Government of Canada / Gouvernement du Canada

PROPOSED RISK MANAGEMENT APPROACH

for

Hexabromocyclododecane (HBCD)

Chemical Abstracts Service Registry Number (CAS RN):
3194-55-6

Environment Canada
Health Canada

November 2011

Canada

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This proposed risk management approach document builds on the previously released risk management scope document for Hexabromocyclododecane (HBCD), and outlines the proposed control actions for this substance. Stakeholders are invited to submit comments on the content of this proposed risk management approach or provide other information that would help to inform decision making. Following this consultation period, the Government of Canada will initiate the development of the specific risk management instrument(s) and/or regulation(s) where necessary. Comments received on the proposed risk management approach will be taken into consideration in developing the instrument(s) and/or regulation(s). Consultation will also take place as instrument(s) and/or regulation(s) are developed.

SUMMARY OF RISK MANAGEMENT

The Government of Canada plans to take the following actions with respect to HBCD:

1. Implementing regulations to prohibit the manufacture, use, sale, offer for sale, import and export of HBCD and products containing HBCD.
2. Adding HBCD to the Virtual Elimination List of CEPA 1999.

Note: This summary is an abridged list of the instruments and tools proposed to risk manage this substance. Please see section 9.1 of this document for a complete explanation of risk management.

1. ISSUE

1.1 Pilot Project Background

Hexabromocyclododecane (HBCD) having Chemical Abstracts Service Registry Number (CAS RN)[1] 3194-55-6, was one of the substances on the Domestic Substances List (DSL) selected for a pilot project for screening assessments under the *Canadian Environmental Protection Act, 1999* (CEPA 1999) (Canada, 1999) on the basis of its potential persistence in the environment, bioaccumulation, and inherent toxicity to non human organisms.

CEPA 1999 requires the Minister of the Environment and the Minister of Health (the Ministers) to categorize all substances on the Domestic Substances List (DSL). Further to this activity, the Act requires the Ministers to conduct screening assessments of substances that meet the categorization criteria to determine whether these substances meet one or more of the criteria set out in section 64 of the Act[2].

1.2 Final Screening Assessment Report Conclusion for Hexabromocyclododecane

A notice summarizing the scientific considerations of a final screening assessment report was published by Environment Canada and Health Canada in the *Canada Gazette*, Part I, for HBCD on November 12, 2011, under subsection 77(6) of CEPA 1999. The final screening assessment report concluded that HBCD is entering or may be entering the environment in a quantity or a concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity.

The final screening assessment report also concluded that HBCD meets the criteria for persistence and meets the criteria for bioaccumulation, as defined in the *Persistence and Bioaccumulation Regulations* made under CEPA 1999. The presence of HBCD in the environment results primarily from human activity.

The final screening assessment report also concludes that HBCD is not entering the environment in a quantity or concentration or under conditions that constitute or may constitute a danger in Canada to human life or health. The highest upper-bounding estimated intake of HBCD is expected to be in infants from ingestion of human milk and the mouthing of consumer products.

[1] CAS RN: Chemical Abstracts Service Registry Number. The Chemical Abstracts Service information is the property of the American Chemical Society and any use or redistribution, except as required in supporting regulatory requirements and/or for reports to the Government of Canada when the information and the reports are required by law or administrative policy, is not permitted without the prior, written permission of the American Chemical Society.

[2] A determination of whether one or more of the criteria of section 64 are met and whether risk management may be required is based upon an assessment of potential risks to the environment and/or to human health associated with exposures in the general environment. For humans, this includes, but is not limited to, exposures from ambient and indoor air, drinking water, foodstuffs and the use of consumer products. A conclusion under CEPA 1999 is not relevant to nor does it preclude an assessment against the hazard criteria specified in the Workplace Hazardous Materials Information System [WHMIS] *Controlled Products Regulations* for products intended for workplace use. Similarly, a conclusion based on the criteria contained in section 64 of CEPA 1999 does not preclude actions being undertaken under other sections of CEPA or other Acts.

A comparison of these exposure estimates with the critical effect levels results in margins of exposure that are considered adequate to address uncertainties in the health effects and exposure databases.

For further information on the final screening assessment report conclusion for HBCD, refer to the final screening assessment report, available at http://www.chemicalsubstanceschimiques.gc.ca/challenge-defi/hexabromo-eng.php#a1#a1 .

