

Annex F Questionnaire (one per chemical)

Chemical name (as used by the POPs Review Committee (POPRC))	c-OctaBDE
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Explanatory note:

- This chemical is undergoing a risk management evaluation. It has already satisfied the screening criteria set out in paragraph 4 (a) of Article 8 of the Convention. A risk profile has also been completed for this chemical in accordance with paragraph 6 of Article 8 and with Annex E to the Convention.

Introductory information	
Name of the submitting Party/observer	Canada
Contact details (name, telephone, e-mail) of the submitting Party/observer	France Jacovella Stockholm Convention on POPs Focal Point for Canada Executive Director, Chemicals Management Division Environment Canada 351 St. Joseph Blvd., 12th Floor Place Vincent Massey Gatineau, Quebec K1A 0H3 Canada Tel. (819) 956-5263 Email France.Jacovella@ec.gc.ca
Date of submission	February 5, 2008

NOTE REGARDING CANADIAN SUBMISSION –

Detailed information is provided in the documents submitted by Canada:

1. Environment Canada. 2006. Canadian Environmental Protection Act 1999, Ecological Screening Assessment Report on Polybrominated Diphenyl Ethers (PBDEs). June 2006. Existing Substances Division, Environment Canada, Gatineau, Canada.

Submitted as electronic file: << PBDEs SAR EC June 2006 (en) (2).pdf & PBDEs SAR EC Juin 2006 (fr) (3)>>

2. Environment Canada. 2006. Canadian Environmental Protection Act 1999, Supporting Working Documentation for the Ecological Screening Assessment Report on Polybrominated Diphenyl Ethers (PBDEs). Unpublished document. June 2006. Existing Substances Division, Environment Canada, Gatineau, Canada.

Submitted as electronic file: << June 2006 Draft Environmental SA PBDE Supporting Working Document1>>

3. Health Canada. 2006 State of the Science Report for a Screening Health Assessment . Polybrominated Diphenyl Ethers(PBDEs)

Submitted as electronic file: << HC SOS report PBDE_e & PBDEs SAR EC Juin 2006 (fr) (3) >>

4. Government of Canada. 2006. Order Adding Toxic Substances to Schedule 1 to the Canadian Environmental Protection Act, 1999. Canada Gazette Part II, vol. 140, no. 26, pp. 2147-2153. 27 December 2006.

Submitted as link- http://www.ec.gc.ca/Ceparegistry/documents/orders/g2-14026_o1.pdf

5. Government of Canada. 2006. Polybrominated Diphenyl Ethers Regulations. Canada Gazette Part I, vol. 140, no. 50. <http://canadagazette.gc.ca>.

(published 16 December 2006 for 60-day comment period)	
Submitted as link- http://www.ec.gc.ca/CEPARegistry/regulations/DetailReg.cfm?intReg=108 http://www.ec.gc.ca/registrelcpce/regulations/DetailReg.cfm?intReg=108	
6. Environment Canada. 2006. Proposed Risk Management Strategy for Polybrominated Diphenyl Ethers (PBDEs). Environment Canada, Gatineau, Canada. http://www.ec.gc.ca/Toxics/docs/substances/PBDE/consult-09-06/EN/index.cfm . (Comment period: 2006-09-20 to 2006-10-30)	
Submitted as electronic file: << Final Revised RMS PBDE EN 06-12-11 (2) & Final Revised RMS PBDE 06-12-12>>	
Additional Annex E information	
(i) Production data, including quantity and location	c-OctaBDE has never been produced in Canada (reference: Mandatory industry survey conducted by Environment Canada pursuant to paragraph 71(1)(a) and (b) of the Canadian Environmental Protection Act, 1999 (CEPA 1999) in November 2001; 2) Technical and Socio-Economic Background Study for the Brominated Flame Retardants Polybrominated Diphenyl Ethers, Final Report K0821-3-0000. Prepared for Environment Canada by Toxicology, 2003 (internal document))
(ii) Uses	The use of OctaBDE as a flame retardant in polymer pellets, and use in finished products has been phased out of Canada since 2006 A mandatory industry survey conducted by Environment Canada pursuant to paragraph 71(1)(a) and (b) of the <i>Canadian Environmental Protection Act, 1999</i> (CEPA 1999) in November 2001, identified that PentaBDE and OctaBDE were used in Canada in 2000. Only a very small amount of the OctaBDE commercial mixture was imported into Canada in 2000 (however, the reported volumes do not include quantities imported in finished articles, which are estimated to account for the largest quantities of PBDEs entering Canada). Significant reformulation activity has occurred in recent years related to PentaBDE and OctaBDE. All companies that reported uses of PentaBDE and OctaBDE in 2000 reported minor remaining uses in 2005, and complete phase-out by 2006. Reference - Mandatory industry survey conducted by Environment Canada pursuant to paragraph 71(1)(a) and (b) of CEPA, 1999, November 2001.
(iii) Releases, such as discharges, losses and emissions	See table below (estimated releases from historic use)

