategies, Inc. 2005.

[31] E-mail from La-Z-Boy customer service, La-Z-Boy Incorporated, to consumer David Woods, regarding inquiry number #244535. January 30, 2008.

[32] E-mail from Mary Underwood, Seating Marketing for

Steelcase, to Laura Rusello. February 8, 2008.

[33] E-mail from Betty Lemmen, Compliance Program Mgr. at Herman Miller Inc., to Diane Sherman. February 20, 2008.

[34] Michigan Interdepartmental Toxics Steering Group. "Polybrominated Diphenyl Ethers: A Scientific Review with Risk Characterization and Recommendations." May 2008. http://www.michigan.gov/documents/deq/deq-tox-PBDEBackground_Paper-5-08_243976_7.pdf. Accessed September 18, 2008.

[35] Environmental Working Group. Body Burden - The Pollution in Newborns. July 14, 2005. Pp 46. http://archive.ewg.org/reports/bodyburden2/pdf/bodyburden2_final-r2.pdf. Accessed January 16, 2008.

[36] Michigan Interdepartmental Toxics Steering Group. "Polybrominated Diphenyl Ethers: A Scientific Review with Risk Characterization and Recommendations." May 2008. http://www.michigan.gov/documents/deq/deq-tox-PBDEBackground_Paper-5-08_243976_7.pdf. Accessed September 18, 2008.

[37] Michigan Interdepartmental Toxics Steering Group. "Polybrominated Diphenyl Ethers: A Scientific Review with Risk Characterization and Recommendations." May 2008. http://www.michigan.gov/documents/deq/deq-tox-PBDEBackground_Paper-5-08_243976_7.pdf. Accessed September 18, 2008.

[38] Michigan Legislature webpage on HB 4465: http://www.legislature.mi.gov/(S(ftraf4usdr5k1j55u0le4c45))/mileg.aspx?page=getObject&objectName=2007-HB-4465. Accessed January 16, 2008.

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The Michigan Network for Children's Environmental Health is a coalition of health professionals, health-affected groups, environmental organizations, and others dedicated to a safe and less toxic world for Michigan's children. Through education, outreach, and advocacy, we seek to protect Michigan's children from adverse impacts caused by exposure to widespread hazardous chemicals.

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