Environment Canada Environnement Canada

# CONSULTATION DOCUMENT ON THE PROPOSED RISK MANAGEMENT INSTRUMENT FOR PRODUCTS CONTAINING POLYBROMINATED DIPHENYL ETHERS (PBDEs)

| **PBDE** | **CAS No.*** |
|---|---|
| tetrabromodiphenyl ethers (tetraBDE) | 40088-47-9 |
| pentabromodiphenyl ethers (pentaBDE) | 32534-81-9 |
| hexabromodiphenyl ethers (hexaBDE) | 36483-60-0 |
| heptabromodiphenyl ethers (heptaBDE) | 68928-80-3 |
| octabromodiphenyl ethers (octaBDE) | 32536-52-0 |
| nonabromodiphenyl ethers (nonaBDE) | 63936-56-1 |
| decabromodiphenyl ethers (decaBDE) | 1163-19-5 |

Products Division
Chemicals Sector Directorate

September 2013

* Chemical Abstracts Service (CAS) Registry Numbers

Canada

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# 1. INTRODUCTION

## 1.1 Objective of this Consultation

Environment Canada has prepared this consultation document to inform stakeholders and solicit feedback on the key elements of the proposed risk management measure for **products** containing polybrominated diphenyl ethers (PBDEs) other than mixtures, polymers and resins.

This consultation paper aims to:

- identify and inform stakeholders on the proposed risk management measure for products containing PBDEs other than mixtures, polymers and resins;
- obtain further information with respect to the economic considerations; and
- provide an opportunity for stakeholders to comment on the approach.

The Government of Canada is committed to providing interested or affected parties with the opportunity to take part in consultations at all stages of the development process. All parties may comment in writing by mail, fax or email to the addresses provided in Section 7 of this document**.**

This initiative is in addition to the consultation document[1] on the substance – based controls for Decabromodiphenyl ethers (DecaBDE) commercial mixture published on February 5, 2013.

## 1.2 Consultation Process

This document's purpose is to provide focus and guidance to the consultation. In soliciting input from stakeholders, Environment Canada has posted a copy of the document on the CEPA Environmental Registry website and distributed it by email and regular mail to all designated Canadian stakeholders, including representatives from other federal departments; provincial, territorial and municipal governments; industry; environmental groups; and public advocacy groups.

Environment Canada will review all written responses received during the consultation period prior to drafting and publishing the proposed instrument in the *Canada Gazette*, Part I. A summary of comments received will be published concurrently with the proposed instrument. Environment Canada welcomes the addition of contacts who were not previously involved in the stakeholder consultation, and the distribution of this document to other potential stakeholders.

[1] Available from http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=92B7DD05-1

It is expected that stakeholders may include non-governmental organizations, provincial, territorial and federal government departments, associations, as well as industries and companies belonging to the following sectors:

- chemical manufacturing and distribution;
- electrical and electronic equipment (EEE);
- transportation;
- construction/industrial;
- plastics and plasticizer manufacturing and distribution;
- textiles;
- importing of consumer products; and
- other commercial manufacturing.

# 2. BACKGROUND

## 2.1 Summary of Environmental and Human Health Impact Assessments of PBDEs

The *Ecological Screening Assessment Report on Polybrominated Diphenyl Ethers (PBDEs)*[2] and the *State of the Science Report for a Screening Health Assessment for Polybrominated Diphenyl Ethers (PBDEs)*[3] were prepared under the *Canadian Environmental Protection Act, 1999* (CEPA 1999). A summary of the final ecological and human health screening assessment reports was published in Part I of the *Canada Gazette* on July 1, 2006.[4]

The *State of the Science Report on the Bioaccumulation and Transformation of Decabromodiphenyl Ether (decaBDE)*[5] was published in August 2010, based on new information that became available after publication of the final PBDE assessment. The report concluded that:

- decaBDE is not sufficiently bioaccumulative to meet the criteria for bioaccumulation stated in the *Persistence and Bioaccumulation Regulations* under CEPA 1999;
- however, there is sufficient evidence that decaBDE is transforming in the environment to other PBDEs that meet the criteria for virtual elimination.

The outcome of this review and comments received from the public provided justification for the development of additional regulatory controls and the revision of the PBDE Risk Management Strategy.