1.3 Proposed Measure

As a result of a screening assessment of a substance under section 74 of CEPA 1999, the substance may be found to meet one or more of the criteria under section 64 of CEPA 1999. The Ministers can propose to take no further action with respect to the substance, add the substance to the Priority Substances List (PSL) for further assessment, or recommend the addition of the substance to the List of Toxic Substances in Schedule 1 of the Act. Under certain circumstances, the Ministers must make a specific proposal to recommend the implementation of virtual elimination. In this case, the Ministers proposed to recommend the addition of HBCD to the List of Toxic Substances in Schedule 1. As a result, the Ministers will develop a regulation or instrument respecting preventive or control actions to protect the Canadian environment from the potential effects of exposure to this substance.

In addition, the final screening assessment report concluded that HBCD meets the virtual elimination criteria set out in subsection 77(4) of CEPA 1999 because:

- HBCD meets the criterion set out in paragraph 64(a) of CEPA 1999;
- HBCD meets the criteria for persistence and bioaccumulation as defined in the *Persistence and Bioaccumulation Regulations* made under CEPA 1999;
- the presence of HBCD in the environment results primarily from human activity; and
- HBCD is not a naturally occurring radionuclide or a naturally occurring inorganic substance.

As a result, the process for substances targeted for virtual elimination will be followed.

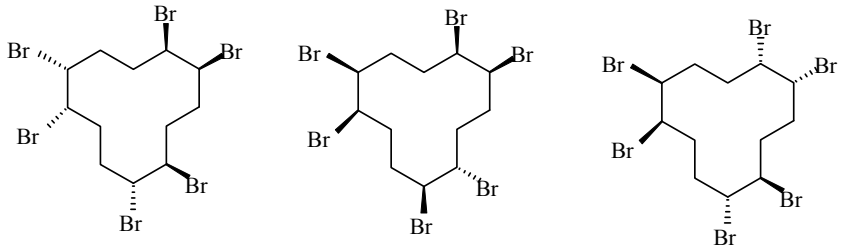
2. BACKGROUND

2.1 Substance Information

HBCD is a cyclo-aliphatic bromide produced by the bromination of cyclododecatriene (CAS RN 27070-59-3: Mack, 2004). The resulting technical product is primarily a mixture of three diastereomers (stereoisomers), designated alpha (α), beta (β) and gamma (γ). Commercial HBCD is typically composed of approximately 80–85% γ-isomer, 8–9% α-isomer and 6% β–isomer (ACCBFRIP 2005). Four commercial grades are available, low melt, medium range, high melt and thermally stabilized, with each containing different proportions of the three stereoisomers (Tomy et al., 2004). Final use determines the grade of HBCD selected.

Table 1 presents other names, trade names, chemical groupings, the chemical formula, the chemical structure and the molecular mass for HBCD.

Table 1. Identity of HBCD

Chemical Abstracts Service Registry Number	**3194-55-6**
DSL name	**Cyclododecane, 1,2,5,6,9,10-hexabromo-**
National Chemical Inventories (NCI) names[1]	Cyclododecane, 1,2,5,6,9,10-hexabromo- (TSCA, ENCS, AICS, PICCS, ASIA-PAC, NZIoC) 1,2,5,6,9,10-Hexabromocyclodecane (EINECS) 1,2,5,6,9,10-Hexabromocyclododecane (ENCS, ECL, PICCS) Hexabromocyclododecane (ECL) 1,2,5,6,9,10- HEXABROMOCYCLODODECANE (PICCS) CYCLODODECANE, 12,5,6,9,10-HEXABROMO- (PICCS
Other names	Hexabromocyclododecane (HBCD); 1,2,5,6,9,10-Hexabromocyclododecane hbcd Bromkal 73-6D FR 1206 FR 1206HT Hexabromocyclododecane (HBCD) Pyroguard SR 104 SR 104 YM 88A
Chemical group	Brominated flame retardant
Chemical subgroup	Brominated cyclic alkane
Chemical formula	$C_{12}H_{18}Br_6$
Chemical structures	**Dominant Isomer Structures of Hexabromocyclododecane (HBCD)**  alpha-HBCD 10–13% beta-HBCD 1–12% gamma-HBCD 75–89% Ratios of dominant isomers in technical product. Each isomer is a pair of enantiomers or mirror-images.
SMILES[2]	BrC(C(Br)CCC(Br)C(Br)CCC(Br)C(Br)C1)C1
Molecular mass	641.69 g/mol (ACC, 2002)
Physical state	White powder at 25°C

