

***Analysis of the information received by the Basel
Convention related to c-decaBDE as called for in decision
BC-12/3***

Meeting of the Small Intersessional Working Group (SIWG) on
Persistent Organic Pollutants (POPs): tentative schedule for the
meeting (20-22 February 2017)

Presentation related to Agenda Item 5: Report on deca-BDE*

* see UNEP/CHW.13/INF/14

Background / Mandate

Decision BC-12/3: Technical guidelines on the ESM of wastes consisting of, containing or contaminated with POPs

The Conference of the Parties

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15. *Invites* parties and others to submit waste-related information on decabromodiphenyl ether to the secretariat and Norway by 30 August 2016;
16. *Welcomes* the intention of Norway to analyse the information received in accordance with paragraph 15 above and to share its analysis with the intersessional working group;
17. *Requests* the Secretariat to submit the information received in accordance with paragraph 15 above and the analysis conducted by Norway described in paragraph 16 above to the Conference of the Parties for consideration at its thirteenth meeting;

Background / Information submitted according to decision BC-12/3

Parties	Submitted information / documents
Canada	1. [Canada Env 2006] Canadian Env. Protection Act 1999_PBDEs
	2. [Canada Env 2010a] Ecological State of the Science Report on Decabromodiphenyl Ether (decaBDE)
	3. [Canada Env 2010b] Final Risk Management Strategy for PBDEs
	4. [Canada Env 2011] PBDEs in the Canadian environment
	5. [Canada Env 2014] Background study on the content of shredder residue
EU	1. [EU 2016] Waste related information on decaBDE, Comments from the EU and its MS
	2. [Danish EPA 2014] Survey of Brominated Flame Retardants
India	1. [India 2016] Waste related information on decaBDE, Submission from India
Japan	1. [Japan 2016] Information on decaBDE waste from Japan
Norway	1. [Norway 2015] Literature Study – DecaBDE in waste streams
	2. [Norway 2016] Consultancy service on collecting, summarizing and analyzing information on c-decaBDE in waste, Delivery part 1
	3. [Leslie et al. 2016] Propelling plastics into the circular economy — weeding out the toxics first.

Background / Process (1)

1st step: Definition of key information issues relevant under the Basel Convention; information related to

- Production and use of c-decaBDE
- Levels in articles, waste, recycled materials
- Share/distribution in different waste streams
- Management of waste containing c-decaBDE
- Human health impacts related to management of waste
- Legislation and limit values related to c-decaBDE and waste
- Planned/ongoing studies
- Information gaps

2nd step: Screening of submitted documents for information on the identified key information issues

Background / Process (2)

- **Compilation of the results in a draft report**
- **Coordination with Norway**
- **8 November 2016: presentation and discussion of a draft report with the SIWG on POP waste**
- **Comments of the SIWG were considered in coordination with Norway for the final report (UNEP/CHW.13/INF/14) for COP 13**

Results

Table of Content of the report

1. Background
2. **Information on national legislation** relevant for c-decaBDE in waste
3. **C-decaBDE in products, waste and recycled material**
4. Identification and **management of C-decaBDE containing waste**
 - 4.1 C-decaBDE in products, waste and recycled material
 - 4.2 Analysis and monitoring
 - 4.3 Separation and disposal methods for c-decaBDE containing waste
5. Environmental and human health **impacts related to management** of c-decaBDE waste
6. **Foreseen and ongoing research** related to c-decaBDE

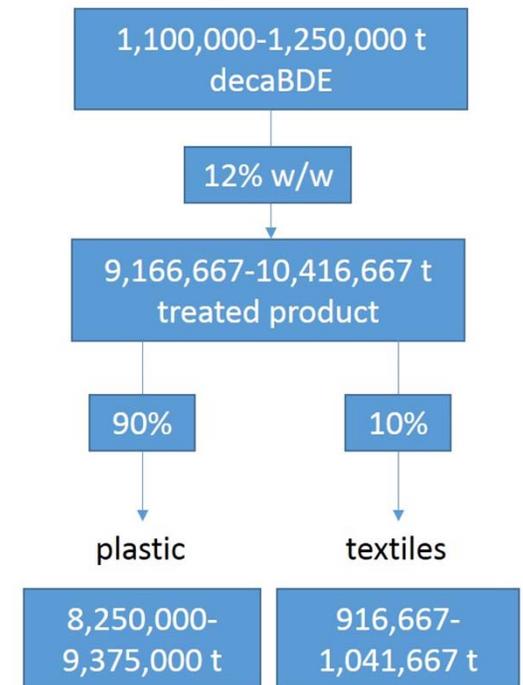
Results – 2 Information on national legislation