Table 1: (iii) Releases, such as discharges, losses and emissions

Source of Release	Release (ton/year)	Year of release	Compartment of release (air, water, soil)	Quantification method	Current/historic use
Materials Handling - removal from drums/sacks, pouring etc.	0.4	2000	liquid waste	Estimated using emission factors published by BRE, May 2003 - produced for the Chemicals Assessment Unit of the UK Environment Agency for use under the EU Existing Substances Regulation and modified with comments from the OECD Task Force on Environmental Exposure	historic

				Assessment	
Compounding - formulation into resin, simple mixing; and Conversion - open process: foam articles	0.03 (0.023 from compounding + 0.010 from conversion)	2000	soil	same as above	historic
Compounding - formulation into resin, simple mixing; and Conversion - open process: foam articles	0.01 (0.002 from compounding; and 0.010 from conversion)	2000	air	same as above	historic
Emissions from OctaBDE from plastic products in service	0.7	2000	air	Estimated based on an emission factor of 0.054% per annum, and a vapour pressure of 4.9 E -8 mm Hg @20 degree C, and 1223.22 tons estimated market demand for OctaBDE in plastics in Canada in 2000	historic
Emissions from OctaBDE from ABS products at disposal	>3.09 tons/year, with >150.97 tons per year remaining in the disposed products		solid waste/water	Estimated based on a loss to the environment of approx 2% of the quantity disposed (European Commission. 2002a. European Union Risk Assessment Report for OctaBDE. European Chemical Bureau)	historic

Reference for Table 1: Technical and Socio-Economic Background Study for the Brominated Flame Retardants Polybrominated Diphenyl Ethers, Final Report K0821-3-0000. Prepared for Environment Canada by Toxecology, 2003 (internal document) - pg. 32, 35 & 39

Explanatory note:

- This information was requested for preparation of the risk profile in accordance with Annex E of the Convention. The POPRC would like to collect more information on these items. If you have additional or updated information, kindly provide it.

A. Efficacy and efficiency of possible control measures in meeting risk reduction goals (provide summary information and relevant references):

(i) Describe possible control measures	<p>Proposed <i>Polybrominated Diphenyl Ether Regulations</i>, published in the Canada Gazette, Part 1, on December 16th, 2006. Regulations should be finalized by spring 2008. Prohibits the manufacture of tetra-BDE, penta-BDE, hexa-BDE, hepta-BDE, octa-BDE, nona-BDE and deca-BDE. Prohibits the use, sale, offer for sale and import of tetra-BDE, penta-BDE, hexa-BDE and mixtures, polymers, and resins containing these substances, and prohibits the manufacture of these mixtures, polymers and resins.</p> <p>Canada is also currently developing a regulation to control the use of PBDEs in manufactured products.</p> <p>Link to proposed regulation: http://www.ec.gc.ca/CEPARRegistry/regulations/DetailReg.cfm?intReg=108</p>
(ii) Technical feasibility	High
(iii) Costs, including environmental and health costs	<p>It is not possible to quantify and monetize the preventative (health and environment) benefits of the proposed Regulations given that PBDE use by industry has been discontinued and future demand for the substance cannot be estimated.</p> <p>However, costs to industry and government of the proposed regulations have been estimated. The economic criterion that was considered was the cost to industry to reformulate away from the use of PentaBDE and OctaBDE. This cost was deemed to be minor (zero) as drop-in substitutes are available, and PentaBDE and OctaBDE are no longer being manufactured, imported or used in Canada. Therefore, the industry is not expected to experience any incremental costs as a result of the regulatory requirements. Costs to government were also considered as part of the economic analysis, which included compliance promotion and enforcement activities; these costs were calculated over a 25-year time frame and estimated to be in the order of \$439,646 (discounted at 5.5%).</p> <p>Overall, the Regulations were estimated to result in a negative net benefit of \$439,646 (net present value discounted at 5.5%) over a 25-year time frame.</p> <p>Reference – Regulatory Impact Analysis Statement for the proposed <i>Polybrominated Diphenyl Ether Regulations</i> http://www.ec.gc.ca/CEPARRegistry/regulations/DetailReg.cfm?intReg=108</p>