[1] National Chemical Inventories (NCI). 2009: AICS (Australian Inventory of Chemical Substances); ASIA-PAC (Asia-Pacific Substances Lists); ECL (Korean Existing Chemicals List); EINECS (European Inventory of Existing Commercial Chemical Substances); ENCS (Japanese Existing and New Chemical Substances); NZIoC (New Zealand Inventory of Chemicals); PICCS (Philippine Inventory of Chemicals and Chemical Substances); and TSCA (Toxic Substances Control Act Chemical Substance Inventory).

[2] Simplified Molecular Input Line Entry System

3. WHY WE NEED ACTION

3.1 Characterization of Risk

Evidence that a substance is persistent and bioaccumulative, as defined in the *Persistence and Bioaccumulation Regulations* of CEPA 1999 (Canada, 1999), when considered with the potential for environmental release and the potential for toxicity to organisms, provides an indication that the substance may enter the environment under conditions that may have harmful long-term ecological effects. Substances that are persistent remain in the environment for an extended period of time after being released, increasing the potential magnitude and duration of exposure. Releases of small quantities of bioaccumulative substances may lead to high internal concentrations in exposed organisms. Highly bioaccumulative and persistent substances are of special concern since they biomagnify in food webs, increasing internal exposures, especially for top predators.

Release of HBCD into the environment may occur during manufacture, processing, transportation, use, improper handling, improper storage or containment, product usage and disposal of the substance or products containing the substance. HBCD is not manufactured in Canada.

HBCD has been detected in all environmental media (Canada, 2011). In addition, the substance is present in samples collected from regions considered remote from potential sources, including the Arctic, indicating that it is sufficiently stable in the environment to allow long-range transport in air or water, or both. HBCD has demonstrated toxicity in both aquatic and terrestrial species. This information suggests that HBCD has the potential to cause ecological harm in Canada.

4. CURRENT USES AND INDUSTRIAL SECTORS

Information gathered in 2000 through an Environment Canada use pattern survey, conducted under section 71 of CEPA 1999, indicated that no company manufactured HBCD in Canada in a quantity meeting the 100 kg reporting threshold (Environment Canada, 2003). The total quantity of HBCD imported into Canada in that year was between 100,000 kg and 1,000,000 kg, both as a pure compound and in products, with all reported uses as a flame retardant. Global demand for HBCD was estimated at 16,700 tonnes in 2001, representing 8.2% of total demand for brominated flame retardants that year (BSEF, 2003).

HBCD is an additive type flame retardant. Additive flame retardants are physically combined with the material being treated, rather than chemically bonded as are reactive flame retardants; therefore, it has increased potential to leach out of the product during usage.

HBCD is used primarily as a flame retardant in expanded (EPS) and extruded (XPS) polystyrene foams that are used as thermal insulation materials in the building industry (roofs, walls, and foundations) and other below grade applications (geofoam). HBCD is also imported into Canada for use in EPS resin. Typical loading of HBCD in EPS and XPS is 0.5 – 1.0% by weight (EPSMA, CPIA, BSEF and XPSA 2009). EPS and XPS applications are estimated to amount to greater than 90% of HBCD usage (Cheminfo Services Inc., 2010).

Another application is in the flame retarding of textiles, where HBCD in a typical concentration range of 6 to 15% is applied to the back of the upholstery fabric encapsulated in a polymer (ACCBFRIP, 2005). Common end products from this application include residential and commercial furniture, upholstery seating in vehicles, draperies, and wall coverings (FRCA, 1998). HBCD may be added to latex binders, adhesives and paints to make them flame retardant (Albemarle Corporation, 2000; Great Lakes Chemical Corporation, 2005).

A minor usage is the addition of HBCD to high impact polystyrene (HIPS) used in electrical and electronic equipment such as audiovisual equipment, although this application is not common (BSEF, 2003). HBCD is not used in products such as television sets and computers, which are required to meet higher flame retardancy standards than HBCD can satisfy or meet (ACCBFRIP, 2005).

