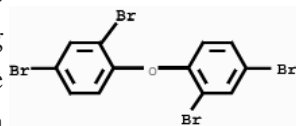


# Toxic Flame Retardants: Emerging Public Health Threat

## Background and science: What are toxic flame retardants?

Polybrominated diphenyl ethers (PBDEs), a widely used class of brominated flame retardants, are leaving a lasting toxic legacy in the environment and in

human beings. PBDEs are flame retardants used in foam products, textiles, electrical equipment, building materials and transportation. Penta-BDE, octa-BDE and deca-BDE are three of the most common commercial classes, with varying numbers of bromine atoms per molecule. Chemically, they look very much like PCBs, which were banned in 1979 due to their high toxicity and persistence and evidence that they can cause developmental problems in children.<sup>1</sup> Like PCBs, PBDE flame-retardants have accumulated in the environment, in fish and meats, in breast milk and in humans.

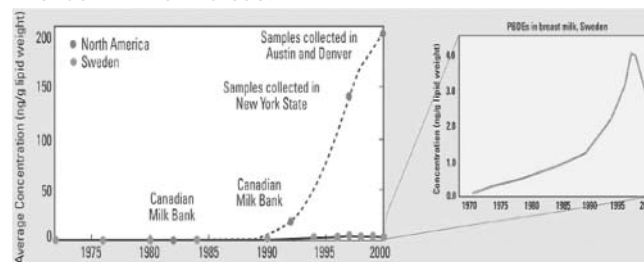


**Health effects and scope of the problem.** Laboratory studies in animals indicate that PBDEs, like PCBs, are toxic to the brain, reproductive system and liver and disrupt thyroid function.<sup>2,3,4,5,6,7,8,9,10</sup> While PCB levels in fish and breast milk have slowly declined since being banned, PBDE levels are increasing at an exponential pace, as they are still largely unregulated in the U.S. For example:

- ▶ Luross et al noted a 100-fold increase in PBDEs in Lake Ontario trout between 1978 and 1998.<sup>11</sup>
- ▶ PBDEs were detected in fish, sediments, sewage sludge and landfill leachates in Minnesota.<sup>12</sup>
- ▶ Recent research found levels of PBDEs in U.S. women's breast milk to be 10 to 100 times higher than reported levels in European women.<sup>13</sup>

- ▶ Total PBDE levels in human milk, blood and tissues have increased by a factor of 100 during the past 30 years, doubling about every five years.<sup>14</sup>

## Trends: PBDEs in breast milk



Betts: Env Sci Technol, Dec. 2001

Penta-BDEs have the highest potential for bioaccumulation and are typically the most common classes found in humans, fish and other wildlife. However, scientists have increasingly been finding deca-BDEs in biota.<sup>15,16,17</sup> Deca can debrominate to the more bioavailable forms in the environment and potentially during metabolism as well, making them a greater health risk than originally thought.

**Food exposure is important.** Since PBDE are lipophilic (fat loving), they accumulate in animal-based foods—so eating fish, meat and dairy products can be an important route of exposure.<sup>18</sup> IATP's *Smart Meat and Dairy Guide*, available at [iatp.org/foodandhealth](http://iatp.org/foodandhealth), provides tips for reducing exposure through safer food choices. New evidence shows that inhalation of dust contaminated with PBDEs, including deca, is also a route of exposure.<sup>19</sup>

**Regulation needed.** Action is needed to prevent further environmental contamination and to protect public health. Global demand for PBDEs totaled 150 million pounds in 1999, over 50 percent of which was used in the Americas. Eliminating most uses of PBDE flame-retardants is possible, and a prudent step to protect public health. The European Union has enacted a ban

on penta and octa-BDEs and is considering a ban on deca-BDEs as well. Regulatory action by Sweden and the European Union in the late 1990s has resulted in significant declines in levels of PBDEs in Swedish women's breast milk in just a few years.<sup>20</sup>

**State actions.** In the absence of federal regulation, states are enacting laws to regulate the use and production of PBDEs to protect public health. California enacted a phase-out by 2008 of penta- and octa-BDEs. Hawaii and New York passed similar phase-outs for 2006 and 2007 respectively. Maine's legislation, the most comprehensive bill to date, calls for a phase-out of penta and octa by 2006 and deca by 2008. Other states have also proposed phase-outs, including Minnesota, Michigan, Maryland and Washington.

**Alternatives available.** Alternatives to the use of PBDE flame retardants are available and cost effective. Some alternatives are: product redesign to eliminate the need for added chemicals, use of naturally flame retardant materials like wool and leather or plastics containing sulfur and use of less toxic alternatives.<sup>21</sup> The German Environmental Agency selected red phosphorus, ammonium polyphosphate and aluminum trihy-

droxide as alternatives with the least adverse environmental impact.<sup>22</sup>

**Industry actions.** Great Lakes Chemical, the only U.S. manufacturer of the penta- and octo-BDEs has announced that they will phase out these formulations by 2005. Computer and electronics manufacturers like Apple, Ericsson, IBM, Intel, Motorola, Panasonic, Phillips and Sony are using some alternatives. For example, Motorola now uses a halogen-free laminate that is cost effective, while meeting fire safety standards.<sup>23</sup> Toshiba has replaced BFR-containing plastic casings in electronic parts with inherently flame-resistant polyphenylene sulfide. IKEA furniture, Crate and Barrel and Eddie Bauer are requesting PBDE-free polyurethane foam from their manufacturer Hickory Springs. ●

**For more information:**

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