

# Claims and Facts About Deca-BDE Flame Retardant



**T**he Bromine Science and Environment Forum (BSEF) is an industry association of only four companies: Albemarle, ICL, Chemtura, and Tosoh. When their flame retardant products came under regulatory pressure, the companies contracted Burson-Marsteller, the global PR firm, to change public and legislative perceptions about the harms associated with them. Burson-Marsteller in turn organized BSEF. Previously, Burson-Marsteller organized similar groups to lobby on behalf of the tobacco and nuclear industries. Two of BSEF member company flame retardants have been nominated for global ban and phase-out under the Stockholm Convention (penta-BDE and octa-BDE). Attention has now shifted to deca-BDE, a flame retardant in wide use. This document addresses common claims by BSEF about deca-BDE.

**BSEF CLAIM:** *Brominated flame retardants such as deca-BDE should not be found in the environment and concerns over brominated flame retardants being found in the environment are legitimate.<sup>1</sup>*

**FACT:** This is true! Toxic flame retardants such as PBDEs manufactured by BSEF member companies are widely found in the environment, in animals, and even human beings. Deca-BDE is found in fish, birds, grizzly bears, and other animals at high concentrations, demonstrating that deca-BDE can be absorbed by biological systems.<sup>2,3,4,5</sup> Deca-BDE has been measured in human blood and breast milk<sup>6,7</sup> and at high levels in electronics recycling workers.<sup>8</sup> Safer alternatives to PBDEs make this exposure unnecessary.

**BSEF CLAIM:** *No state has taken any action against deca-BDE.*

**FACT:** Regulatory actions to prohibit deca-BDE have been taken in Maine and Washington. Maine law bans new uses of deca in mattresses and upholstered furniture effective January 1, 2008 and phases out existing uses of deca in televisions and computer housings by January 1, 2010.<sup>9</sup> Washington State bans the use of deca in mattresses by 2008 and the use of deca in televisions, computers, and residential upholstered furniture by 2011.<sup>10</sup> Illinois EPA advised the legislature and governor that deca-BDE can and should be eliminated.<sup>11</sup> States taking action against other PBDEs include California, Hawaii, Maryland, Michigan, Minnesota, New York, Oregon, and Rhode Island.

**BSEF CLAIM:** *Deca-BDE is the most highly studied flame retardant available.*

**FACT:** Almost all of the peer-reviewed scientific studies published since 2005 contain evidence supporting elimination of deca-BDE. These studies demonstrate toxicity, breakdown into harmful substances, and the presence of deca-BDE in animals and humans.<sup>12</sup> One study that supported continued use was performed under contract to BSEF member companies.

**BSEF CLAIM:** *Deca-BDE is not toxic.*

**FACT:** Deca-BDE and other PBDEs are similar to PCBs. Deca-BDE is characterized by the U.S. Environmental Protection Agency (EPA) as a "possible human carcinogen" based

on laboratory studies which showed that there was a dose-dependent increase of liver tumors in both female and male rats, and acinar cell adenoma in male rats.<sup>13</sup> The state of Washington finds that deca-BDE is toxic based on studies which showed liver, kidney and thyroid effects and fetal death.<sup>14</sup> Mice exposed to deca-BDE suffered brain damage which was not reversible.<sup>15</sup> PBDEs such as deca-BDE are also sources of polybrominated dioxins and furans.<sup>16</sup>

**BSEF CLAIM:** *Deca-BDE does not degrade to lower brominated PBDEs of concern such as octa-BDE.*

**FACT:** The POPs Review Committee of the Stockholm Convention concluded that components of the commercial octa-BDE mixture are formed by debromination of deca-BDE in the environment.<sup>17</sup> Deca-BDE degrades under normal environmental conditions in house dust forming three different nona-BDEs and several octa-BDEs.<sup>18</sup> Numerous other studies show degradation of deca-BDE to octa-BDE and other BDEs in rats, birds, cows, and fish.<sup>19,20,21,22,23,24</sup> Workers exposed occupationally to deca-BDE contain hepta-BDE and octa-BDE congeners that are not present in the commercial deca-BDE mixture or in reference groups. A follow up study found that reduced exposure decreased the deca-BDE concentrations but increased the hepta-BDE and octa-BDE concentrations suggesting that debromination was occurring in humans.<sup>25</sup>