5. PRESENCE IN THE CANADIAN ENVIRONMENT AND EXPOSURE SOURCES

5.1 Releases to the Environment

HBCD is not known to occur naturally. Release of HBCD into the environment may occur during manufacture, processing, transportation, use, improper handling, improper storage or containment, product usage and disposal of the substance or products containing the substance. HBCD may be released to air, water, soil, and sediment. HBCD has been known to be discharged into various tributaries, watersheds, rivers and lakes resulting in increased levels in sediments, surrounding soils and biota (Canada, 2011). As HBCD is not covalently bound, but is only mixed or dissolved in the product polymer, HBCD has the potential to migrate out of consumer or industrial end-use products into the environment. Releases may thus occur in both indoor and outdoor environments (Canada, 2011).

5.2 Exposure Sources

Manufacture and Processing

Manufacture of HBCD does not occur in Canada. HBCD is reported to be manufactured in the U.S., Japan, Israel, the Netherlands and China and is imported into Canada for further processing in various applications. HBCD released during processing activities may enter the air, be discharged into industrial wastewater, be contained in solid waste. As major uses are associated with polymers for the building industry and textiles, most releases would likely be in urban and industrial areas.

Whether present in air as dust particles or sorbed to particulates, the relatively high density of HBCD suggests that removal from the air by settling would be relatively rapid. Nevertheless, monitoring studies document the presence of HBCD in areas remote from potential sources, thus providing evidence of the potential for long-range transport. HBCD released to industrial wastewater would likely go into a sewer system and be transported to a wastewater treatment system. Due to its hydrophobic nature, most HBCD entering a wastewater system will be sequestered in sludge; however, small amounts have been measured in final effluents discharged to receiving waters. HBCD entering surface waters would be expected to partition into bed sediments, after sorption to suspended particulates in the water and subsequent settling. Release

into the soil could occur during the application of biosolids to agricultural and pasture lands (Canada, 2011).

Product Use

Over the service life of end products, HBCD may be released in vapour or particulates to air or by leaching to water. Releases are expected to be initially to air, however settling and removal of the particulates would result ultimately in losses to soil or water. Losses through abrasion and degradation of polymer end products may also occur. HBCD present in foam insulation is unlikely to be exposed to the weather once building construction is complete, and it is expected that releases from encapsulated materials would be low. However, prior to and during construction, as well as during demolition, the insulation may be subject to weathering, physical disintegration and wear, leading to the potential release of particulates containing HBCD.

HBCD encapsulated within textile back-coating materials will have more opportunity for weathering and wear throughout the lifetime of the polymer product, including being washed and chemically cleaned. Losses will likely be primarily to solid waste and domestic wastewater. In the case of construction materials, however, releases to the soil, with subsequent transport by air or runoff, could also occur. These losses apply to HBCD in products manufactured in Canada, as well as to HBCD in finished and semi-finished products imported into the country.

End of Life

Solid waste containing HBCD may be scrap materials generated during processing operations, particulates released through aging and wear of end products, and disposal of products at the end of service life. Products and materials in landfill sites will be subject to weathering, releasing HBCD particulates primarily to soil, and to a lesser extent, to water and air. HBCD released to soil during landfill operations would be expected to sorb to particles and organic matter, remaining largely immobile. Some limited surface transport in water may occur, due to scavenging in rainfall and runoff, for example. However, the low vapour pressure of the substance suggests that volatilization from the surface of the landfill is unlikely. Due to the low water solubility of the substance, it is expected that leaching from the surfaces of the polymer products in the landfill is probably limited. The tendency of HBCD to sorb to particulates, its limited solubility in water, and evidence that it will undergo anaerobic biodegradation all suggest that the risk of groundwater contamination from HBCD-containing products in landfill is probably low.

While potential release to air from incineration of materials containing HBCD is possible, the effective use of emission control devices and appropriately functioning incinerators likely precludes this. Uncontrolled burns and accidental fires may provide atmospheric sources of HBCD, and the resulting ash may contain potentially hazardous degradation products derived from the thermal degradation of HBCD (i.e. polybrominated dibenzo-p-dioxins and dibenzofurans).

Summary

Once released into the environment, the physical and chemical properties of HBCD and other environmental fate processes suggest that HBCD will be unlikely to distribute into air and water, moving instead into the sediment and soil compartment, depending on the compartment of release (Canada, 2011).