[2] Available from http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=0DDA2F24-1.
[3] Available from http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/pbde/index-eng.php.
[4] Summary of the Screening Assessment of Polybrominated Diphenyl Ethers. *Canada Gazette*, Part I, vol. 140, no. 26, p.1852-1855.
[5] Available from http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=B901A9EB.

## 2.2 Revised Risk Management Objective

As outlined in the revised *Risk Management Strategy for Polybrominated Diphenyl Ethers (PBDEs)*, the risk management objective for all PBDEs assessed under CEPA 1999 is to prevent the introduction of their manufacture in Canada, their import into Canada and to minimize their releases into the environment from all sources in Canada. To accomplish the objective, the revised Risk Management Stategy proposed the use of a multi-instrument approach to minimize releases of PBDEs from all sources to the environment. It proposed to extend existing substance-based controls and implement controls for products containing PBDEs.

The Government of Canada proposes to implement regulations to extend the existing PBDE prohibition to prohibit the use, sale, offer for sale, and import to heptabromodiphenyl ethers (heptaBDE), octabromodiphenyl ethers (octaBDE), nonabromodiphenyl ethers (nonaBDE) and decabromodiphenyl ethers (decaBDE). As a result, the commercial mixture DecaBDE would be prohibited. On February 5, 2013, a separate consultation document[6] on the proposed risk management measure for PBDEs, specifically the commercial mixture DecaBDE, was published for a 60-day public comment period. The comments received will be considered in finalizing the risk management measures for these substances.

For products, the approach considers the need for risk management measures that would apply to all products, and includes all seven PBDE groups assessed under CEPA 1999 (see Table 1).

## 2.3 Overview of Existing Initiatives on PBDEs in Canada

The *Polybrominated Diphenyl Ethers Regulations*[7] were made under CEPA 1999 and came into force on June 19, 2008. The regulations prohibit the manufacture of all seven PBDE groups assessed under CEPA 1999 (i.e., tetra-, penta-, hexa-, hepta-, octa-, nona- and decaBDE) in Canada. The regulations also prohibit the use, sale, offer for sale and import of mixtures, polymers and resins containing tetra-, penta- and hexaBDE.

In Canada, there are no specific controls for PBDEs in products, other than for mixtures, polymers and resins. Annex A provides a sector-by-sector summary of regulations for products containing PBDEs in jurisdictions outside of Canada as well as under international agreements.

[6] Available from http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=92B7DD05-1
[7] For more information, visit http://www.ec.gc.ca/lcpe-cepa/eng/regulations/detailReg.cfm?intReg=108.

## 2.4 Substance Information

PBDEs are a class of substances that have been used as flame retardants in a wide variety of products. These substances contain an identical base structure, but differ in the number of attached bromine atoms (ranging from 1 to 10). Table 1 shows the seven PBDE groups present on the Canadian Domestic Substances List that have been assessed by Environment Canada and Health Canada.

**Table 1: PBDE groups assessed by Environment Canada and Health Canada**

| *PBDE* | *CAS No.** | *Molecular Formula* |
|---|---|---|
| tetrabromodiphenyl ethers (tetraBDE) | 40088-47-9 | $C_{12}H_6Br_4O$ |
| pentabromodiphenyl ethers (pentaBDE) | 32534-81-9 | $C_{12}H_5Br_5O$ |
| hexabromodiphenyl ethers (hexaBDE) | 36483-60-0 | $C_{12}H_4Br_6O$ |
| heptabromodiphenyl ethers (heptaBDE) | 68928-80-3 | $C_{12}H_3Br_7O$ |
| octabromodiphenyl ethers (octaBDE) | 32536-52-0 | $C_{12}H_2Br_8O$ |
| nonabromodiphenyl ethers (nonaBDE) | 63936-56-1 | $C_{12}HBr_9O$ |
| decabromodiphenyl ethers (decaBDE) | 1163-19-5 | $C_{12}Br_{10}O$ |

* Chemical Abstracts Service (CAS) Registry Numbers

PBDEs have generally been sold in three commercial mixtures: PentaBDE, OctaBDE and DecaBDE, each of which contains two or more of the seven PBDE groups. Table 2 shows the typical compositions of these commercial mixtures. Additionally, information on the uses of these commercial mixtures is provided in Section 3.1.