Explanatory notes:

3. If relevant, provide information on uses for which there may be no suitable alternative or for which the analysis of socio-economic factors justify the inclusion of an exemption when considering listing decisions under the Convention. Detail the negative impacts on society that could result if no exemption were permitted.
4. “Risk reduction goals” could refer to targets or goals to reduce or eliminate releases from intentional production and use, unintentional production, stockpiles, wastes, and to reduce or avoid risks associated with long-range environment transport.
5. Provide the costs and benefits of implementing the control measure, including environmental and health costs and benefits.
6. Where relevant and possible “costs” should be expressed in US dollars per year.

B. Alternatives (products and processes) (provide summary information and relevant references):	
(i) Describe alternatives	See Table 2 below
(ii) Technical feasibility	
(iii) Costs, including environmental and health costs	
(iv) Efficacy	
(v) Risk	
(vi) Availability	
(vii) Accessibility	

Explanatory notes:

7. Provide a brief description of the alternative product or process and, if appropriate, the sector(s), use(s) or user(s) for which it would be relevant.
8. If several alternatives could be envisaged for the chemical under consideration, including non-chemical alternatives, provide information under this section for each alternative.
9. Specify for each proposed alternative whether it has actually been implemented (and give details), whether it has only reached the trial stage (again, with details) or whether it is just a proposal.
10. The evaluation of the efficacy should include any information on the performance, benefits, costs, and limitations of potential alternatives.
11. Specify if the information provided is connected to the specific needs and circumstances of developing countries.
12. The evaluation of the risk of the alternative should include any information on whether the proposed alternative has been thoroughly tested or evaluated in order to avoid inadvertently increasing risks to human health and the environment. The evaluation should include any information on potential risks associated with untested alternatives and any increased risk over the life-cycle of the alternative, including manufacture, distribution, use, maintenance and disposal.
13. If the alternative has not been tried or tested, information on projected impacts may also be useful.
14. Information or comments on improving the availability and accessibility of alternatives may also be useful.

Table 2: Alternatives to c-OctaBDE

Use	Chemical used as substitute for c-OctaBDE	Impact study type (health/economic/environmental) (include reference)	
Substitutes for OctaBDE in ABS (Acrylonitrile-Butadiene-Styrene) resins	Tetrabromobisphenol-A	Available data indicate it is not expected to pose higher risks to humans or the environment than OctaBDE (Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Octabromodiphenyl Ether. Prepared for UK Department for Environment, Food and Rural Affairs by Risk and Policy Analysts (RPA) Ltd. Final Report June 2002)	Expected to cost approx 50% less expensive than OctaBDE but higher quantities required