6. OVERVIEW OF EXISTING ACTIONS

6.1 Existing Canadian Risk Management

Currently, there are no risk management measures in Canada aimed specifically at addressing HBCD.

However, the Government of Canada has been monitoring HBCD in the Canadian environment (since 2008) and landfill leachate (since 2009) under the Chemicals Management Plan. This monitoring information could be used to assess the progress and effectiveness of future risk management actions that may be taken by the Government of Canada and to better understand potential environmental exposure from these sources. The media being monitored include wildlife, fish, air and sediment.

HBCD is also being measured in Canadians aged 6 - 79 years as part of a study on organohalogens in pooled serum from the Canadian Health Measures Survey (http://www.statcan.gc.ca/survey-enquete/household-menages/5071o-eng.htm).
Results of this study are anticipated to be available in 2012.

6.2 Existing International Risk Management

Europe:

- In June 2009, the European Chemical Agency (ECHA) recommended the inclusion of seven substances, including HBCD, in Annex XIV of the REACH (Registration, Evaluation, Authorisation and Restriction of CHemical substances) Regulation (EC No 1907/2006) (ECHA, 2009). Substances listed in Annex XIV, also known as the "Authorisation List", should not be placed on the market or used after a set date unless the company is granted an authorization. HBCD was added to Annex XIV on the basis that it is persistent, bioaccumulative and toxic in accordance with the criteria set out in Annex III of the Reach Regulation. Previously, in October 2008, HBCD was added to the Candidate List of Substances of Very High Concern for Authorisation.
- In force since February 2003, the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC (European Parliament and Council of the European Union, 2003) promotes the collection and recycling of such equipment. The Directive requires separation of all brominated flame retardant plastics (including HBCD) from equipment prior to disposal, recovery or recycling. Disposal or recovery of such plastics is carried out in an environmentally friendly manner (in compliance with Article 4 of Council Directive 75/442/EEC).
- Norway: Brominated flame retardants, including HBCD, are listed on the Norwegian List of Priority Substances (Norway, 2007). The Norwegian Pollution Control authority (SFT) published (January 2010) an updated version of its brominated flame retardants (BFR) Action Plan. The plan aims to achieve a substantial reduction in BFR emissions by 2010 and to eliminate emissions completely by 2020. The plan focuses on five BFRs: penta-, octa- and decaBDE, hexabromocyclododecane (HBCD) and tetrabromobisphenol A (TBBPA). Furthermore, a proposal to ban the use of HBCD in consumer products is currently being considered by the Norwegian Environment Ministry (EBFRIP, 2007 and 2010).

- Denmark: The Danish Ministry of the Environment lists HBCD along with other brominated flame retardants on their List of Undesirable Substances (Denmark, 2004).
- Germany: The German Federal Environmental Agency classified HBCD as toxic for aquatic organisms, persistent and highly bioaccumulative, and advocated its gradual phase out with timelines depending on the application (German Federal Environment Agency, 2008).
- Sweden: The Swedish Chemicals Agency (KEMI) classified HBCD as a phase-out substance in the PRIO database considering its persistent, bioaccumulative and toxic properties. PRIO is a web-based tool intended to be used to preventively reduce risks to human health and the environment from chemicals (KEMI, 2011).
- The Commission for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) includes HBCD on their List of Chemicals for Priority Action (as a potential persistent and bioaccumulative substance) (OSPAR, 2001).

United States:

- In August 2010, the US EPA announced its Action Plan for HBCD (US EPA, 2009), as part of a comprehensive approach to enhance the Agency's current chemicals management program under the Toxic Substances Control Act (TSCA).
- Based on available information, the US EPA will consider adding HBCD to the list of chemicals which present, or may present, an unreasonable risk of injury to health or the environment. A notice to this effect is to be published by the end of 2011. In addition, a Significant New Use Rule (SNUR) would apply to imports of consumer textiles articles containing HBCD. A rule may be developed to regulate HBCD and the extent of the rule would be determined during the rule making process. In late 2011, rule making is to be initiated to add HBCD to the Toxics Release Inventory to require manufacturers or importers to provide environmental release information.
- The US EPA has undertaken a Design for the Environment alternatives assessment of HBCD. The information gathered during the assessment could be used to encourage industry to move away from HBCD instead of, or in addition to, any regulatory action taken under TSCA. This process began in April 2011 and is expected to be completed in early 2012.