**Table 2: Typical compositions of the PBDE commercial mixtures[8]**

| **Commercial Mixtures** | **PBDE Groups** | | | | | | |
|---|---|---|---|---|---|---|---|
| | **tetraBDE** | **pentaBDE** | **hexaBDE** | **heptaBDE** | **octaBDE** | **nonaBDE** | **decaBDE** |
| **PentaBDE** | 24-38% | 50-62% | 4-12% | Trace | - | - | - |
| **OctaBDE** | - | 0.5% | 12% | 45% | 33% | 10% | 0.7% |
| **DecaBDE** | - | - | - | - | Trace | 0.3-3% | 97-98% |

[8] For the purposes of this document, PBDE commercial mixtures are capitalized to distinguish them from the types of PBDEs they contain (e.g., “PentaBDE” refers to the commercial mixture, while “pentaBDE” refers to the PBDE groups).

At the end of 2004, production of the PentaBDE and OctaBDE commercial mixtures ceased in the United States, due to a voluntary phase-out by industry. PBDEs have never been manufactured in Canada.

In December 2009, in concert with the U.S. Environmental Protection Agency (U.S. EPA), Albemarle Corporation, Chemtura Corporation and ICL Industrial Products, which represent two U.S. manufacturers and one U.S. importer of the DecaBDE commercial mixture (containing nona- and decaBDE groups), announced their intention to voluntarily phase out the production of DecaBDE in the United States by 2013.[9] In 2010, those three companies extended their voluntary commitment to phase out exports of DecaBDE to Canada.[10]

While imports to Canada are declining, DecaBDE could still enter Canada through importation in the following forms:

- as a chemical formulation;
- as a component in resins, polymers or substrates;
- as a component in semi-finished articles, materials or components;
- as a component made from recycled products; and
- as a component in finished products.

# 3. USES OF PRODUCTS OTHER THAN MIXTURES, POLYMERS AND RESINS CONTAINING PBDEs

## 3.1 Current Uses

In general, plastics are the primary end-use for flame retardants, including PBDEs, due to the inherent flammability of many plastics. Consequently, PBDEs have seen widespread use in electrical and electronic goods, transportation, textiles and construction products.

As outlined below, there are substantial differences in the historic use patterns of the three commercial mixtures, i.e., PentaBDE, OctaBDE and DecaBDE.

**PentaBDE Commercial Mixture**

- The PentaBDE commercial mixture was primarily used in polyurethane resins, particularly foams. The downstream industries that employed such products were primarily the users of polyurethane foams (PUFs) containing flame retardants, including manufacturers of furniture and bedding, moulded and

[9] Information on the DecaBDE Phase Out Initiative and commitment letters from the manufacturers are available at http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/deccadbe.html.

[10] For more information, visit http://www.ec.gc.ca/toxiques-toxics/default.asp?lang=en&n=F64D6E3B-1&xml=F64D6E3B-0328-4C11-A9E4-790D053E42A1.

slab foams for automotive parts, carpets and rugs with polyurethane underlay, and building construction foam.

**OctaBDE Commercial Mixture**

- The OctaBDE commercial mixture was primarily used in acrylonitrile butadiene styrene (ABS) resins. The downstream industries that used ABS containing OctaBDE were manufacturers of electrical and electronic products. These resins were used for computer housings, appliances, automotive parts and communications equipment.

**DecaBDE Commercial Mixture**

- The three largest manufacturers of DecaBDE to Canada have voluntarily ceased exports to Canada; however DecaBDE may potentially be present in a variety of imported products, or products currently in use.
- Primary uses of the DecaBDE mixture are as an additive to plastics and other resins, as coatings on textiles, and as an additive to sheeting on cables. In turn, these uses have been linked to other uses in the electronics/electrical, textiles, transportation, and construction/industrial sectors. Examples of applications where DecaBDE may still be used are provided in Annex B.

A move away from DecaBDE towards alternative flame retardants and, in certain cases, flame-retardant barriers in products, in lieu of chemicals, means that many of the applications listed in Annex B no longer use DecaBDE, especially in view of the phase-out in the United States and the broad controls proposed in other jurisdictions.

In 2005, a PBDE technical and socio-economic report estimated that electronic enclosures (housings and casings made of high-impact polystyrene [HIPS]) accounted for approximately 80% of DecaBDE use, with textile applications accounting for 10-20%.[11] In recent years, however, there has been a shift in the use profile for this substance: manufacturers of electronics and mattresses have moved to alternative flame retardants, based in part on the impact of the European Union's Restriction of Hazardous Substances Directive (EU RoHS) for the use of certain substances, and the impact of regulations established in a number of U.S. states.