- Numerous regulatory initiatives concerning c-decaBDE around the world
- Table 2 in the report: overview submitted information on (1) **waste related legislation**, (2) relevant **limit values** and (3) **requirements to separate or specifically treat** waste containing c-decaBDE (or PBDEs or brominated flame retardants (BFR))
- The majority of regulatory initiatives are **targeting c-decaBDE and other PBDEs contained in electronic and electrical equipment (EEE)**
- **Requirements to separate** plastic with brominated flame retardants such as c-decaBDE containing waste from E-waste and to manage it properly established in the EU, Norway and China
- Other waste streams than E-waste: **no requirements to separate** c-decaBDE
- Norway: waste containing c-decaBDE at or above **0.25%** (2,500 mg/kg) must be handled as hazardous waste
- Denmark: Plastic with bromine content **< 5 mg/kg** can be returned for reprocessing and recycling

Results – 3.1 Production and use of c-decaBDE

- 75% of global PBDE production was c-decaBDE (total production 1970-2005 between 1.1-1.25 million tonnes)
- Consumption peak in the early 2000's; ongoing use;
- Up to about 90% of c-decaBDE ends up in plastics, primarily in electronics, while the remainder ends up in coated textiles, upholstered furniture and mattresses
- Table 3 in the report gives an overview on production and consumption quantities according to submitted Information
- **Substantial stocks of c-decaBDE are still present in c-decaBDE containing products in the technosphere**

Global decaBDE production 1970-2005



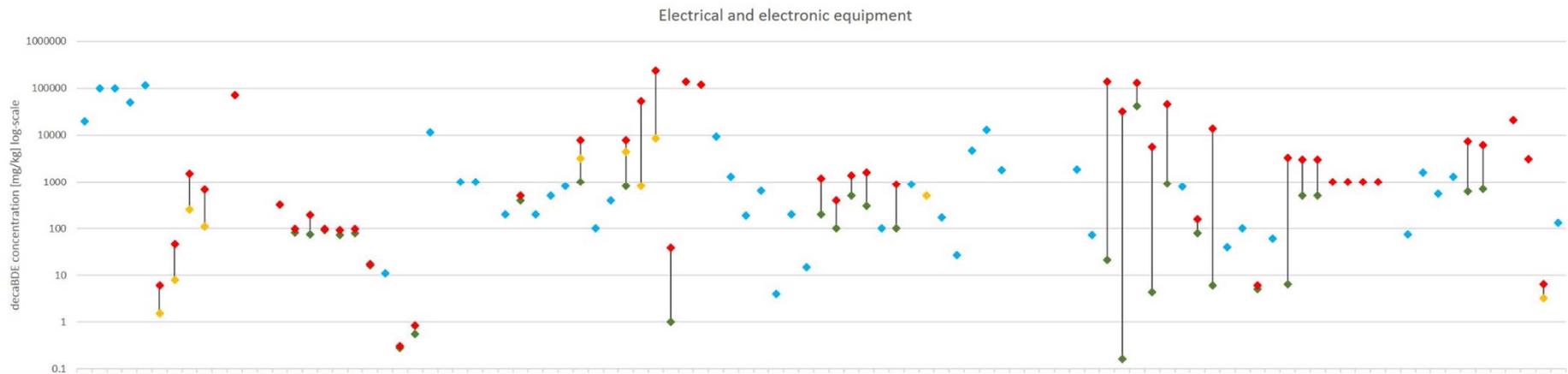
Results – 3.2 Concentration levels of c-decaBDE in products

- Typically used in plastics at concentrations of 10-15% by weight (up to 20%)
- C-decaBDE treated textiles contain up to 12% of c-decaBDE by weight
- Concentration levels of c-decaBDE were identified in the course of a literature review (see Table 4 of the report and specific references in annex to the report).

Sector	DecaBDE Levels
EEE products	0 to 15% (0 to 150,000 mg/kg)
Transport	0-2.7% (0 to 27,000 mg/kg)
Construction	0-30% (0 to 300,000 mg/kg)
Textiles	Up to 12% (up to 120,000 mg/kg)

Results – 3.3 Concentration levels of c-decaBDE in waste (1)

- Production and use is decreasing, however, continuous entry to waste streams, particularly into **E-waste**
- Also present in other waste streams: plastics from ELV treatment, C&D and textiles/furniture waste
- E-Waste (2003 to 2014): Typical av. levels range from 0 to 0.3% (3,000 mg/kg) with higher levels for CRT TVs and monitors and office equipment (Europe)
- Nigeria 2011: higher av. levels in TV CRT screens: 0.86% (8,600 mg/kg)
- Due to voluntary and legislative action: c-decaBDE levels in waste and recycled materials will decrease over time



Results – 3.3 Concentration levels of c-decaBDE in waste (2)

- Particular use of c-decaBDE in the electronic sector → E-waste of particular importance
- E-waste is often treated together with ELVs in the same shredder plants
- Different types of shredder residues with input from E-waste (E-waste SR), from cars (automotive shredder residues = ASR), and mixed input (mixed SR)
- Levels reported in shredder residues range from 0-0.33% (3,300 mg/kg)
- Average concentrations in ASR range from ~0.003% to 0.22% (2.55 to 2,163 mg/kg). Specific levels in ASR demonstrate a decreasing trend over time. A recent representative study in Ireland (sampling in 2014; av. age of cars 15 years) indicates very low levels (2.55 and 3.5 mg/kg) in current representative ASR (with pure ELV input)
- No specific information on C&D waste
- No specific information on textile and furniture waste