International Conventions:

Canada plays an active role in two international agreements related to persistence organic pollutants (POPs): the Stockholm Convention and the United Nations Convention on Long-range Transboundary Air Pollution (LRTAP).

- Stockholm Convention on Persistent Organic Pollutants (POPs): At the fifth meeting of the POPs Review Committee (POPRC) in October 2009, the committee concluded that HBCD fulfilled the criteria in Annex D of the Convention for adverse effects, persistence, bioaccumulation and long-range transport. A risk profile for HBCD (Annex E) was discussed and accepted at the sixth POPRC meeting in October 2010. Risk management options (Annex F) are currently being prepared for discussion at the upcoming POPRC in October 2011.
- United Nations Economic Commission for Europe (UN ECE) Convention on Long Range Transboundary Air Pollution (LRTAP): At the 27th Session of the Executive Body, in December 2009, the Executive Body agreed that HBCD should be considered as a persistent organic pollutant as defined under the Protocol. Risk management options are currently being discussed under the Protocol.

7. CONSIDERATIONS

7.1 Alternative Chemicals or Substitutes

In Canada, HBCD is mainly used in EPS and XPS foam. The manufacture of these two types of foam follows different processes which have specific considerations when determining acceptable flame retardant additives. HBCD meets these specific process needs for both EPS and XPS foam production, such that the desired flame retardant properties are imparted to the foam without affecting the physical properties, such as density and strength, of the final product.

EPS foam can be manufactured using either a one-step or two-step process. The one-step process is more widely used within industry and involves adding the flame retardant prior to polymerization. At present, there are no commercially available alternatives to HBCD for use in the one-step EPS process. In the two-step process, the flame retardant of choice is added after polymerization. The following substances have been identified by industry as acceptable alternatives to HBCD for the two-step process (Cheminfo Services Inc., 2010):

1. Tetrabromobisphenol A bis(allyl ether) (CAS #25327-89-3)
2. 1,2,5,6-tetrabromocyclo-octane (CAS #3194-57-8)
3. Tribromophenyl allyl ether (CAS #3278-89-5)

Currently, there are no commercially available alternatives to HBCD for use in the XPS production process.

Recently, Dow Global Technologies LLC (DGTL), a subsidiary of The Dow Chemical Company, announced the development of a new high molecular weight brominated polymeric flame retardant that can replace HBCD in the manufacture of EPS and XPS foams (Dow, 2011). It is reported that the alternative is a stable, high-molecular weight, non-PBT (persistent, bioaccumulative, or toxic) chemical. Interim quantities of the chemical will be available in 2011, likely to be followed by large scale plant construction in 2012 making larger commercial volumes available by 2013-2015. This phased approach is intended to assist the EPS and XPS foam manufacturers in executing a smooth transition away from HBCD.

It is important to note that these substitutes have not undergone an assessment to determine whether they meet the criteria under section 64 of CEPA 1999. However, a draft screening assessment report is expected to be published for Tetrabromobisphenol A bis(allyl ether) (CAS #25327-89-3) in 2012.

7.2 Alternative Technologies and/or Techniques

Alternative insulation systems are currently under investigation and development by industry to replace XPS foam insulation products. The use of alternative insulation systems would be dependent on the specific application. In applications that are moisture or freeze/thaw sensitive alternate systems do not perform adequately. XPS is currently the only qualified material that can perform under these conditions, which include exterior continuous wall insulation, cold storage, frost protected shallow foundations, roof recovery and protected roof membrane assemblies, green roofs, plaza decks, and below grade and geofoam applications.

7.3 Socio-economic Considerations

Socio-economic factors have been considered in the selection process for a regulation and/or instrument respecting preventive or control actions, and in the development of the risk management objective(s). Socio-economic factors will also be considered in the development of regulations, instrument(s) and/or tool(s) as identified in the *Cabinet Directive on Streamlining Regulation* (Treasury Board of Canada Secretariat, 2007) and the guidance provided in the Treasury Board document *Assessing, Selecting, and Implementing Instruments for Government Action*.

