



## BACKGROUND

### What are PBDEs?

PBDEs are a group of synthetic chemicals used as flame retardants. A PBDE molecule can have one to ten bromine atoms. PBDEs with four or more bromine atoms have been assessed for toxicity under the *Canadian Environmental Protection Act*:

- Tetrabromodiphenyl ether (tetraBDE)
- Pentabromodiphenyl ether (pentaBDE)
- Hexabromodiphenyl ether (hexaBDE)
- Heptabromodiphenyl ether (heptaBDE)
- Octabromodiphenyl ether (octaBDE)
- Nonabromodiphenyl ether (nonaBDE)
- Decabromodiphenyl ether (decaBDE)

PBDEs are sold in the following three commercial mixtures:

- PentaBDE – primarily composed of tetraBDE, pentaBDE, and hexaBDE congeners
- OctaBDE – primarily composed of hexaBDE, heptaBDE, and octaBDE congeners
- DecaBDE – primarily composed of decaBDE with trace amounts of nonaBDE congeners.

Widely used until recently, PentaBDE and OctaBDE were voluntarily phased out of use internationally and in Canada in 2006. DecaBDE is now the only PBDE mixture used in manufacturing worldwide, although in December 2009, U.S. manufacturers of the chemical pledged to phase it out as well. Obsolete PBDE mixtures are still an environmental concern as older products and components containing these mixtures are still commonly found in homes, offices, vehicles, and disposal sites.

### Regulatory Status of PBDEs in Canada

In December 2006, PBDEs were added to the “List of Toxic Substances,” paving the way for federal regulatory action under the *Canadian Environmental Protection Act (CEPA), 1999*. Furthermore, Environment Canada identified tetra- through hexaBDEs as meeting the legal criteria for “virtual elimination.” A risk management strategy and proposed regulation introduced at the time contemplated a ban on the use of PentaBDE and OctaBDE mixtures in manufactured and imported products.

Ecojustice Canada on behalf of David Suzuki Foundation, Canadian Environmental Law Association and Environmental Defence formally objected to the proposed regulation by filing a Notice of Objection (‘NOO’) under *CEPA* because the proposed regulation failed to ban the most prevalent commercial PBDE mixture – DecaBDE. The groups argued that DecaBDE meets the criteria for virtual elimination under *CEPA* citing growing scientific evidence that DecaBDE can

transform to the lower brominated PBDEs targeted for elimination under the proposed regulation and that DecaBDE bioaccumulates in biota. Based on this scientific evidence the groups argued that the government's proposed approach would be ineffective because it allowed the continued use of the DecaBDE commercial mixture. The NOO called for a Board of Review to be struck to make recommendations to the federal Ministers of the Environment and Health on these issues.

The final regulation was released on July 9<sup>th</sup>, 2008 and, like the proposed regulation, bans the manufacture of all PBDEs and the import and use of tetra- through hexaBDE (ingredients in the discontinued Penta and Octa commercial mixtures) but fails to ban heptaBDE through to decaBDE and thus the DecaBDE commercial mixture.

The Minister of the Environment had still not responded to the NOO from environmental groups contending that all PBDEs meet the criteria for virtual elimination and should be banned in manufacturing and imports.

On March 27<sup>th</sup> 2009, Environment Canada released a draft state-of-the-science report, which examines the central issues raised in the NOO on the basis of scientific research published since the original PBDE screening assessment was completed. The draft report confirmed the concerns of the groups, finding that DecaBDE transforms into bioaccumulative products and may accumulate to high and potentially problematic levels in certain species. However the report maintained that DecaBDE does not meet the regulatory bioaccumulation criteria for virtual elimination.

Based on the conclusions of the draft state-of-the-science report, Environment Canada proposed a revised PBDE risk management strategy. It called for a regulation banning the DecaBDE mixture in electronics and electrical equipment to be in force by 2011.

In response to both the draft state-of-the-science report and the revised risk management strategy, the groups called for the proposed ban on DecaBDE to be expanded to all products and all uses, not just electronics. In addition, the groups warned the government that some of the alternatives to DecaBDE are just as hazardous and that they should ensure safe alternatives are used. The groups also called for a robust program to manage the reuse, recycling and disposal of used products and parts containing PBDEs .

On August 28<sup>th</sup> 2010, Environment Canada released the final ecological state-of-the-science report on decaBDE and the final revised risk management strategy for PBDEs. The final strategy calls for an expanded ban on DecaBDEs in all products by 2013 -- two years later than the target date proposed in March 2009 for the partial ban. In addition, a risk management strategy for the waste sector including products containing PBDEs will be developed.