Substitues for OctaBDE in ABS (Acrylonitrile-Butadiene-Styrene) resins	1-2-bis (pentabromophenyl)ethane	Available data (limited) indicate that it is not expected to pose higher risks to humans or the environment than OctaBDE (Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Octabromodiphenyl Ether. Prepared for UK Department for Environment, Food and Rural Affairs by Risk and Policy Analysts (RPA) Ltd. Final Report June 2002)	Expected to be approx 30% more expensive than OctaBDE
Substitues for OctaBDE in ABS (Acrylonitrile-Butadiene-Styrene) resins	1,2 bis(tribromophenoxy)ethane	Available data (very limited) indicate that it is not expected to pose higher risks to humans or the environment than OctaBDE (Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Octabromodiphenyl Ether. Prepared for UK Department for Environment, Food and Rural Affairs by Risk and Policy Analysts (RPA) Ltd. Final Report June 2002)	Expected to be comparable in price to OctaBDE
Substitues in other resins	triphenyl phosphate (TPP)	No evidence of greater risk to health, very few data available on potential environmental risks (Danish EPA, Alternatives to BFRs, Screening for Environmental and Health Data; Report 17, 2000; Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Octabromodiphenyl Ether. Prepared for UK Department for Environment, Food and Rural Affairs by Risk and Policy Analysts (RPA) Ltd. Final Report June 2002)	Less expensive but polymer/FR system likely to be more costly. Poorer plastic recyclability
Substitues in other resins (Polycarbonate/ABS blends, and polyphenylene oxide)	Resorcinol bis (diphenylphosphate)	No evidence of greater risks to health, acutely toxic but biodegradable (Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Octabromodiphenyl Ether. Prepared for UK Department for Environment, Food and Rural Affairs by Risk and Policy Analysts (RPA) Ltd. Final Report June 2002; Risk Reduction Strategy and Analysis of Advantages and Drawbacks for Decabromodiphenyl Ether - Stage 2 Report. Prepared for UK Department for Environment, Environment, Food and Rural Affairs by Risk and Policy Analysts (RPA) Ltd. Final Report May 2003)	Less expensive but polymer/FR system likely to be more costly. Poorer plastic recyclability

C. Positive and/or negative impacts on society of implementing possible control measures (provide summary information and relevant references):	
(i) Health, including public, environmental and occupational health	Same response as for Table A (iii). The primary alternatives to PentaBDE and OctaBDE have lower

	<p>persistence and bioaccumulation potential; hence, incremental benefits are expected from phase-out of PentaBDE and OctaBDE. However, any incremental benefits from PentaBDE and OctaBDE phase-out do not apply directly to the proposed PBDE Regulations (in the same way that industry costs associated with phase-out do not apply to the Regulations), as the phase-out is already complete.</p> <p>The proposed PBDE Regulations ensure that c-Penta- and c-OctaBDE are not introduced in Canada in the future. It is not possible to quantify and monetize the preventative benefits of the Regulations given that the use of these PBDE commercial mixtures by industry has been discontinued and future demand for the substance cannot be estimated.</p> <p>Costs related to a regulation Canada is developing to control PBDEs in manufactured products and finished articles have not yet been estimated.</p>
(ii) Agriculture, including aquaculture and forestry	Unknown
(iii) Biota (biodiversity)	Unknown
(iv) Economic aspects	<p>Same response as for Table A (iii). Costs to industry and government of the proposed <i>Polybrominated Diphenyl Ethers Regulations</i> have been estimated. The economic criterion that was considered was the cost to industry to reformulate away from the use of PentaBDE and OctaBDE. This cost was deemed to be minor (zero) as drop-in substitutes are available, and PentaBDE and OctaBDE are no longer being manufactured, imported or used in Canada. Therefore, the industry is not expected to experience any incremental costs as a result of the regulatory requirements. Costs to government were also considered as part of the economic analysis, which included compliance promotion and enforcement activities; these costs were calculated over a 25-year time frame and estimated to be in the order of \$439,646 (discounted at 5.5%).</p> <p>Overall, the Regulations were estimated to result in a negative net benefit of \$439,646 (net present value discounted at 5.5%) over a 25-year time frame.</p> <p>Reference – Regulatory Impact Analysis Statement for the proposed <i>Polybrominated Diphenyl Ether Regulations</i> http://www.ec.gc.ca/CEPARRegistry/regulations/DetailReg.cfm?intReg=108</p>
(v) Movement towards sustainable development	Switching to alternatives to c-OctaBDE that are less persistent and bioaccumulative is expected to have a positive impact on sustainable development, but these costs have not been estimated.
(vi) Social costs	Social costs related to a regulation Canada is developing to control PBDEs in manufactured products and finished articles have not yet been estimated.

