Decabromodiphenyl Ether (Deca-BDE)

Legislation in the 2007 session directed the Minnesota Pollution Control Agency to report to the 2008 Legislature on Decabromodiphenyl Ether (Deca-BDE). Deca-BDE is a high use bromine-based flame retardant that is added to a variety of consumer and commercial products to improve fire resistance. Deca-BDE’s high rate of use around the world and its potential effects on human health and the environment has led several states to consider banning or limiting its use. This fact sheet summarizes highlights from the report submitted to the Legislature on January 15, 2008.

What is Deca-BDE and why is it a concern?
Deca-BDE belongs to a series of chemicals known as polybrominated diphenyl ethers (PBDEs). In use since the 1960s, PBDEs are now ubiquitous in the environment. They are found in indoor and outdoor air, house and office dust, rivers, lakes and sediments, sewage sludge, and in remote arctic regions. They are in crops and animals, including fish, birds, terrestrial and marine mammals, and people.

Interest in PBDEs was sparked in 1999 after a study showed that PBDE concentrations in the breast milk of mothers in Sweden increased exponentially between 1972 and 1999, doubling almost every five years. Subsequent studies showed a similar trend of rapidly increasing PBDE concentrations in the U.S. population. In the U.S., however, the concentrations detected are about 10 times higher than in Sweden.

PBDEs are commercially available in three formulations: Deca-BDE, Octa-BDE and Penta-BDE. In 2004, the sole U.S. manufacturer of Octa- and Penta-BDE voluntarily ceased production of these products. Shortly thereafter, several states and the European Union banned further use of Penta- and Octa-BDE, with Minnesota taking similar action in 2007. Deca-BDE continues to be widely used, although Washington and Maine have taken steps to begin phasing it out.

Deca-BDE’s primary use is in the plastic enclosures of television sets. It is also used in commercial textiles and upholstery, and in a multitude of small parts and wire coatings used in the electronics, communications, and transportation industries.

What risks does Deca-BDE pose to human health and the environment?
Most scientific research on PBDEs has concerned Penta- and Octa-BDE. Scientists did not originally think Deca-BDE posed much risk to wildlife and people because of its large molecular size; for this reason, early studies of PBDEs often did not include Deca-BDE.

Recent studies of Deca-BDE show that:
- Deca-BDE is found at higher concentrations than other PBDEs in house dust, sediments, and sewage sludge, but at lower concentrations in human tissue compared to other PBDEs.

At a glance
- Deca-BDE is one of several bromine-based flame retardants called PBDEs.
- PBDEs are found everywhere in the environment, and their concentrations are increasing.
- Deca-BDE can have toxic effects on animals and can break down into more toxic PBDEs.
- Many scientists feel there are safer alternatives.
• Deca-BDE concentrations in the environment are increasing.
• Deca-BDE can break down into other, more toxic PBDE molecules once released into the environment. This finding is important to the overall evaluation of risk posed by Deca-BDE and its effects on wildlife and humans.
• Toxic effects associated with exposure to Deca-BDE in laboratory animal studies include liver, thyroid, reproductive, developmental, and neurological effects.

While more research is needed to fill data gaps and improve our understanding of Deca’s possible effects, the fact that it can break down to more harmful PBDEs is cited by many scientists and environmental advocates as substantial cause for concern.

**How would a ban on Deca-BDE affect fire safety?**

In the U.S. and around the world, fire safety regulations require that manufacturers meet flammability standards set up by federal and state regulatory agencies. Manufacturers can meet the flammability standards in several different ways, including:
• using chemical flame retardants (Deca-BDE or alternatives)
• using inherently non-flammable materials in the products
• redesigning products to reduce flammability.

Advocacy groups report that many television manufacturers are voluntarily moving away from using Deca-BDE, and that the textile industry is employing a number of different approaches to achieve required flammability standards, most of which do not require use of chemical flame retardants. These voluntary actions demonstrate that a phase-out of Deca-BDE in the applications where it is used the most can be implemented without compromising fire safety.

**Are safer and effective alternatives to Deca-BDE available?**

Many stakeholders have expressed concern about the potential health and environmental risks posed by the alternatives that would replace Deca-BDE if it is banned. This is an area of uncertainty because less research has been conducted on the environmental behavior and toxicology of likely alternatives.

Potential alternatives from the halogen-based group of flame retardants include other bromine- and chlorine-based chemicals that are similar to PBDEs. Many scientists believe halogenated alternatives should not be considered safer than Deca-BDE, because of their similarity to Deca and the likelihood that these chemicals will also prove to be persistent, bioaccumulative and toxic in the environment.

Potential non-halogenated alternatives to Deca-BDE include phosphorus- and magnesium-based flame retardants. The non-halogenated alternatives are generally thought to be less toxic, persistent and bioaccumulative than the halogenated alternatives. Several state-sponsored studies conclude that certain non-halogenated flame retardants represent safer alternatives to Deca-BDE.

**What is the cost associated with Deca-BDE alternatives?**

Advocacy groups and state-sponsored studies have found that the costs associated with phasing out Deca-BDE from TV enclosures and textiles are minor. However, eliminating the use of Deca-BDE in small parts and wiring used by the medical-device and transportation (including aerospace) industries does pose a concern. This is primarily because of the highly regulated nature of these industries and the extensive product testing required by both regulatory agencies and the manufacturers to certify their products.

**For more information**

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