Format for submitting pursuant to Article 8 of the Stockholm Convention the information specified in Annex E of the Convention

Note: Please find attached annexes I and II

Introductory information:	
Name of the submitting Party/observer	**Bromine Science and Environment Forum (BSEF)** **www.bsef.com**
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Chemical name (as used by the POPS Review Committee (POPRC))	Commercial Octabromodiphenyl ether (CAS Number 32536-52-0; c-OBDE; c-OctaBDE; c-OctaBDE)
Date of submission	**9 February 2007**

(a) Sources, including as appropriate (provide summary information and relevant references)	
(i) Production data:	
Quantity	**1994 data:** - Estimated 6 000 tonnes/year[1] **Estimated worldwide demand for 1999:** - 3 825 tonnes/year[2] **Since 2004:** - No longer produced in the EU, USA and the Pacific Rim - No information that indicates it is being used or produced in developing countries.
Location	**Production sites until 2004:** - The Netherlands, France, USA, Japan, UK and Israel
Other	In addition to Octa-BDE isomers, c-OctaBDE contains amounts of other component groups, such as: - pentabromodiphenyl (penta-BDE), - hexabromodiphenyl (hexa-BDE), - heptabromodiphenyl (hepta-BDE), - nonabromodiphenyl (nona-BDE) ethers and - decabromodiphenyl (deca-BDE). ***For a detailed description of the composition of c-OctaBDE, please see p.5 of Annex II***
(ii) Uses	C-OctaBDE was mainly used as flame retardant in ABS type plastics which were used in consumer and commercial electronics and office equipment. The manufacturing process for c-OctaBDE resulted in a product that contains diphenyl ether molecules with varying degrees of bromination.

(iii) Releases:	
Discharges	**-**
Losses	**-**
Emissions	The EU Risk Assessment Report[3] indicates that emissions of Octa-BDE can occur from Octa-BDE production sites, polymer processing sites, sites formulating or applying flame retardant treatments to textiles, volatile and leaching losses over the service life of polymers or textiles, and also particulate losses over their service life and at disposal. Since production is ceased, manufacturing emissions of Octa-BDE no longer can occur.
Other	**-**

[1] WHO (1994). Environmental Health Criteria: 162: Brominated Diphenyl Ethers. International Programme on Chemical Safety (IPCS), World Health Organization, Geneva, 1994

[2] Arias, P.A. (2001). Brominated flame retardants - An overview. The Second International Workshop on Brominated Flame Retardants, BFR 2001, May 14-16, Stockholm

[3] For reference please see section (f) "National and international risk evaluations, assessments or profiles and labelling information and hazard classifications, as available"

(b) Hazard assessment for endpoints of concern, including consideration of toxicological interactions involving multiple chemicals (provide summary information and relevant references)

Environment

Current available toxicological data in mammals and in aquatic species is adequate to support that only the lower brominated components found in c-OctaBDE may be capable of causing adverse effects on humans or certain aquatic species. This is shown in the by all available studies, i.e. Birnbaum and Staskal[4], WHO[5] etc. as well as EU Risk Assessment report[6] which states that:

> "[The commercial substance] shows no toxicity towards aquatic organisms up to the limit of water solubility, and effects in other organisms are only observed at relatively high concentrations, based on standard laboratory tests."

Therefore, on purely a hazard basis, it can be accepted that c-OctaBDE contains substances that exhibit adverse effects on mammals and aquatic life. But when placed in the context exposure via the environment, there is little evidence that levels in remote areas will present a risk of serious adverse effects.

Human Health

The Human Health component of the EU risk assessment identified occupational exposures in the manufacturing and use of Octa-BDE as a possible concern and recommended risk reduction measures. However, since c-OctaBDE is no longer made or used in the EU or in the US, this possible risk has been eliminated.

The EU Risk Assessment identified no need for risk reduction measure for consumers.

With regards to exposure of humans via the environment, risk reduction measures were not recommended and only the need for additional information was highlighted.

For further information please see pp.4 & 5 of Annex I and p.9 of Annex II

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[4] Birnbaum and Staskal (2004). Brominated Flame Retardants: Cause for Concern? Environmental Health Perspectives Volume 112, Number 1, January 2004
Available at:
http://entc.allenpress.com/pdfserv/10.1897%2F1551-5028(2003)022%3C1252:ATLRTP%3E2.0.CO%3B2

[5] Op.cit.

[6] p. 160. For reference please see section (f) "National and international risk evaluations, assessments or profiles and labelling information and hazard classifications, as available."

