



RISK MANAGEMENT STRATEGY FOR POLYBROMINATED DIPHENYL ETHERS (PBDEs)

**tetrabromodiphenyl ether
pentabromodiphenyl ether
hexabromodiphenyl ether
heptabromodiphenyl ether
octabromodiphenyl ether
nonabromodiphenyl ether
decabromodiphenyl ether**

Chemicals Sector Division
Environmental Stewardship Branch
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1. ISSUE

Ecological and human health screening assessments were conducted for polybrominated diphenyl ethers (PBDEs) under the *Canadian Environmental Protection Act, 1999* (CEPA 1999). Included in these screening assessments were the seven PBDEs (tetraBDE, pentaBDE, hexaBDE, heptaBDE, octaBDE, nonaBDE and decaBDE) that are contained in three commercial PBDE mixtures. 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.

The ecological screening assessment report concludes that PBDEs are entering the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity. It is, therefore, recommended that tetraBDE, pentaBDE, hexaBDE, heptaBDE, octaBDE, nonaBDE and decaBDE be added to Schedule 1 of CEPA 1999, as they meet the criteria set out in paragraph 64(a) of the Act.

It is also concluded that tetra-, penta- and hexaBDE meet the criteria for persistence and bioaccumulation, as defined by the *Persistence and Bioaccumulation Regulations* of CEPA 1999, and their presence in the environment results primarily from human activity. Therefore, tetraBDE, pentaBDE and hexaBDE meet the conditions set out in CEPA 1999 for mandatory addition to the Virtual Elimination List.

The human health risk assessment concluded that worst-case estimates of the exposure of Canadians to PBDEs were much less than those which caused health effects in animals. It is noted that the control measures that Environment Canada will be proposing to protect the environment from PBDEs are expected to also reduce exposure of humans. With the upward trend noted in the levels of human exposure to PBDEs, Health Canada is fully supportive of taking control measures to prevent exposure to PBDEs from increasing to a level that could pose a risk to the health of Canadians.

The Ministers of the Environment and Health must now propose preventive or control measures to manage these substances no later than July 1, 2008. Furthermore, the measures must be finalized within 18 months thereafter.

2. BACKGROUND

2.1 *Substance Information*

Polybrominated diphenyl ethers (PBDEs) are a class of substances that are 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). The following seven PBDEs, present on the Canadian Domestic Substances List, were assessed by Environment Canada and Health Canada:

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

* Chemical Abstracts Service (CAS) Registry Numbers

All seven PBDEs assessed are highly persistent and certain PBDEs have been detected in the Arctic, thus indicating that they are subject to long-range environmental transport. Each satisfies the requirements for persistence as defined in the *Persistence and Bioaccumulation Regulations* under CEPA 1999.

In addition, tetra-, penta- and hexaBDE are highly bioaccumulative and satisfy the criteria for bioaccumulation under these same Regulations. As these PBDEs also result primarily from human activity, they meet the conditions set out in subsection 77(3) of CEPA 1999 for mandatory addition to the Virtual Elimination List.

It is expected that PBDEs entering the environment will tend to bind to the organic fraction of particulate matter, notably in sediment and soil, with only small amounts partitioning into water and air. For this reason, PBDEs are considered to present a negligible risk with respect to atmospheric processes such as global warming, stratospheric ozone depletion and ground-level ozone formation.

2.2 *Production, Import, Export and Uses of PBDEs*

PBDEs are not manufactured in Canada. All PBDEs used in Canada are imported and enter Canada:

- as chemical formulations from foreign producers;
- in resins, polymers or substrates containing PBDEs;

- in semi-finished articles, materials or components containing PBDEs; or
- in finished products containing PBDEs.

In general, plastics are the primary end use for flame retardants due to the inherent flammability of many polymers. PBDEs have seen widespread and growing use in motor vehicles, aircraft, construction products and electrical and electronic goods. Smaller markets include textiles, adhesives and sealants, rubber products and coatings.

PBDEs are generally found in three commercial mixtures, PentaBDE, OctaBDE and DecaBDE, each containing two or more of the seven PBDEs. Although the commercial formulations vary in composition, each PBDE is typically present within a certain range. Typical compositions of the commercial mixtures are shown in Figure 1.

Figure 1: Typical Composition of PBDE Commercial Mixtures

Substance Commercial mixture	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%

 PBDEs targeted for virtual elimination

There are substantial differences in the use patterns of the three commercial mixtures.