Indications are that the most widespread remaining uses of DecaBDE are in transportation, textiles, electrical and electronic equipment, and construction/ industrial (e.g., new uses such as plastic shipping pallets).

[11] The Lowell Center for Sustainable Production, Decabromodiphenylether: An Investigation of Non-Halogen Substitutes in Electronic Enclosure and Textile Applications, April, 2005. Available from http://sustainableproduction.org/downloads/DecaBDESubstitutesFinal4-15-05.pdf.

## 3.2 Alternatives

While PBDEs have been used for a wide array of applications, a variety of alternatives are being used as replacements, such as other brominated flame retardants and halogen-free flame retardants. Currently, the use of flame-retardant barriers and substituting traditional materials with inherently fire-resistant materials are considered viable alternatives. Furthermore, work is underway under the U.S. EPA's Design for the Environment program to assess the hazards posed by these alternative chemicals. The results of this exercise are expected later in 2013.[12]

In this consultation process, Environment Canada is seeking comments on viable alternatives for remaining uses of products containing PBDEs.

# 4. RISK MANAGEMENT INSTRUMENT

## 4.1 Regulatory Framework

To achieve the risk management objective, the Government of Canada is proposing to prohibit the manufacture, import, sale and offer for sale of any product containing tetraBDE, pentaBDE, hexaBDE, heptaBDE, octaBDE, nonaBDE or decaBDE, other than mixtures, polymers and resins.

As part of its regulatory reform, the Government of Canada has introduced the "One-for-One" Rule and the Small Business Lens. In moving forward with the proposed regulations, Environment Canada will apply these two programs to ensure that administrative burden is reduced where possible and that small businesses are taken into account with respect to any administrative and compliance challenges.

**"One-for-One" Rule[13]**
The "One-for-One" Rule is aimed at reducing administrative burden on business and limiting growth in the number of federal regulations. It will require regulators to remove a regulation each time they introduce a new regulation that imposes administrative burden; and when a new or amended regulation increases administrative burden on business, the Government will also offset, from existing regulations, an equal amount of administrative burden costs for business.

The "One-for-One" Rule is intended to be implemented in a manner that does not compromise environmental protection objectives. The Rule is one of several requirements that must be considered when deciding on the most appropriate

[12] For more information, visit http://www.epa.gov/dfe/pubs/projects/decaBDE/index.htm.
[13] For more information, visit http://www.tbs-sct.gc.ca/media/nr-cp/2012/1001-eng.asp.

Risk Management (RM) instrument for a given situation. If the chosen RM instrument is a regulation, the “One-for-One” Rule may apply.

**Small Business Lens**

The purpose of introducing a small business lens is to ensure that the specific needs of small business are considered and that the least burdensome but most effective approach to addressing these needs is identified. Small businesses are defined as any business, including its affiliates, that has fewer than 100 employees or between $30 000 and $5 million in annual gross revenues.

## 4.2 Elements of the Proposed Regulations

### 4.2.1 Application

The regulations would apply to the manufacture, import, sale and offer for sale of any product containing a PBDE (tetraBDE, pentaBDE, hexaBDE, heptaBDE, octaBDE, nonaBDE and decaBDE).

A threshold of 0.1% by weight in homogeneous material is being considered for DecaBDE commercial mixtures (which are not covered under the Stockholm Convention but which include octaBDE, nonaBDE and decaBDE). This threshold would be similar to that of other jurisdictions, namely EU RoHS in electrical and electronic equipment, European Union Directive 2003/11/EC, DecaBDE regulations in Norway, and regulations in several U.S. states (see Annex A). This proposed threshold would also allow for unintentional uses of DecaBDE in products, such as when contained in recycled material that has been chemically or physically modified (e.g., remoulded, reformulated or reconstituted).

Environment Canada does not intend to propose a specific threshold for tetraBDE, pentaBDE, hexaBDE and heptaBDE in products, as Canada has already ratified and implemented amendments to the Stockholm Convention regulating these substances, and a threshold was not relied upon for that implementation (see Annex A, section 5).

### 4.2.2 Permitted Activities

The manufacture, import, use and sale of replacement parts for products containing DecaBDE would be permitted for products manufactured or imported prior to the coming into force of the proposed regulations.