(c) Environmental fate (provide summary information and relevant references)	
Chemical/physical properties	Molecular formula: $C_{12}H_2Br_8O$ Molecular weight: 801.38 C-OctaBDE is actually a material containing only about 30-35% by weight of molecules with 8 bromine atoms.
Persistence	The atmospheric half life of Octa-BDE is 76 days based on modelling data. The molecule is not expected to hydrolyze in the environment to any significant extent. Photolysis of Octa-BDE has been demonstrated in laboratory experiments under conditions that are not typical of the environmental conditions where Octa-BDE would be expected to be found. The EU risk assessment considered that Octa-BDE would be strongly adsorbed to sediment and soil, but not susceptible to photodegradation to any significant extent. In fact, the Risk Assessment considered the rate of photodegradation to be effectively zero. **As a whole, it would appear that from a screening perspective the substance is likely to be sufficiently persistent to be of concern within the scope of both the Stockholm Convention on POPs.** ***For further information please see p. 3 of Annex I and pp. 6 & 7 of Annex II***
How are chemical/physical properties and persistence linked to environmental transport, transfer within and between environmental compartments, degradation and transformation to other chemicals?	The complex composition of c-OctaBDE makes it difficult to generalize how the phys/chem properties are to linked environmental fate and transport. The lower brominated diphenyl ethers (hexa and lower congeners) that make up the major weight% are also major components found in the c-Penta-BDE. These lower brominated components are the most prevalent PBDE's found in biota and the environment in remote areas. The diphenyl ethers with 4, 5 and 6 bromine atoms on the structure have vapor pressures, water solubilities and degradation rates which make them susceptible to long range transport. However the higher brominated (>Br7) diphenyl ethers have insufficient vapor pressures and water solubilities and are not found as frequently or in the concentrations of the lower PBDE's.
Bio-concentration or bio-accumulation factor, based on measured values (unless monitoring data are judged to meet this need)	A careful examination of the conclusions of Sellstrom et al[7] and their work looking at Biota-Soil Accumulation Factors (BSAF) could point that although there was evidence of bioavailability of "higher" BDEs, the BSAFs were generally <1 (concentration in the earthworm was less than the concentration in the soil, in other words not highly bioconcentrating). The authors stated that the BSAF values correlated reasonably well with the log Kow; substances with the highest Kow's (e.g. Octa-BDEs) had the lowest BSAF's across the range of Kow's from 6 to 9. The EU Risk Assessment of Octabromodiphenyl ether concludes on page 87 that "the information available indicates that octabromodiphenyl ether has a low potential for bioconcentration and bioaccumulation." As stated in the Secretariat's Summary c-OctaBDE's proposal, "the situation with regards to the screening criteria for bioaccumulation is not so clear cut" and it is also said that the problem relies at the fact that the commercial product contains lower congeners, namely penta-BDE and hexa-BDE that are congeners with POP characteristics. **In conclusion, it is true that some of the components of c-OctaBDE -namely congeners with 6 or fewer bromine atoms- are considered to be bioaccumulative. However, available information on Octa-BDE, including tests on earthworms and fish, indicate that Octa-BDE is not highly bioaccumulative despite having a log Kow's >5. Hence, current information continues to support the view that, Octa-BDE and more highly brominated species are not highly bioaccumulative.** ***For further information please see p.8 of Annex II*** [7] Sellström, U., De Wit, C.A., Lundgren, N., Tysklind, M. (2005). Effect of sewage-sludge application on concentrations of higher-brominated diphenyl ethers in soils and earthworms. Environ. Sci. & Technol., 39, 9064:9070 Available at: http://pubs.acs.org/cgi-bin/abstract.cgi/esthag/2005/39/i23/abs/es051190m.html

(d) Monitoring data (provide summary information and relevant references)
As stated in the summary of the Secretariat for the proposal on c-OctaBDE referring to data from Environment Canada (2004) "there are no monitoring data from remote locations available for Octa-BDE." Only some lower brominated congeners present in c-OctaBDE, namely penta-BDE and hexa-BDE, appear to be subject to long-range environmental transport.

(e) Exposure in local areas (provide summary information and relevant references)	
- general	**The available information does not support the conclusion that the higher brominated congeners (Hepta-BDE and above) either the physical properties or the presence in sufficient amounts in remote regions to be considered susceptible to long range transport.** The Environmental portion of the EU Risk Assessment concluded that there was no need for further information, or testing, for risk reduction measures beyond those already in place for risks to the aquatic compartment, the terrestrial compartment or the atmospheric compartment for the c-OctaBDE. There were also some uncertainties that needed additional information in order to reach a conclusion regarding risk of secondary poisoning from other sources of c-OctaBDE in the local and regional area that would require further testing. The EU Risk Assessment identified that a possible environmental risk related to potential exposure in areas relatively close to sources of release to the environment (both local and regional), **but not** to those areas exposed remotely (i.e. on a continental basis). The Human Health portion of the risk assessment identified occupational exposures in the manufacturing and use of c-OctaBDE as a possible concern and recommended risk reduction measures. Since c-OctaBDE is no longer produced or used, this possible risk has been eliminated. In addition, no need for risk reduction was identified for consumers. With regards to exposure of humans via the environment, although risk reduction measures were not recommended, the need for additional information was highlighted.
- as a result of long-range environmental transport	The potential for long range transport of a variety of PBDEs has been evaluated by Wania et al in their report "Assessing the Long-Range Transport Potential of Polybrominated Diphenyl Ethers: A Comparison of Four Multimedia Models.[8]" This study evaluated all the relevant physical and chemical properties of a range of PBDEs from the lower Brominated to the fully Brominated. Their conclusions state "Highly brominated congeners such as Octabromo Diphenylether and Decabromo Diphenyl Ether are very likely not subject to significant Long Range Transport. These chemicals are so involatile that in the atmosphere they should exist exclusively sorbed to suspended particles. Long Range Transport potential is then controlled by the Long Range Transport behavior of the particles that they are associated with." This report compares which PBDEs have been found in remote areas far from known sources. The authors conclude that observations in the environment confirm what the models have shown. Data gathered since that time continues to show the same types of patterns, namely that the lower Brominated PBDEs are the most commonly found PBDE's in remote areas. This despite the fact that the volume of Deca-BDE produced and used over the years greatly exceeds that volume of the commercial Penta-BDE product. Based on the available modeling data and evidence in remote areas the potential for Long Range Transport is not significant for Brominated Diphenyl Ethers with 8 or more bromine atoms.