PentaBDE Commercial Mixture

The PentaBDE commercial mixture is used primarily in polyurethane resins, particularly foams. The downstream industries that use such products are primarily the users of flame-retarded polyurethane (PUR) foams, e.g. furniture and bedding manufacturers, manufacturers of moulded and slab foams for automotive parts, manufacturers of carpets and rugs with polyurethane underlay, and manufacturers of building construction foam.

OctaBDE Commercial Mixture

The OctaBDE commercial mixture is used primarily in acrylonitrile butadiene styrene (ABS) resins. The downstream industries that use OctaBDE-containing ABS are the manufacturers of electrical and electronic products, since such resins are used for computer housings, appliances, automotive parts and communication equipment.

DecaBDE Commercial Mixture

The DecaBDE commercial mixture is used primarily in polystyrene (PS), particularly high impact polystyrene (HIPS), and to a lesser extent in a number of other resins. These DecaBDE flame retarded resins are predominantly used in electrical and electronic products. In addition, DecaBDE commercial mixture is also used in the production of textiles that require flame retardant properties, such as upholstery and drapery fabrics.

While information gathered through an Environment Canada use pattern survey in 2001 revealed that 16 Canadian manufacturers reported using ~1300 tonnes of PBDEs in 2000, the use of PBDEs in Canada has significantly declined. Recent discussions with industry indicate that the use of PentaBDE and OctaBDE commercial mixtures in Canada has been voluntarily phased-out and the amount of DecaBDE imported into Canada has decreased. The only US manufacturer of PentaBDE and OctaBDE commercial mixtures voluntarily ceased production in December 2004. This cessation of production along with the current global regulatory climate for PentaBDE and OctaBDE, which is very unfavourable for continued uses, is expected to have had an impact on Canadian imports of PBDEs contained in these mixtures. Manufacturers of DecaBDE have reported that, in 2004, 85.7 tonnes of DecaBDE commercial mixture were imported into Canada.

Not all imported PBDEs remain within Canada, as some are exported from Canada in finished products, most of which are destined for the United States.

3. WHY WE NEED ACTION

According to the ecological assessment report, PBDEs are entering the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity. PBDEs have been detected in a variety of species worldwide and evidence from many studies indicates that levels of certain PBDEs in biota in North America (including the Canadian Arctic) are increasing steadily and substantially over time. The assessment report indicates that the greatest potential risks from PBDEs in the Canadian environment are the secondary poisoning of wildlife from the consumption of prey containing elevated concentrations of PBDEs and effects on benthic organisms that may result from elevated concentrations of certain PBDEs in sediments.

Given the conclusions of the ecological screening assessment, PBDEs will be managed under the provisions of CEPA 1999 with the objectives of preventing the introduction of their manufacture in Canada and minimizing their release into the environment from all sources in Canada. For tetra- to octaBDEs, another proposed risk management objective is the prevention of their import into Canada.

4. PRESENCE IN THE CANADIAN ENVIRONMENT AND EXPOSURE SOURCES

There are no known natural sources of PBDEs. PBDEs are potentially released to the environment throughout their lifecycle, from the chemicals themselves as well as from products containing them. PBDEs may enter the environment through treated or untreated municipal or industrial wastewater discharges to surface water and also through leachate from landfills and municipal incineration when products and materials containing these substances are sent for final disposal. PBDEs may also be released directly to air, land and surface water when products containing PBDEs are

manufactured and during their use. These exposure sources are discussed in this section.

Releases of PBDEs during the different lifecycle stages vary for each of the commercial mixtures and the products in which they are used. It is estimated that releases from the commercial mixture PentaBDE are primarily associated with in-service use of polyurethane foam and to a lesser extent disposal of the foam at the end of its lifecycle. The majority of releases from the use of the OctaBDE commercial mixture are estimated to be associated with product disposal and materials handling before resin compounding. Releases of the DecaBDE commercial mixture from plastics are mainly associated with product disposal; whereas releases of the DecaBDE commercial mixture associated with textile applications appear to be spread relatively evenly throughout the lifecycle – with most releases being associated with textile processing/finishing and releases during product service life. Releases of DecaBDE commercial mixture during service life of textiles would occur during washing and would be to wastewater.

Industrial and Manufacturing Processes

PBDEs are not manufactured in Canada.

The use of PBDE commercial mixtures in industrial and manufacturing processes includes a wide range of operations in which these substances are used to produce commercial and consumer materials. PBDEs are primarily used in the manufacture of plastics to add flame retardancy to products. PBDEs have experienced widespread and growing use in motor vehicles and aircraft, construction products and electrical and electronic goods. Smaller markets include textiles, adhesives and sealants, rubber products and coatings.