Explanatory notes:

15. Socio-economic considerations could include:

- Any information on the impact (if any), costs and benefits to the local, national and regional economy, including the manufacturing sector and industrial and other users (e.g., capital costs and benefits associated with the transition to the alternatives); and impacts on agriculture and forestry;
- Any information on the impact (if any) on the wider society, associated with the transition to alternatives, including the negative and positive impacts on public, environmental, and occupational health. Consideration should also be given to the positive and negative impacts on the natural environment and biodiversity.

- Information should be provided on how control measures fit within national sustainable development strategies and plans.

D. Waste and disposal implications (in particular, obsolete stocks of pesticides and clean-up of contaminated sites) (provide summary information and relevant references):	
(i) Technical feasibility	In Canada, the vast majority of products containing c-OctaBDE are landfilled (≈90%), a small portion are incinerated (≈5%) or recycled (≈5%). These waste management practices are well established. Potential controls on the recycling of products containing c-OctaBDE may face a number of technical challenges, including incomplete knowledge of the composition of the material to be recycled (i.e. whether this material contains c-OctaBDE).
(ii) Costs	Estimates not available

Explanatory note:

16. Specify if the information provided is connected to the specific needs and circumstances of developing countries.

E. Access to information and public education (provide summary information and relevant references):
Public participation is integral to the regulatory process in Canada. Two web sites are of particular importance: Information related to initiatives under the <i>Canadian Environmental Protection Act, 1999</i> are available at the following web site: http://www.ec.gc.ca/CEPARRegistry/ Information on the assessment and management of substances in Canada can also be found at the following address: http://www.ec.gc.ca/toxics/en/index.cfm

Explanatory note:

17. Please provide details here of access to information and public education with respect to both control measures and alternatives.

F. Status of control and monitoring capacity (provide summary information and relevant references):
There are several ongoing bio-monitoring studies in Canada that include (the homologs contained in) c-OctaBDE, including a national survey (the Canadian Health Measures Survey (CHMS)). These surveys monitor PBDE concentrations in adults, infants, pregnant women, and cord blood in order to establish a representative baseline of PBDE concentrations in humans, and help identify future trends and allow comparisons to other countries. In ecological media, various research studies continue to involve monitoring of a range of PBDE homologues.

Explanatory note:

18. With regard to control capacity, the information required is on legislative and institutional frameworks for the chemical under consideration and their enforcement. With regard to monitoring capacity, the information required is on the technical and institutional infrastructure for the environmental monitoring and biomonitoring of the chemical under consideration, not monitoring capacity for alternatives.

G. Any national or regional control actions already taken, including information on alternatives, and other relevant risk management information:
Proposed <i>Polybrominated Diphenyl Ether Regulations</i> , published in the Canada Gazette, Part 1, on December 16 th , 2006. Regulations should be finalized by spring 2008. Prohibits the manufacture of tetra-BDE, penta-BDE, hexa-BDE, hepta-BDE, octa-BDE, nona-BDE and deca-BDE. Prohibits the use, sale, offer for sale and import of tetra-

BDE, penta-BDE, hexa-BDE and mixtures, polymers, and resins containing these substances, and prohibits the manufacture of these mixtures, polymers and resins.

Explanatory notes:

19. Actions or measures taken could include prohibitions, phase-outs, restrictions, cleanup of contaminated sites, waste disposal, economic incentives, and other non-legally binding initiatives.
20. Information could include details on whether these control actions have been cost-effective in providing the desired benefits and have had a measurable impact on reducing levels in the environment and contributed to risk reduction.

H. Other relevant information for the risk management evaluation:

Polybrominated diphenyl ethers that have the molecular formula $C_{12}H_{(10-n)}Br_nO$ in which $4 \leq n \leq 10$ (tetra-, penta-, hexa-, hepta-, octa-, nona- and decaBDE) were added to Schedule 1 (List of Toxic Substances) of the *Canadian Environmental Protection Act, 1999* on December 27, 2006. Canada is implementing virtual elimination for tetra-, penta-, and hexaBDE.

Explanatory notes:

21. The above list of items is only indicative. Any other relevant information for the risk management evaluation should also be provided.

I. Other information requested by the POPRC:

[Note to the Secretariat]