### 4.2.3 Exemptions

At this time, there are no anticipated exemptions for products and product components containing PBDEs, but Environment Canada would appreciate to

receive comments on that subject. If, during this consultation process, products are identified for which there are no technically and economically viable alternatives, consideration will be given to their exemptions.

### 4.2.4 Labelling

Labels indicating that a product contains PBDEs would not be required. However, it is proposed that any person that manufactures, imports, sells or offers for sale products that are subject to the proposed regulations would have to indicate on the container in which the product is to be sold the date on which the product was manufactured or a manufacturing date code (e.g., a batch code). When a code is used, the person shall provide an explanation of it to the Minister when requested to do so.

### 4.2.5 Testing and Accreditation Requirements

It is proposed that provisions on the use of accredited laboratory and test methods will be included in the proposed regulations. Currently, the test method indicated below is being proposed, and it is requested that stakeholders identify additional test methods or alternate approaches that should be considered. Environment Canada welcomes any suggestions on this subject.

The quantity of PBDE found in a product would be determined using the following standard:

- IEC 62321 Test Standard, which includes a PBDEs test method (for EEE polymers)

The purpose of including test methods in the proposed regulations will be to indicate to the regulated community the test methods that would be used by Environment Canada to verify compliance with the regulations.

### 4.2.6 Reporting Requirements

There are no anticipated reporting requirements.

### 4.2.7 Record Keeping

It is proposed that there be record-keeping provisions included in the proposed regulations, to achieve the following:

- specify what the Enforcement Services of Environment Canada may require from the regulated companies;
- define which records are most relevant for the regulated companies to maintain; and

- ensure that, should an investigation be necessary, Environment Canada's enforcement officers will have access to the necessary records within their jurisdiction.

Under the proposed regulations, regulatees would be required to retain all relevant records for a period of at least five years beginning on the date of their creation, and to make the records available to the Minister of Environment or an enforcement officer upon request.

In order to reduce administrative burden, the information required under the proposed record-keeping requirements would be information already collected under other existing regulations.

### 4.2.8 Coming into Force

Comments on the proposed coming-into-force date are welcomed, and will assist with a suitable transition time away from PBDEs to a suitable alternative.

### 4.2.9 Administration and Compliance Verification

Regulated companies would be subject to enforcement and compliance requirements and penalties as specified under CEPA 1999.

## 5. ECONOMIC AND OTHER CONSIDERATIONS

Economic, safety and environmental impacts will be considered during the development of the measures outlined in the preceding sections. Based on preliminary information, data gaps such as the actual quantity of PBDEs in products manufactured in and imported into Canada, as well as the use pattern of these products, have been identified. A study was conducted to gather the necessary information on PBDEs in products in order to ensure that the data gaps have been addressed. Environment Canada will be consulting stakeholders for feedback and input on these considerations during the development of the proposed regulations, as well as part of the public consultation following publication of the proposed Regulations in *Canada Gazette*, Part I.

## 6. CONSULTATION

To assist with the development of the proposed risk instrument, Environment Canada is soliciting information from stakeholders. Below are the questions being posed and areas of interest for which input is being sought. Submissions should be prepared in accordance with the instructions contained in Section 7.

- How are DecaBDEs used in products by your organization (e.g., computer housings, appliances, automotive parts and communication equipment, etc.)?
- What are the trends for PBDEs use in products, i.e., has consumption increased, decreased or remained the same?
- Are there PBDE substitutes available for your products?
- Are you manufacturing products containing PBDEs specifically to be sold in Canada?
- What is the percentage of products containing PBDEs manufactured in Canada in order to be exported?
- Do the identified substitutes have an impact on the efficacy of the products? If so, what are the impacts?
- If available, what is the DecaBDE concentration in your product?
- If available, please provide the material safety data sheet (MSDS) for your product containing PBDEs.

## 7. NEXT STEPS AND PROPOSED TIMELINE

Industry and other interested stakeholders are invited to submit comments on the content of this consultation document or provide other information that would help inform decision making. Industry and other interested stakeholders are also invited to submit information on how they wish to receive information from Environment Canada on existing and new regulations. Please submit comments prior to November 28, 2013.

In addition, Environment Canada welcomes the sharing of this document with other interested stakeholders. The document is posted on the CEPA Registry website at www.ec.gc.ca/ceparegistry.