The release of PBDEs from these sources can occur during the handling of PBDEs prior to formulation, during the formulation and processing of PBDEs into resins and during the conversion of these resins into products. Releases from industrial or manufacturing processes will primarily be to wastewater, to air through vaporization and to land from spills and waste disposal. The majority of air releases from manufacturing facilities would rapidly partition to soil and sediments (from 75 to >99%) and remain near their point of release.

Product Use

The day-to-day use of products containing PBDE flame retardants has the potential to release PBDEs to the environment. Emission to air has been identified as a potential source of release due to the vaporization of PBDEs from products. Air releases may be one pathway for PBDE presence in dust. Particle emissions may also result from aging and wear of products (i.e., foam particles from furniture).

PBDEs are released to wastewater, some of which makes its way to the municipal treatment facility, through the disposal of wash water containing PBDEs present in dust. While potential releases to wastewater have also been identified from the washing of

textiles, PBDEs are generally used in textiles such as upholstery fabrics, curtains and tent materials, which are not subject to frequent washing.

Product Disposal

The term “products” refers to articles to which PBDE commercial mixtures have been added. Thus, products may include furniture, carpet backing, textiles, televisions, electronic equipment, computer housings and automotive parts.

The majority of PBDEs used in products remain in the product matrices at the time of disposal. At present, in Canada, most solid articles containing PBDEs are disposed of to landfills. Though the majority of electronic equipment containing PBDEs is sent to landfills, some is sent to recycling facilities for processing into other products.

The release of PBDEs occurs when products containing PBDEs are disposed of in landfill sites at the end of their operational life or, in the case of some products, sent to recycling facilities for processing. Releases may occur at various points during disposal and recycling operations including handling, transport and product breakup at collection sites. While municipal incineration of solid waste is a potential source of PBDE emissions, incineration represents less than 5% of solid waste disposal in Canada.

Landfilling may result in releases of PBDEs to soil, surface water and potentially to groundwater. Based on their properties, it is assumed that PBDEs will partition to soil and sediments and remain close to the point of release. Releases from landfills are dependent on the concentration of these substances remaining in the products at their end of life, landfilling practices and the existence of leachate collection systems.

It should be noted that leachate that may contain PBDEs that is collected from landfills is normally taken to municipal treatment facilities. Since PBDEs are not removed at the treatment process at these facilities, the PBDEs are either passed directly through and into the downstream aquatic environment or are contained in bio-solid sludge that is either applied to land or returned to the landfill that originally generated the leachate.

Long-Range Transport

Certain PBDEs have been detected in remote sites around the world, including the Canadian Arctic where they are present at elevated levels (e.g., in air, lakes and in the tissues of some living organisms), suggesting that the PBDEs undergo long-range transport. This long-range transport of PBDEs through the atmosphere or through the ocean currents is a potential source of PBDE loadings to the Canadian environment. Manufacturing of PBDEs, manufacturing processes using PBDEs, as well as use and disposal of formulations and products outside of Canada are expected to contribute to the presence of PBDEs in Canada.

5. OVERVIEW OF EXISTING ACTIONS

5.1 Existing Canadian Initiatives

The *Environmental Choice Program*, Environment Canada's ecolabelling program, has established criteria for notebook and desktop computers. Certification will be awarded to products that demonstrate environmental leadership throughout their life-cycle and meet requirements for reduced use of hazardous substances (including PBDEs), design for re-use and recycling, energy efficiency, reduced packaging and ergonomic considerations.

Canada has been following decaBDE release trends through the National Pollutant Release Inventory program.

5.2 Existing European Initiatives

The European Community has adopted Directive 2003/11/EC, banning the manufacture or use of PentaBDE and OctaBDE commercial mixtures and the sale of products containing more than 0.1% PentaBDE or OctaBDE. The European Community has also adopted two Directives to minimize PentaBDE and OctaBDE commercial mixtures in electrical and electronic equipment and to manage waste. Directive 2002/96/EC on waste electrical and electronic equipment (WEEE) aims to prevent the generation of electrical and electronic waste and to promote reuse, recycling and other forms of recovery in order to reduce the quantity of such waste being disposed of through landfilling or incineration. Under Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), beginning on July 1, 2006, producers are not allowed to put electrical and electronic equipment on the market if it contains more than 0.1 % PBDEs. The annex to the Directive contains a list of exemptions from the substance ban for which alternatives are not available. The RoHS Directive does not restrict the use of DecaBDE commercial mixture.