August 31, 2010 the Federal Minister of the Environment responded to the Notice of Objection submitted on February 14, 2007. The Minister decided that the board of review requested in the NOO is not necessary after considering the findings of the ecological state of the science report and the revised risk management strategy. In a letter of reply, the petitioning groups agreed that many of the issues raised in the NOO had been addressed, but pointed to unreasonable delays in the process and unresolved concerns with the regulatory thresholds for determining persistence

and bioaccumulation. They expressed the hope that the lessons learned on PBDEs will translate into more effective regulation of other toxic chemicals.

### **History of PBDEs under CEPA**

**June 2006** – Environment Canada publishes Ecological Screening Assessments for PBDEs; Health Canada Screening Health Assessment released concurrently (though dated December 2004).

**July 1, 2006** – Ministers of Health and Environment give notice of intention to add PBDEs (tetra- through decaBDE) to the List of Toxic Substances and to implement the “virtual elimination” of tetra- through hexaBDE.

**December 2006** – Environment Canada publishes Risk Management Strategy for PBDEs, indicating that “Phase I” regulations would be finalized in Fall 2007.

**December 7, 2006** – Government of Canada adds PBDEs (tetra- through decaBDE) to the List of Toxic Substances.

**December 16, 2006** – Environment Canada proposes “Phase I” regulations to prohibit the use, sale, offer for sale, and import of tetra-, penta-, and hexaBDE, and mixtures, polymers and resins containing these substances. The regulations would also prohibit the manufacture of all PBDEs in Canada (PBDEs have never been manufactured in Canada).

**February 14, 2007** – Sierra Legal (now Ecojustice), the David Suzuki Foundation, the Canadian Environmental Law Association, and Environmental Defence submit a Notice of Objection to the Minister of the Environment, concerning the proposed PBDE regulations. The objection argues that the scope of the regulations is too narrow; *all* PBDEs meet the legal requirements for virtual elimination and should be banned, including the commonly used DecaBDE commercial mixture.

**December 7, 2007** – Ecojustice, the David Suzuki Foundation, the Canadian Environmental Law Association, and Environmental Defence submit a supplement to the Notice of Objection, reviewing recent scientific findings on decaBDE.

**June 18, 2008** – Ecojustice writes to Environment Minister John Baird, on behalf of the David Suzuki Foundation, the Canadian Environmental Law Association, and Environmental Defence, requesting an update on consideration of the Notice of Objection and finalization of PBDE regulations.

**July 9<sup>th</sup>, 2008** - Canada bans the manufacturing of all PBDEs (although PBDEs have never been manufactured in Canada nor is there any intention by industry to do so) and bans the "use, sell or offer for sale of three PBDE congeners (tetraBDE, pentaBDE and hexaBDE) which has the effect of banning the PentaBDE and OctaBDE commercial mixtures but not the DecBDE commercial mixture. Canada's ban does not extent to PBDEs that may be in imported goods.

**March 27<sup>th</sup>, 2009** – In response to the issues raised in the NOO, Canada releases a “Draft State of the Science Report on Bioaccumulation and Transformation DecaBDE”.

**March 27, 2009** – Canada publishes a draft Revised Risk Management Strategy in response to the findings of the draft State of the Science Report on Decabromodiphenyl ether. The strategy proposes regulations in force by 2011 to ban the use of PentaBDE and OctaBDE mixtures in manufactured and imported products and DecaBDE mixtures in electronics and electrical equipment, similar to the RoHS Directive ban in place in the European Union.

**May 27, 2009** - Ecojustice, Canadian Environmental Law Association and David Suzuki Foundation submit comprehensive comments on both of these documents.

**August 28<sup>th</sup>, 2010** – Environment Canada publishes the “Ecological State of the Science Report on Decabromodiphenyl Ether (decaBDE) Bioaccumulation and Transformation and the Final Revised Risk Management Strategy. The findings of the final science report are similar to that of the draft but note that concerns noted regarding decaBDE exist for the alternative flame retardants with similar chemical structure such as Decabromodiphenyl Ethane (decaBD ethane). The final strategy proposes an expanded ban on DecaBDE to all products, not just electronics, thus expanding the proposed ban on PBDEs in products to all PBDE congeners in all products. The final revised risk management strategy calls for the ban to be in place in 2013. In addition, a risk management strategy for the waste sector including products containing PBDEs will be developed.