Comments on this risk management instrument proposal should be submitted to the addresses provided below.

| | |
|---|---|
| By Mail | Products Division<br>Environment Canada<br>Place Vincent Massey, 9th Floor<br>351 St. Joseph Boulevard<br>Gatineau QC K1A 0H3 |
| By Email | **products.produits@ec.gc.ca**<br><br>Please type “Consultation on Products Containing PBDEs” in the subject line of your message. |
| By Fax | 819-953-3132 |

# ANNEX A: ACTIONS IN OTHER JURISDICTIONS

## 1. Regulations affecting electrical and electronic equipment (EEE) products containing PBDEs

### 1.1 Europe

- The European Union's Restriction on the Use of Certain Hazardous Substances (EU RoHS) in EEE restricts the content of all PBDEs in products to no greater than 0.1% by weight at the homogeneous level[14] of a product.
- The European Union Waste and Electrical and Electronic Equipment (WEEE) Directive requires product manufacturers to reuse, recycle and recover EEE waste, and that plastics containing brominated flame retardants (including PBDEs) be removed from the EEE waste and properly disposed of.
- The European Union Directive 2003/11/EC prohibits the use of the PentaBDE and OctaBDE commercial mixtures in all manufactured or imported products at concentrations greater than 0.1% by weight.
- Norway has enacted regulations that restrict the use of the DecaBDE commercial mixture in all manufactured products (excluding transportation applications) at concentrations greater than 0.1% by weight.

### 1.2 United States

- Restrictions have been introduced in many U.S. states, mainly prohibiting the manufacture and sale of products containing more than 0.1% by weight of the PentaBDE and OctaBDE commercial mixtures. Several states are also proposing the restricted use of the DecaBDE commercial mixture.
- Four states have signed into legislation the prohibition of DecaBDE in EEE applications.
- The U.S. EPA's action plan for PBDEs[15] calls for the following:
    - Support for the phase-out of the DecaBDE commercial mixtures. The U.S. EPA has received commitments from the principal manufacturers and importers for all sales of DecaBDE commercial mixtures to cease by December 31, 2013.

[14] The definition of a homogeneous material can be found in the Frequently Asked Questions of the EU RoHS and EU WEEE (European Commission 2006) and in the proposal to update the EU RoHS Directive.

[15] For further information, visit http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/pbde.html .

- Initiate rulemaking under the Toxic Substances Control Act (TSCA) §5(b)(4) Concern List on PBDEs.
- Initiate action to include articles in current Penta/OctaBDE significant new use rule (SNUR), which requires new chemical notices for new uses or imports.
    - The proposed PBDE SNUR was published on April 2, 2012.
- Initiate rulemaking to simultaneously propose a SNUR and the previously announced TSCA §4 test rule for DecaBDE. The significant new use would be manufacture (including import) of DecaBDE or articles to which DecaBDE has been added. The test rule would require laboratory studies to determine the effects that decaBDE has on human health and the environment.
    - The proposed PBDE SNUR and test rule were published on April 2, 2012.

### 1.3 Asia

- China has implemented a staged approach that initially required labelling and disclosure of PBDE content in EEE products followed by product-specific restrictions.
- Japan implemented the Law for the Promotion of Effective Utilization of Resources, which requires the labelling of select EEE and white goods for the presence of substances covered under the EU's RoHS Directive.
- Korea implemented a law that includes exemptions, limit values and substance restrictions for electronic products and vehicles.

## 2. Regulations affecting textiles and related products containing PBDEs

- Four U.S. states have taken measures to restrict the content of DecaBDE in textile applications.
- The State of Washington has prohibited the manufacture, sale, offer for sale and distribution of mattresses containing DecaBDE.
- The States of Maine and Vermont have prohibited the manufacture, sale, offer for sale and distribution of mattresses, mattress pads and upholstered furniture intended for residential use that contain DecaBDE.
- The State of Oregon has prohibited the introduction into commerce of any product, excluding transport applications, that contain more than 0.1% by weight of DecaBDE.
- Norway has a broad restriction on products containing DecaBDE, which includes textiles and related products.

## 3. Regulations affecting transportation vehicles/products containing PBDEs

- The use of PentaBDE and OctaBDE have been prohibited in all products by the majority of the international community (see section 5).
- No jurisdictions currently restrict the use of DecaBDE in any transportation application.
- The U.S. EPA and the EU under REACH are currently considering additional controls on DecaBDE which may include products in the transportation sector.

