

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 phase out deca-BDE in mattresses, residential furniture, televisions, and computers.

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
- In the U.S., PBDEs have been **found in the breast milk of women** at levels 10 to 100 times higher than those found in Europe.^{18,19}

HEALTH IMPACTS

- Learning and Memory: Exposure to deca-BDE in mice and rats during brain development “can give rise to **irreversible changes in adult brain function**.”²⁰
- Reproductive: Rats exposed to PBDEs experienced a **delayed onset of puberty** and reproductive development.²¹
- Cancer: Rodents who ate deca-BDE developed **liver tumors**, causing the U.S. Environmental Protection Agency to classify deca as a “possible human carcinogen.”²²
- Thyroid: PBDEs can disrupt homeostatic thyroid levels in mice.²³ Decreased concentrations of the thyroid hormone can lead to **decreased IQ** in offspring.²⁴

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 known as hydrogen bromide which expose firefighters to additional chemical hazards.”²⁵

- **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.**”^{26,27}

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.²⁸
- Mattress companies Sealy, Simmons, and Serta do not use deca-BDE in their products. IKEA sells only PBDE-free office furniture.²⁹
- **Michigan-based La-Z-Boy Incorporated³⁰ and Steelcase Furniture³¹ 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.”³²

BANS GAINING MOMENTUM

- Michigan and nine other states already regulate the use of penta-BDE and octa-BDE.³³ 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.³⁴

- Washington State and Maine recently banned deca for many uses.³⁵
- The **Michigan Interdepartmental Toxics Steering Group recommends “legislation banning Deca-BDE...contingent on the availability of a safe alternative.”**³⁶

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)
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
Voices for Earth Justice

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

Support HB 4699 to phase out deca-BDE in mattresses, residential furniture, televisions, and computers.³⁷

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

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](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](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 Viberg H Mundy W Eriksson P. Neonatal exposure to decabrominated diphenyl ether (PBDE 209) results in changes in BDNF, CaMKII and GAP-43, biochemical substrates of neuronal survival, growth, and synaptogenesis. *NeuroToxicology* Volume 29, Issue 1, January 2008, Pages 152-159.
- ¹⁹ Schecter A Pavuk M Papke O et al. Polybrominated Diphenyl Ethers (PBDEs) in U.S. Mothers' Milk. *Environmental Health Perspectives* Volume 111, Number 14, November 2003.
- ²⁰ 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.
- ²¹ 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.
- ²² 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.
- ²³ 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.
- ²⁴ 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.
- ²⁵ Michigan Association of Fire Chiefs Position Statement on Michigan House Bill 4465.
- ²⁶ 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.
- ²⁷ 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.
- ²⁸ 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.
- ²⁹ Greiner T. Alternatives to DecaBDE in Electronics and Textile Products. Pure Strategies, Inc. 2005.
- ³⁰ E-mail from La-Z-Boy customer service, La-Z-Boy Incorporated, to consumer David Woods, regarding inquiry number #244535. January 30, 2008.
- ³¹ E-mail from Mary Underwood, Seating Marketing for Steelcase, to Laura Rusello. February 8, 2008.
- ³² E-mail from Betty Lemmen, Compliance Program Mgr. at Herman Miller Inc., to Diane Sherman. February 20, 2008.
- ³³ 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.
- ³⁴ 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.
- ³⁵ 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.
- 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 Legislature webpage on HB 4465: [http://www.legislature.mi.gov/\(S\(traf4usdr5k1j55u0le4c45\)\)/mileg.aspx?page=getObject&objectName=2007-HB-4465](http://www.legislature.mi.gov/(S(traf4usdr5k1j55u0le4c45))/mileg.aspx?page=getObject&objectName=2007-HB-4465). Accessed January 16, 2008.



Network Members:

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 Fund • Clinton County Family Resource Center • Detroiters Working for Environmental Justice • East Michigan Environmental Action Council • Ecology Center • Healthy Homes Coalition of West Michigan • Learning Disabilities Association (LDA) of Michigan • Local Motion • Michigan Chapter of the National Association of Pediatric Nurse Practitioners • Michigan Coalition for Children and Families • Michigan Environmental Council • Michigan League of Conservation Voters Education Fund • Michigan Nurses Association • Science and Environmental Health Network • Voices for Earth Justice.

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.

For more information, contact Gen Howe, MPH, Environmental Health Campaign Director, at 734-761-3186 ext. 115 or Mike Shriberg, Ph.D.,