Denmark, and the European Parliament have challenged the European Commission to include DecaBDE commercial mixture in the list of hazardous substances that must be minimized in electrical and electronic equipment under the RoHS Directive. Sweden is supporting Denmark and the European Parliament on this challenge.

Sweden has notified the European Commission that it intends to ban DecaBDE commercial mixture. Challenges have been received from certain European countries which have temporarily stalled the regulatory progress respecting DecaBDE commercial mixture in Sweden.

In May 2004, the Voluntary Emissions Control Action Programme (VECAP) was officially started. Under this program, a voluntary code of practice was developed jointly by the British Plastics Federation and the Bromine Science and Environmental Forum entitled *A Code of Good Practice for the Use of the Flame Retardant Decabromodiphenylether (Deca-BDE) in the Plastics Sector*. A similar voluntary code was developed jointly by the British Textile Finishers Association and the Bromine Science and Environmental Forum entitled *A Code of Good Practice for the Use of the Flame Retardant Decabromodiphenylether (Deca-BDE) in Textile Applications*.

In 1989, the German Chemical Industry Association (VCI) and the Association of the Plastics Producing Industry (VKE), in a statement to the Federal Government, voluntarily agreed to discontinue the production and further use of PBDEs.

In Norway, products containing more than 0.25% PentaBDE, OctaBDE or DecaBDE commercial mixtures are classified as hazardous waste when they are discarded. Norway has proposed a regulation banning all chemical products as well as other products that consist of or contain DecaBDE commercial mixture in concentrations higher than 0.1% by mass.

5.3 American Initiatives

The only United States manufacturer of PentaBDE and OctaBDE commercial mixtures voluntarily ceased production in December 2004.

The United States Environmental Protection Agency (USEPA) has issued a *Significant New Use Rule* that will require notification of, and evaluation by, the USEPA of any new use of PentaBDE or OctaBDE commercial mixtures.

Trends in releases of decabromodiphenyl oxide (decaBDE) are also being followed by the United States through the Toxics Release Inventory.

Several states, including California, Maine, Michigan, New York, Hawaii, Washington, Maryland and Illinois, have enacted or are considering legislation prohibiting products containing more than 0.1% of PentaBDE or OctaBDE commercial mixtures.

A program called the Electronic Product Environmental Assessment Tool (EPEAT) was created by a multi-stakeholder group in the United States. EPEAT is a procurement tool used to identify desktop computers, notebooks and monitors that satisfy established environmental criteria, including conformance to the European RoHS.

5.4 Asian Initiatives

Japan has a law concerning the reporting of releases of specific chemical substances and promoting improvements in their management. Under this Law, yearly reports are required on volumes of DecaBDE commercial mixture imported and used and quantities released to the environment.

China's Ministry of Information Industries issued the *Management Methods for the Prevention and Control of Pollution Caused by Electronic Information Products*, which will come into effect on March 1, 2007. The Methods provide a broad regulatory framework for restrictions of "toxic and hazardous substances", including PBDEs, pre-market certifications, labeling and information disclosure requirements for electronic information products.

5.5 International Agreements

PentaBDE and OctaBDE commercial mixtures are being considered for addition to two international agreements because some of the PBDEs contained in them have the ability to undergo long-range transport, are persistent and bioaccumulative and sufficient information exists to suggest that they are likely to cause adverse effects as a result of their long-range transport.

In December 2005, the Parties to the United Nations Economic Commission for Europe (UNECE) Long-Range Transboundary Air Pollution (LRTAP) Convention's Protocol on Persistent Organic Pollutants (POPs) agreed that PentaBDE commercial mixture should be considered as a persistent organic pollutant. The examination of management strategies has begun under the Convention. In addition, the European Commission submitted, in 2005, a proposal to add OctaBDE commercial mixture to the Protocol. It is anticipated that a decision on the OctaBDE commercial mixture will be taken by the Executive Body at the Convention in December 2006.

In November 2006, the Persistent Organic Pollutants Review Committee under the United Nations Stockholm Convention on POPs decided that commercial PentaBDE warrants global action and is currently preparing a risk management evaluation prior to deciding whether to recommend addition of the substance to the Convention. At that meeting, the Committee also decided that commercial OctaBDE meets the criteria outlined in the Convention for consideration as a persistent organic pollutant, and a risk profile is being prepared to support a decision as to whether global action is warranted. Both issues will be discussed further in November 2007.