## 4. Regulations affecting building/construction/industrial products containing PBDEs

- The use of PentaBDE and OctaBDE has been prohibited in all products by the majority of the international community (see section 5).
- No jurisdictions (with the exception of Norway) restrict the use of DecaBDE in applications related to this sector.
- The U.S. EPA and the EU under the Registration, Evaluation, Authorisation and Restriction of Chemical substances (REACH) are considering additional controls on DecaBDE, which may include products in the transportation sector.

## 5. International agreements

PBDEs are prohibited under two international agreements: the Stockholm Convention on Persistent Organic Pollutants (POPs), and the Protocol on Persistent Organic Pollutants under the Convention on Long-range Transboundary Air Pollution. In 2009, tetraBDE, pentaBDE, hexaBDE and heptaBDE (components that make up the PentaBDE and OctaBDE commercial mixtures) were added to Annex A of the Stockholm Convention and Annex 1 of the Protocol on POPs. For the Stockholm Convention, this resulted in a prohibition on the production, use, import and export of these substances, with specific exemptions for recycling of articles until 2030 (at the latest). Canada ratified these amendments in 2011 through, among other things, the *Polybrominated Diphenyl Ethers Regulations* published in 2008. Under the 2009 amendments to those regulations, exports of articles containing levels or concentrations of the listed PBDEs above domestically regulated levels or concentrations are not allowed.

## ANNEX B: POTENTIAL APPLICATIONS WHERE THE DECABDE MIXTURE MAY STILL BE USED

| Sector | Example Applications |
|---|---|
| Electrical and electronic equipment (EEE) | • Housings and internal components of TVs, mobile phones, fax machines, audio and video equipment, remote controls, communications cables, capacitor films, building cables, wire, cables, connectors in electrical and electronic equipment, circuit breakers, coils, printing and photocopy machine components (toner cartridges and connectors), and scanner components<br>• Household-specific items including lamp sockets, kitchen hoods, electrical kitchen appliances, components of water-heating devices, components of electrical appliances (i.e., transformers and switches), and components in fans, heating fans and hair dryers |
| Textiles | • Upholstered furniture (i.e., textiles and polyurethane foam used in sofas, office chairs, stadium seats and transportation fabrics), tents, mattresses, carpets, hanging drapes, awnings and specialized clothing |
| Transportation (automobiles / mass transportation) | • Fabric material where DecaBDE is encapsulated in back-coating of articles: rear deck, upholstery, headliner, sun visor, head rest and trim panel<br>• Reinforced plastics, including instrument panel and interior trim<br>• Under the hood or dash, including terminal/fuse block, higher amperage wire, and cable jacketing (spark plug wire)<br>• EEE, including battery case, battery tray, engine control, electrical connectors, components of radio disk, GPS and computer systems |
| Transportation (airplanes, ships/boats) | • Electrical wiring and cables<br>• EEE, including navigation and telecommunications equipment, computers and computer devices, audio and video equipment, electrical connectors, appliances, housings and internal components of TVs, fax machines, remote controls, communications cables, capacitor films, cables, circuit breakers, printing and photocopy machine components (toner cartridges and connectors), scanner components, air ducts for ventilation systems, electrical ducts and fittings, switches and connectors, and components in |

| Sector | Example Applications |
|---|---|
| | fans, heating fans and hair dryers |
| Building/ construction/ industrial | • Pipes, lamp holders, stadium seats, reinforced plastics, switches and connectors, facing laminates for insulation panels, film for use under the roof and to protect building areas, electrical ducts and fittings, components in analytical equipment in industrial and medical laboratories, air ducts for ventilation systems, pillars for telephone and communication cables, and plastic pallets |

NOTE: Information contained in this table is taken from the Bromine Science and Environmental Forum (BSEF) fact sheet entitled Applications of Deca-BDE,[16] a PBDE technical and socio-economic report (Cheminfo 2008),[17] and a study on the importation of PBDEs in products into Canada (Cheminfo 2012).[18]

[16] http://www.bsef.com/uploads/library/Deca-BDE%20Applications%202.06.pdf

[17] Unpublished confidential study submitted to Environment Canada, Chemicals Management Division: Technical and Socio-Economic Analysis of Proposed Regulations for Addressing Products Containing Polybrominated Diphenyl Ethers, final version.

[18] Unpublished confidential study submitted to Environment Canada: Analysis of the Importation of Polybrominated Diphenyl Ethers (PBDEs) in Products into Canada, final version.