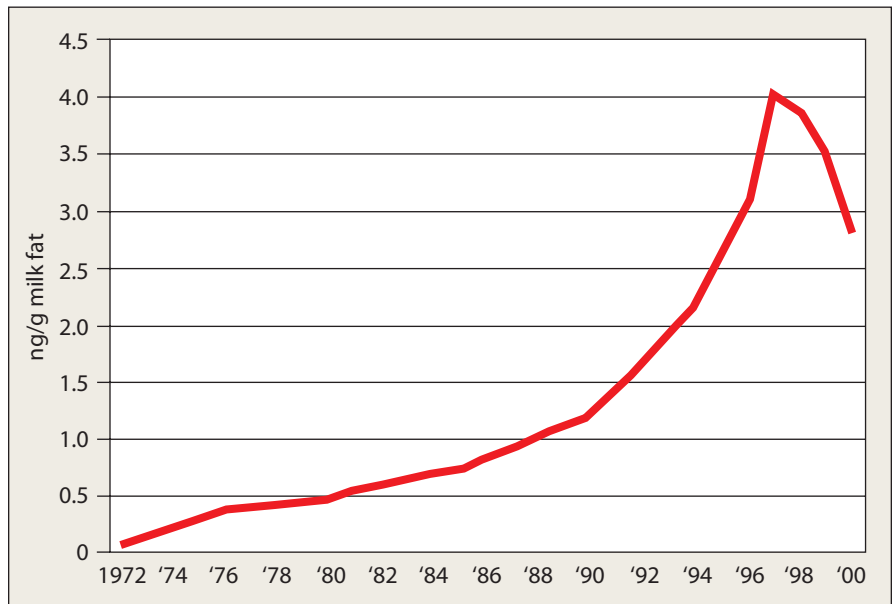
**BSEF CLAIM:** *Levels of deca-BDE in breast milk are vanishingly small, and there is no evidence that they are increasing.*

**FACT:** The highest recorded PBDE levels in human breast milk were in U.S. residents, three times higher than those found in Canada, and 10–100 times higher than levels in Japan, Sweden and other parts of Europe.<sup>26</sup>

The graph above shows the dramatic reduction of PBDE breast milk levels in Swedish women after PBDE controls were established. Between 1997 and 2000, PBDE levels fell about 30 percent in Sweden.

**BSEF CLAIM:** *None of the alternatives have the track record of deca-BDE.*

## PBDEs in Breast Milk, Sweden



Source: NRDC

**FACT:** Leading electronic manufacturers are using safer substitutes to deca-BDE in plastic. Ninety-five percent<sup>27</sup> of computer manufacturers and a majority of TV manufacturers do not use deca-BDE in enclosures. Apple, Dell, Lenovo, Toshiba, Acer, Sony, LG Electronics, Samsung, Sharp, Phillips, Hewlett Packard and Panasonic have phased out deca-BDE and plan to eliminate all BFRs by 2011.<sup>28</sup> The Danish EPA found "... a large number of the world's major manufacturers of EEE (electrical and electronic equipment) have phased out deca-BDE in their products, this demonstrates ipso facto that commercially viable and suitable alternatives are used in many polymeric applications, and that safe fire retardant EEE components free of DecaBDE are actually available."

**BSEF CLAIM:** *A better alternative to deca-BDE is not available.*

**FACT:** Alternatives to deca-BDE include chemical substitutes and non-chemical alternatives such as design changes. One chemical substitute, resorcinol bis (diphenyl phosphate) (RDP), a commonly used alternative to deca-BDE, is safer for the environment and public health. The chemicals analysis tool, The Green Screen for Safer Chemicals<sup>29</sup> finds deca-BDE is a chemical of high concern while RDP is not, and concludes RDP is safer than deca-BDE. The Maine Department of Environmental Protection also found RDP, "presents a significantly lower threat to the environment and human health than does deca-BDE."<sup>30</sup> Alternative materials or design

changes that eliminate the need for chemical flame retardants may include shielding the plastic outer casing of components with metal or making the entire case of metal.<sup>31,32</sup>

**BSEF CLAIM:** *A ban on deca-BDE could have lethal consequences for firefighters.*

**FACT:** The Professional Firefighters Union of Minnesota concluded that deca-BDE poses an unacceptable risk to firefighters.<sup>33</sup> The European Commission determined it is possible to meet the UL94 V-0 fire safety standard using substitutes for deca-BDE.<sup>34</sup>