6. CONSIDERATIONS

In working towards the risk management objectives, there is a need to weigh one potential risk against another. Fire prevention is important to protect human safety and avoid social and economic losses due to fire. In addition, many toxic substances are released during fires; hence, fire prevention can yield net environmental benefits. Cost-effective substitutes or alternatives must be available to meet the relevant fire safety standards.

6.1 *Alternative Chemicals*

Chemical alternatives to PBDEs are available for the vast majority of industrial and manufacturing applications, and these vary by application. However, several issues need to be addressed as some potential alternatives are:

1. currently under scrutiny themselves;
2. new proprietary chemicals for which data on environmental and health effects are very limited;
3. more costly; and
4. less effective, hence much higher levels are required and products may be less likely to meet flammability standards.

6.2 *Alternative Techniques*

The need for PBDEs can be reduced through the use of alternative techniques such as:

1. use of materials that are less prone to fire hazard in electronics equipment (such as aluminum or “super-plastics” with very high oxygen requirements for combustion);
2. use of barrier fabrics, wrappings or coatings for foams to replace chemical flame retardants; or
3. design-for-environment (DFE) techniques for re-use of components containing PBDEs, as an alternative to landfilling or recycling plastic materials containing PBDEs.

Some of these alternative techniques present challenges, such as increased weight of final products and methods to collect, reuse and reassemble products with components containing PBDEs.

7. PROPOSED OBJECTIVES

7.1 Environmental Objective

The proposed environmental objective for all seven PBDEs is to reduce the concentrations of PBDEs in the Canadian environment to the lowest level possible.

The ultimate environmental objective for tetraBDE, pentaBDE and hexaBDE is virtual elimination (VE) as specified under subsection 77(3) of CEPA 1999. CEPA 1999 requires that substances targeted for VE be added to the Virtual Elimination List along with their Level of Quantification (LoQ). The LoQ is the lowest concentration that can be accurately measured using sensitive but routine sampling and analytical methods. According to CEPA 1999, virtual elimination means, in respect of a toxic substance released into the environment as a result of human activity, the ultimate reduction of the quantity or concentration of the substance in the release below the LoQ specified in the Virtual Elimination List.

7.2 Risk Management Objectives

The proposed risk management objective for all seven PBDEs is to prevent the introduction of their manufacture in Canada and to minimize their releases into the environment from all sources in Canada. For tetra- to octaBDEs, another proposed risk management objective is the prevention of their import into Canada.

8. PROPOSED RISK MANAGEMENT INSTRUMENTS / TOOLS TO BE DEVELOPED

Given the conclusions of the final ecological screening assessment, as outlined in section 1 of this report, action is required to prevent the introduction of PBDE manufacturing in Canada. In order to minimize releases of PBDEs to the Canadian environment, consideration must also be given to addressing releases resulting from the use of products as well as releases created at the point of disposal or recycling.

As a first step in the risk management of PBDEs in Canada, the Government of Canada will focus risk management action on the three PBDEs (tetraBDE, pentaBDE and hexaBDE) that meet the criteria for virtual elimination under CEPA 1999. Additional risk management actions targeting products containing PBDEs, as well as additional actions on heptaBDE, octaBDE, nonaBDE and decaBDE will be developed to complement the proposed Regulations. These actions, collectively, will contribute to ensuring the Canadian environment is protected and Canadians' exposure to these substances is minimized.

8.1 Proposed Immediate Risk Management Actions for PBDEs

As an important first step in the risk management of PBDEs in Canada, the Government of Canada has developed and proposed regulations, entitled *Polybrominated Diphenyl Ethers Regulations*, with a focus on the three PBDEs (tetraBDE, pentaBDE and hexaBDE) that meet the criteria for virtual elimination under CEPA 1999.

The proposed Regulations prohibit the manufacture of all seven PBDEs (tetraBDE, pentaBDE, hexaBDE, heptaBDE, octaBDE, nonaBDE and decaBDE) in Canada. The proposed Regulations also restrict the use, sale, offer for sale and import of tetraBDE, pentaBDE, hexaBDE and mixtures, polymers and resins containing these substances and prohibit the manufacture of these mixtures, polymers and resins.

8.2 Proposed Risk Management Actions for tetra-, penta-, hexa-, hepta- and octaBDEs

The Government of Canada is proposing to complement the proposed *Polybrominated Diphenyl Ethers Regulations* with regulations that would apply to products containing tetra-, penta-, hexa-, hepta- and octaBDEs. Restrictions on the use, sale, offer for sale and import of nonaBDE is not proposed at this time as nonaBDE is a component of the DecaBDE commercial mixture.