Results – 3.4 Concentration levels of c-decaBDE in recycled material (1)

- Studies show that PBDEs including c-decaBDE occur in recycled materials such as plastic pellets, carpet padding and isolation materials, plastic toys, baby products and food contact articles (FCAs)
- → Plastics containing PBDEs are mixed with other plastics and/or
→ imperfect separation of bromine containing from bromine free plastics
- Examples for products made from recycled materials containing c-decaBDE:
 - Rubik's cube (children toy) and several other consumer goods (see para 27)
 - Black coloured FCA's: typical elements in E-waste occur together with PBDEs in FCAs (see para 28)

Results – 3.4 Concentration levels of c-decaBDE in recycled material (2)

- Mass flow Netherlands (see para 30):
 - 22% of POP-BDEs in E-waste expected to end up in recycled plastics
 - 14% of POP-BDEs in ELV-waste expected to end up in recycled plastics
 - 19% of POP-BDEs in ELV-waste expected to end up in second hand parts
 - All carpeting and insulation materials made from recyclates contained either decaBDE (BDE-209) (up to 0.8 mg/kg (0.00008%)) or both decaBDE (BDE-209) and POP-BDEs (up to 0.4 mg/kg (0.00004%))
 - A quarter of the toys sampled contained POP-BDEs (up to 44 mg/kg (0.0044%)) and decaBDE (BDE-209) (up to 800 mg/kg (0.08%))
- → decaBDE is present in (plastic waste and) recycled materials in the Netherlands and BDE 209 is usually the predominant BDE congener found

Results – 4.1 Identification of c-decaBDE containing waste

- Use in plastics/polymers and textiles at typical loadings of 10-15% and up to 12% respectively
- C-decaBDE can occur in significant levels in specific waste streams
 - **particularly in E-waste**
 - plastics from ELV treatment
 - plastics from construction waste
 - textiles/furniture waste

Results – 4.2 Analysis and Monitoring

- Sensitive methods for chemical analysis are available (usually GC/MS in different variations; see para 31)
- No specific information submitted on the global availability and accessibility of such methods
- There is environmental exposure to c-decaBDE from waste management activities (such as e-waste recycling, waste water treatment and landfill)

Results – 4.3 Disposal methods for c-decaBDE containing waste

- C-decaBDE containing waste is either incinerated, landfilled or recycled.
- Separation of c-decaBDE containing plastics is carried out in some regions (e.g. in Europe and North America using different strategies and technologies based on bromine content according to CENELEC or US EPEAT Standard; see para 34).
- Specific information on separation methods is available from a draft BAT/BEP Guideline under the Stockholm Convention (see para 35).
- Sorting and separation techniques are globally available and accessible, however, collection and management practices worldwide depend very much on the country.
- Globally, an important share of WEEE is treated inappropriately under informal waste management regimes.
- At global level, ASR is mostly landfilled or incinerated, in some parts of the world possibly under inappropriate conditions.

Results – 5 Environmental and human health impacts

- Environmental and health impacts of c-decaBDE, including those relating to waste, are assessed and described in the Stockholm Convention risk profile (UNEP/POPS/POPRC.10.10/Add.2)
- Information submitted overlaps with information previously assessed in the risk profile
- Conclusion: Waste containing c-decaBDE is a source to environmental emissions and worker exposure may be a concern, especially in developing countries and for workers involved in handling of e-waste

Results – 6 Foreseen and ongoing research (1)

Information needs related to c-decaBDE in waste and the Basel Convention

- Practical application of available separation technologies and recycling standards for plastics containing c-decaBDE
- Extent to which c-decaBDE and other PBDE containing waste is separated and subsequently recycled and further used as recycled materials
- Information on emissions and formation of brominated dioxins and furans in waste treatment processes including incineration, smelting/reformulation and shredder mills
- Levels in recycled material
- Specific data on management (and levels) of c-decaBDE containing textile waste and construction and demolition waste

Results – 6 Foreseen and ongoing research (2)

Ongoing research

- **EU study** on waste related aspects of decaBDE in 2017/18
(1) waste streams and their size, (2) technical and economic feasibility of waste management options (3) key issues for ESM including traceability, identification, separation from non-POP wastes, and destruction of decaBDE in these waste streams (4) low POP content level;
Final report first quarter of 2018 (interim results end 2017/beginning 2018)
- **Canada** continues to examine and collect information on waste and recyclable materials processing facilities in Canada (how and to what degree enters waste and is released from waste management activities)
- **Canada** recently completed studies on the presence of decaBDE in plastics recycling as well as in construction, renovation and demolition waste
- **Canada and the US** develop and implement strategies to address decaBDE, reporting every three years on its status

Thank you for your attention!

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