### **PBDE Use in Canada**

PBDEs are added as fire retardants to polymer resins and plastics, including many consumer products such as televisions, stereos, computers, furniture, carpets, and curtains. PBDEs are also used, to a lesser extent, in textiles, adhesives, sealants, and coatings. PBDEs are not produced in Canada, but are imported by manufacturers and in consumer products. The only commercial PBDE mixture available in Canada is DecaBDE and it is manufactured in the United States.

### **Environmental and Health Impacts of PBDEs**

PBDEs are dangerous chemicals that have increased significantly over time in the tissue of human beings and wildlife. PBDEs are toxic to development, including the developing brain, immune, reproductive and hormonal systems.

PBDEs are released into the environment during manufacturing operations, and as products containing these chemicals degrade. This breakdown begins indoors during normal use of products making housedust the largest exposure source and of particular concern to small children.

Like PCBs, their long-banned chemical relatives, PBDEs are persistent in the environment and bioaccumulative, building up in people's bodies and concentrations are rising.

Biomonitoring studies have detected PBDEs in Canadians' blood samples and even in mothers' breast milk. One study found that the breast milk of Canadian women contains the second-highest PBDE concentrations in the world (behind Americans) and PBDE levels measured in breast milk samples from Vancouver women increased 15-fold from 1992 to 2002.

PBDEs are so ubiquitous in the environment that they are one of a handful of chemicals found in organisms including octopods and squids that live at depths between 1000 and 2000 meters below the surface of the sea. Researchers have measured concerning levels of PBDEs contaminating Canadian landscapes, from the Great Lakes to the Arctic, and building up in the tissues of Canadian wildlife, including polar bears, grizzly bears, and killer whales. A recent study of herring gull eggs from the Great Lakes region found that the concentrations of decaBDE in the eggs, the most prevalent PBDE still in use today, is doubling every 2 to 3 years.

Furthermore, studies have found that higher brominated PBDEs like decaBDE break down naturally into the lower brominated PBDEs. Thus only a ban that includes all PBDEs in all products will be completely effective at lowering the levels in the environment.

### **Measures to Ban PBDEs in other Jurisdictions**

**February 2003** - the European Union bans the commercial mixtures OctaBDE and PentaBDE. The ban prohibits goods containing OctaBDE and PentaBDE from being placed on the market in the EU.

**January 2005** - the US passes a law which effectively bans the import and manufacturing of OctaBDE and PentaBDE.

**February 2006** - China passes a law banning the use of OctaBDE and PentaBDE in new electrical and electronic equipment (i.e. Restriction on Hazardous Substances – China RoHS).

**August 2006** - Sweden approves a ban on the use of DecaBDE in textiles, furniture and some electronics. In May 2008, the Swedish ban is supplanted by European Union Restrictions on Hazardous Substances (RoHS) for DecaBDE - see below – as Sweden is a member-country of the EU.

**April 17th, 2007** - Washington State banned the use of DecaBDE in mattresses as of January 2008 and televisions, computers, and residential upholstered furniture by 2011.

**June 14th, 2007** - Maine banned the use of DecaBDE in mattresses and upholstered furniture as of January 2008 and computers and plastic cased electronics like televisions in January 2010. Maine had already banned the use of PentaBDE and OctaBDE commercial mixtures along with eleven other US states.

**January 18th, 2008** - Norway announces a ban on the use of DecaBDE in new consumer products.

**July 1<sup>st</sup>, 2008** - European Union bans the use of DecaBDE in electrical and electronic goods, following a ruling from the European Court of Justice on April 1<sup>st</sup>, 2008. DecaBDE in electrical and electronic goods was banned in 2002 under the EU's Restriction on Hazardous Substances (RoHS) law, but in 2005 the Commission lifted the ban, citing "practicalities". Denmark, backed by members of the European Parliament, challenged this decision and won and the ban was reinstated.

**May 2009** - PentaBDE and OctaBDE are added the Stockholm Convention on Persistent Organic Pollutants (POPs) which requires parties to take action to prohibit the manufacturing and import of the chemicals.

**May 8<sup>th</sup>, 2009** - Vermont passed a ban on DecaBDE in mattresses and upholstered furniture effective July 1, 2010 and a ban on the manufacturing, sale or distribution of televisions or computers with decaBDE effective July 1, 2011.

**December, 2009** - PentaBDE and OctaBDE are added to the Persistent Organic Pollutant (POPs) Protocol of the United Nations Convention on Long Range Transboundary Air Pollution (LRTAP).

**December 30, 2009** - The three largest manufactures of decaBDE substances in the United States, after negotiations with the US Environmental Protection Agency, announced their intention to phase out by the end of 2013, the production and import of the substance in the United States.