The proposed regulations for tetra-, penta-, hexa-, hepta- and octaBDEs would provide an exemption for products or articles that are in use in Canada at the time the regulations come into force and for recyclable materials. The possibility of specifying maximum concentration limits for tetra- to octaBDEs in products may be considered.

The Government of Canada will follow the process specified in CEPA 1999 for substances that meet the criteria for virtual elimination.

8.3 Proposed Risk Management Actions for nonaBDE and decaBDE

The Government of Canada also plans to develop, in consultation with stakeholders, an approach to minimize releases of the DecaBDE commercial mixture (containing nona- and decaBDE) to the environment from textile and plastic manufacturing operations in Canada. Mechanisms to achieve this may include an Environmental Performance Agreement, a Code of Practice or a combination of the two.

8.4 Other Proposed Actions

The development of suitable alternatives to PBDEs will be encouraged.

The development of a strategy for the management of products or materials containing PBDEs requiring disposal or recycling will be explored taking into consideration that the federal, provincial and territorial governments have authority to regulate waste management in Canada in accordance with their constitutional powers and law-making authorities.

Environment Canada will assess whether products or materials containing PBDEs destined for disposal should be defined as hazardous waste and hazardous recyclable material for the purpose of export from, import into or transit through Canada as well as interprovincial movements to ensure the environmentally sound management of these residual materials. This assessment will also take into consideration Canada's domestic and international obligations.

Additional science and ongoing environmental monitoring efforts will contribute to an understanding of the trends and levels of decaBDE and other PBDEs in the environment, and whether decaBDE transformation processes are contributing to the environmental levels and risk resulting from the lower brominated PBDEs. Monitoring of environmental levels of PBDEs will also help to understand whether implemented control instruments for these substances are reducing their presence in the environment.

Furthermore, the Government of Canada will continue to engage international partners to address PBDEs. Canada will continue to follow the proposals to add the PentaBDE and OctaBDE commercial mixtures to the UNECE POPs Protocol and the Stockholm Convention.

9. PROPOSED CONSULTATION APPROACH

The proposed risk management strategy for PBDEs was posted on Environment Canada's website on September 20, 2006 for comments. Comments received have been taken into consideration in the revision of the risk management strategy.

Proposed *Polybrominated Diphenyl Ethers Regulations* were published in the *Canada Gazette*, Part I, on December 16, 2006, for a formal 60-day public comment period.

The development of the regulatory proposal to address products containing tetra-, penta-, hexa-, hepta- and octaBDEs will follow the normal Government of Canada regulatory process, including publication in the *Canada Gazette*, Part I for consultation.

The development of a risk management approach to minimize releases of the DecaBDE commercial mixture (containing nona- and decaBDE) to the environment from textile

and plastic manufacturing operations in Canada will follow the normal Government of Canada process and include consultation opportunities.

The primary stakeholders include:

- Plastics industry
- Textile industry
- Recycling industry
- Environmental non-governmental organizations
- Provincial/territorial governments
- Other federal government departments.

10. NEXT STEPS / PROPOSED TIMELINE

Immediate Actions for PBDEs (focus on tetra-, penta- and hexaBDE)

Actions	Date
Publication of proposed <i>Polybrominated Diphenyl Ethers Regulations</i> in the <i>Canada Gazette</i> , Part I	December 16, 2006
Public consultation period on the proposed <i>Polybrominated Diphenyl Ethers Regulations</i>	December 16 to February 14, 2007
Publication of final regulations in the <i>Canada Gazette</i> , Part II	Fall 2007

Next Steps for tetra-, penta-, hexa-, hepta- and octaBDE

Actions	Date
Publication of proposed regulations related to products containing tetra-, penta-, hexa-, hepta- and octaBDE in the <i>Canada Gazette</i> , Part I	4th quarter 2007
Formal comment period on the proposed regulations	2008
Publication of final regulations in the <i>Canada Gazette</i> , Part II	2008

Next Steps for nonaBDE and decaBDE

Actions	Date
Initiate discussions with stakeholders on approach to minimize releases of decaBDE	1st quarter 2007
Public consultation on the draft measures to address releases of decaBDE	2 nd quarter 2007
Publication of proposed measures to address releases of decaBDE	4 th quarter 2007
Formal comment period on measures to address releases of	2008

decaBDE	
Publication of final measures to address releases of decaBDE	2008