**BSEF CLAIM:** *The U.S. EPA is evaluating deca-BDE.*

**FACT:** The EPA evaluation is under Congressional investigation to probe corporate corruption of science. The investigation was launched after EPA responded to a request by the chemical industry to remove Dr. Deborah Rice as chair of the EPA Deca risk assessment panel. Rice is an internationally

recognized deca-BDE expert, former EPA scientist, and current scientist for the state of Maine. Rice had presented data representing the Maine Center for Disease Control position that deca-BDE use should be restricted. Rep. John D. Dingell (D-MI), House Energy and Commerce Committee Chair, and Rep. Bart Stupak (D-MI), chair of the Oversight and Investigations Subcommittee have demanded documents from EPA and the industry.<sup>35</sup>

**BSEF CLAIM:** *The proposed ban of deca-BDE contradicts the findings of the European Union's comprehensive, 10-year-long risk assessment.*

**FACT:** Deca-BDE is banned in electrical and electronic equipment in the European Union effective July 1, 2008. The European Court of Justice successfully defended this ban in April 2008. Many large manufacturers use bromine-free alternatives, which present minimal risks for adverse environmental effects.<sup>36</sup>

## ENDNOTES

- 1 [http://www.bsef.com/product\\_stew/overview/](http://www.bsef.com/product_stew/overview/)
- 2 Johnson-Restrepo B, Kannan K, Addink R, Adams DH, Polybrominated diphenyl ethers and polychlorinated biphenyls in a marine foodweb of coastal Florida. *Environmental Science & Technology* 2005, 39, (21), 8243-8250
- 3 Bixian M, Song J, Suin Q, Zeng E, Hale RC. Polybrominated Diphenyl Ethers in Birds of Prey Collected from Northern China, SETAC, Montreal, Quebec, 2006; Montreal, Quebec, 2006
- 4 Christensen JR, Macduffee M, Macdonald RW, Whittar M, Ross PS. Persistent organic pollutants in British Columbia grizzly bears: Consequence of divergent diets. *Environmental Science & Technology* 2005, 39, (18), 6952-6960
- 5 <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/05/07/MN2S10HPVE.DTL>
- 6 Schecter A, Vuk MP, Papke O, Ryan, JJ, Birnbaum L, Rosen, R. Polybrominated diphenyl ethers (PBDEs) in US mothers' milk. *Environmental Health Perspectives* 2003, 111, (14), 1723-1729
- 7 Schecter A, Papke O, Harris, TR, Tung, KC. Partitioning of polybrominated diphenyl ether (PBDE) congeners in human blood and milk. *Toxicological & Environmental Chemistry* 2006, 88, (2), 319-324
- 8 Jakobsson K, Thuresson K, Rylander L, Sjodin A, Hagmar L, Bergman A. Exposure to polybrominated diphenyl ethers and tetrabromobisphenol A among computer technicians. *Chemosphere*. 2002 Feb;46(5):709-16
- 9 The State of Maine. "Governor signs deca ban bill into law: State will require phase-out of the flame retardant in household items." June 14, 2007. Available online at: <http://www.maine.gov/tools/whatsnew/index.php?topic=HouseDems+News&id=39101&v=Article>
- 10 Washington State Department of Ecology. *PBDE Law*. 2008. Available online at: <http://www.ecy.wa.gov/PROGRAMS/SWFA/pbt/pbdeLAW.html>
- 11 <http://www.epa.state.il.us/reports/decabde-study/index.html>
- 12 See citations throughout this document.
- 13 .Bureau of Health and Department of Environmental Protection, Draft *Brominated Flame Retardants – A Report to the Joint Stand-ing Committee on Natural Resources, 122nd Maine Legislature*, January 21, 2005, p.28.
- 14 Peele, Cheri. *Washington State PBDE Chemical Action Plan*. 2004. Washington State Department of Ecology, Washington State Department of Health, Olympia, WA. p.19.
- 15 Viberg H., Fredriksson A., Jakobsson E., Örn U. and Eriksson P. 2003. Neurobehavioral derangements in adult mice receiving decabrominated diphenyl ether (PBDE 209) during a defined period of neonatal brain development. *Toxicological Sciences*, 76, p 112-120.
- 16 Hanari N, Kannan K, Miyake Y, Okazawa T, Kodavanti PR, Aldous KM, Yamashita N (2006) Occurrence of polybrominated biphenyls, polybrominated dibenzo-p-dioxins, and polybrominated dibenzofurans as impurities in commercial polybrominated diphenyl ether mixtures, *Environ Sci Technol* 40:4400-4405
- 17 [http://www.pops.int/documents/meetings/poprc/chem\\_review/OctaBDE/OctaBDE\\_RiskProfile\\_e.pdf](http://www.pops.int/documents/meetings/poprc/chem_review/OctaBDE/OctaBDE_RiskProfile_e.pdf)
- 18 Stapleton H, Dodder N. Photodegradation of Decabromo-diphenyl Ether in House Dust by Natural Sunlight. *Environ Sci Technol* 41, Oct, 2007
- 19 Van den Steen, E., Covaci, A., Jaspers, V.L., Dauwe, T., Voorspoels, S., Eens, M. and Pinxten, R. (2007), 'Accumulation, tissuespecific distribution and debromination of decabromodiphenyl ether (BDE 209) in European starlings (*Sturnus vulgaris*)', *Environ. Pollut.* 148: 648-653
- 20 Kierkegaard, A., Asplund, L., De Wit, C., McLachlan, M.S., Thomas, G.O., Sweetman, A.J. and Jones, K.C. (2007), 'Fate of Higher Brominated PBDEs in Lactating Cows', *Environ. Sci. Technol.* 41, 417-423