	Besides, the EC Risk Profile states that "Octa-BDE has not been detected in the monitoring studies from remote regions but polybrominated diphenyl ethers of lower and higher bromination ….are frequently found in such monitoring studies, suggesting significant long range transport." **As stated in the summary of the UNEP Secretariat for the proposal on c-OctaBDE referring to data from Environment Canada (2004) "there are no monitoring data from remote locations available for Octa-BDE." Only some lower brominated congeners present in c-OctaBDE, namely penta-BDE and hexa-BDE, appear to be subject to long-range environmental transport.** ***For further information please see p. 4 of Annex I and pp. 10 & 11 of Annex II***
- information regarding bio-availability	A careful examination of the conclusions of Sellstrom et al[9] and their work looking at Biota-Soil Accumulation Factors (BSAF) could point that although there was evidence of bioavailability of "higher" BDEs, the BSAFs were generally <1 (concentration in the earthworm was less than the concentration in the soil, in other words not highly bioconcentrating). The authors stated that the BSAF values correlated reasonably well with the log Kow; substances with the highest Kow's (e.g. Octa-BDEs) had the lowest BSAF's across the range of Kow's from 6 to 9. ***For further information please see p.8 of Annex II*** [8] Wania, F., Dugani, C. (2003). Assessing the Long-Range Transport Potential of Polybrominated Diphenyl Ethers: A Comparison of Four Multimedia Models. Environ. Toxicol. Chem. 22, 1252:1261 Available at: http://entc.allenpress.com/entconline/?request=get-abstract&doi=10.1897%2F1551-5028(2003)022%3C1252:ATLRTP%3E2.0.CO%3B2 [9] Op.cit.

(f) National and international risk evaluations, assessments or profiles and labelling information and hazard classifications, as available (provide summary information and relevant references)

- Environment Canada (2004). Environment Screening Assessment Report on Polybrominated Diphenyl Ethers (PBDEs). Draft for public comments, February 2004.
  Available at: http://www.ec.gc.ca/CEPARegistry/documents/subs_list/PBDE_draft/PBDE_TOC.cfm

- European Commisison (2002). European Union Risk Assessment Report: Bis(pentabromophenyl ether). 1st Priority List, Volume 17. European Commission Joint Research Centre, EUR 20402 EN, 2002.
  Available at: http://ecb.jrc.it/DOCUMENTS/Existing-Chemicals/RISK_ASSESSMENT/REPORT/decabromodiphenyletherreport013.pdf

- European Commission (2003). European Union Risk Assessment Report. Diphenyl Ether, Octabromo Derivative (CAS No: 32536-52-0, EINECS No: 251-087-9). Risk Assessment. Office for Official Publications of the European Communities, 2003.
  Available at: http://ecb.jrc.it/DOCUMENTS/Existing-Chemicals/RISK_ASSESSMENT/REPORT/octareport014.pdf

- European Commission (2004). Update of the Risk Assessment of Bis(pentabromophenyl) ether (decabromodiphenyl ether). Final Environmental Draft of May 2004, R013_0405_env.
  Available at: http://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_012.pdf

- Directive 2003/11/EC of the European Parliament and of the Council of 6 February 2003 amending for the 24th time Council Directive 76/769/EEC relating to restrictions on the marketing and use of certain dangerous substances and preparations (pentabromodiphenyl ether, octabromodiphenyl ether). Official Journal of the European Union, 15.2.2003, L 42, p. 45.
  Available at: http://www.bsef.com/regulation/eu_legislation/index.php

(g) Status of the chemical under international conventions

- OSPAR Convention: Octa-BDE takes part of the list of selected substances for the OSPAR lists (no 236). Under the reviewed list, Octa-BDE is put under section C – about the substances put on hold because they are not produced and/or used in the OSPAR catchment or are used in sufficiently contained systems making a threat to the marine environment unlikely.

- UNECE, Convention on Long-range Transboundary Air Pollution (LRTAP) and its Protocol on Persistent Organic Pollutants (POPs): c-OctaBDE is being considered under Protocol procedures for inclusion.

For detailed comments on the review of the EU submission under the UNECE LRTAP POPs Protocol, please see:

- *Annex I: BSEF Comments to EU submission, 12 September 2005*
- *Annex II: BSEF Comments to UN-ECE review, May 2006*