In Canada, HBCD is largely imported for use in the production of XPS foam boardstock and EPS resin. In addition, HBCD is imported into Canada as a component of pre-formulated EPS resin. The announcement by Dow (Dow, 2011) indicates that a viable alternative to HBCD may be commercially available in late 2011 or early 2012. The EPS and XPS manufacturers will require additional time to conduct testing to facilitate the switch from HBCD to the new high molecular weight brominated polymeric flame retardant.

8. PROPOSED OBJECTIVES

8.1 Environmental Objective

An environmental objective is a quantitative or qualitative statement of what should be achieved to address environmental concerns identified during a risk assessment.

The ultimate environmental objective for HBCD is virtual elimination (VE) of releases into the environment. CEPA 1999 requires that substances targeted for VE under section 77 be added to the Virtual Elimination List. 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.

8.2 Risk Management Objective

A risk management objective is a target expected to be achieved for a given substance by the implementation of risk management regulations, instrument(s) and/or tool(s). The proposed risk management objective for HBCD is to achieve the lowest level of release of the substance, which is technically and economically feasible, into the Canadian environment.

9. PROPOSED RISK MANAGEMENT

9.1 Proposed Risk Management Instruments

As required by the Government of Canada's *Cabinet Directive on Streamlining Regulation*[3] and criteria identified in the Treasury Board document entitled *Assessing, Selecting, and Implementing Instruments for Government Action*, the proposed risk management instruments were selected using a consistent approach, and took into consideration the information that has been received and available at the time.

In order to achieve the risk management objective and to work towards achieving the environmental objective, the Government of Canada is proposing the following actions for HBCD:

1. Implementing regulations to prohibit the manufacture, use, sale, offer for sale, import and export of HBCD and products containing HBCD.
2. Adding HBCD to the Virtual Elimination List of CEPA 1999.

9.2 Implementation Plan

The proposed measures will be published in the *Canada Gazette*, Part I, by November 2013, as per the timelines legislated in CEPA 1999.

Continued monitoring of HBCD in the environment will be considered under the comprehensive monitoring and surveillance strategy for substances under the Chemicals Management Plan. Monitoring has been identified as a key pillar in the Chemicals Management Plan, and will serve the following functions: to collect and generate environmental data to inform decision-making, to provide an adaptive management framework to support intervention and to measure the efficacy of preventive and mitigation actions. These analyses and monitoring would be used to determine whether further action needs to be taken with respect to HBCD to meet the risk management and environmental objectives.

The Government of Canada is undertaking research, evaluating findings from new studies, collecting information and investigating potential releases of toxic substances from waste management (e.g. landfills) and recycling facilities in Canada. These substances would continue to be included in any monitoring from the waste sector, if needed. Based on the findings, the Government of Canada will implement further risk management activities if warranted.

10. CONSULTATION APPROACH

The risk management scope document for HBCD, which summarized the proposed risk management under consideration at that time, was published on August 28, 2010. Industry and other interested stakeholders were invited to submit comments on the risk management scope document during a 60-day comment period. Comments received on the risk management scope

[3] Section 4.4 of the *Cabinet Directive on Streamlining Regulation* states that "Departments and agencies are to: identify the appropriate instrument or mix of instruments, including regulatory and non-regulatory measures, and justify their application before submitting a regulatory proposal".

document were taken into consideration in the development of this proposed risk management approach document.

The primary stakeholders include

- Plastics Sector
- Environmental non-governmental organizations

11. NEXT STEPS / PROPOSED TIMELINE

Actions	Date
Electronic consultation on proposed risk management approach document	November 12, 2011 – January 11, 2012
Response to comments on proposed the risk management approach document	At time of publication of proposed instrument
Consultation on the draft instrument	Spring 2012
Publication of the proposed instrument	Spring 2013
Formal public comment period on the proposed instrument	No later than November 2013
Publication of the final instrument	No later than 18 months following the publication of the proposed instrument

Industry and other interested stakeholders are invited to submit comments on the content of this proposed risk management approach or provide other information that would help to inform decision making. Please submit comments prior to January 11, 2012, since the risk management of HBCD will be moving forward after this date. During the development of regulations, instrument(s) and tool(s), there will be opportunity for consultation. Comments and information submissions on the proposed risk management approach should be submitted to the address provided below:

Chemicals Management Division
Gatineau Quebec K1A 0H3
Tel: 1-888-228-0530 / 819-956-9313
Fax: 819-953-7155
Email: GR-RM@ec.gc.ca

12. REFERENCES

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