- 21 La Guardia, M.J., Hale, R.C. and Harvey, E. (2007), 'Evidence of Debromination of Decabromodiphenyl Ether (BDE-209) in Biota from a wastewater Receiving Stream', *Environ. Sci. Technol.* 41 (19), 6663-6670
- 22 Stapleton HM, Alaee M, Letcher RJ, Baker JE. Debromination of the flame retardant decabromodiphenyl ether by juvenile carp (*Cyprinus carpio*) following dietary exposure. *Environmental Science & Technology* 2004, 38, (1), 112-119
- 23 Rui A, Cravedi JP, Debrauwer L, Garcia A, Canlet C, Jouanin I, Zalko D. Institut National de la Recherche Agronomique, Unité Mixte de Recherche 1089 Xénobiotiques, 180 chemin de Tournefeuille, BP3, 31931 Toulouse cedex 9, France. Disposition and metabolic profiling of [(14)C]-Decabromodiphenyl ether in pregnant Wistar rats. *Environ Int*, May, 2007
- 24 Huwe JK, Smith DJ. Biosciences Research Laboratory, ARS, USDA, P.O. Box 5674, University Station, Fargo, North Dakota 58105-5647, USA. Accumulation, whole-body depletion, and debromination of decabromodiphenyl ether in male sprague-dawley rats following dietary exposure. *Environ Sci Technol* 41:2371 – 2377, 2007
- 25 Thuresson K, Hoglund P, Hagmar L, Sjodin A, Bergman A, Jakobsson K. (2006) Apparent half-lives of hepta- to deca-brominated diphenyl ethers in human serum as determined in occupationally exposed workers. *Environ Health Perspect* 114:176 – 181
- 26 Natural Resources Defense Council. *Healthy Milk, Healthy Baby: Chemical Pollution and Mother's Milk*. Available online at: <http://www.nrdc.org/breastmilk/pbde.asp>
- 27 Washington State Department of Ecology and Department of Health, 2006. Washington State Polybrominated Diphenyl Ether (PBDE) Chemical Action Plan: Final Plan.
- 28 Clean Production Action. *DecaBDE and BFR Substitution in the Electronics Industry*. Available online: <http://www.healthlegacy.org/resources.cfm?refid=100431>
- 29 <http://www.cleanproduction.org/Green.Greenscreen.php>
- 30 Brominated Flame Retardants, Third Annual Report to the Maine Legislature, January 2007.
- 31 Danish Environmental Protection Agency, Brominated flame retardants: Substance flow analysis and assessment of alternatives, June 1999
- 32 Risk and Policy Analysts Limited for Department for Environment, Food and Rural Affairs, UK. Risk reduction strategy and analysis of advantages and drawbacks for octabromodiphenyl ether. 24 June 2002
- 33 [http://marketplace.publicradio.org/display/web/2007/06/27/firefighters\\_want\\_flame\\_retardant\\_put\\_out/](http://marketplace.publicradio.org/display/web/2007/06/27/firefighters_want_flame_retardant_put_out/)
- 34 Lassen, Carsen, Sven Havelund, André Leisewitz, Peter Maxson, 2006. *Deca-BDE and Alternatives in Electrical and Electronic Equipment*. Environmental Project No. 1141 2006 . Miljøprojekt : Danish Ministry of the Environment.
- 35 [http://energycommerce.house.gov/Press\\_110/110nr267.shtml](http://energycommerce.house.gov/Press_110/110nr267.shtml)
- 36 Proceedings of the court of justice and the court of first instance of the European communities and the civil service tribunal of the European Union. Available online at: <http://curia.europa.eu/en/actu/communiqués/index.htm>