

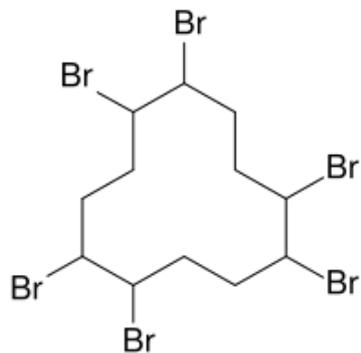
# HBCD

## Proposal for listing hexabromocyclododecane in Annex A of Stockholm Convention

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29 April 2013

- Background on HBCD
- Evaluation by POPRC
  - Risk profile (Annex E)
  - Risk management evaluation (Annex F)
- Recommendation of POPRC



1,2,5,6,9,10-hexabromocyclododecane

Stereoisomers: 70-95%  $\gamma$ -HBCD, 3-30%  $\alpha$ - and  $\beta$ -HBCD

**PRODUCTION:** China, Netherlands, Japan, and USA (31,000 tonnes in 2011)

**USE:** Additive brominated flame retardant

- Insulation and construction:
  - flame-retarded expanded (EPS) and extruded (XPS) polystyrene foam
- Back-coatings for upholstery and other interior textiles
- Electric and electronic appliances:
  - high impact polystyrene (HIPS)

Proposal by Norway  
(UNEP/POPS/POPRC.5/4) 2009

Annex D criteria:  
Decision POPRC.5/6, 2009

Annex E criteria: Risk profile  
(UNEP/POPS/POPRC.6/13/Add.2) 2010

Annex F criteria: Risk management evaluation  
(UNEP/POPS/POPRC.7/19/Add.1) 2011

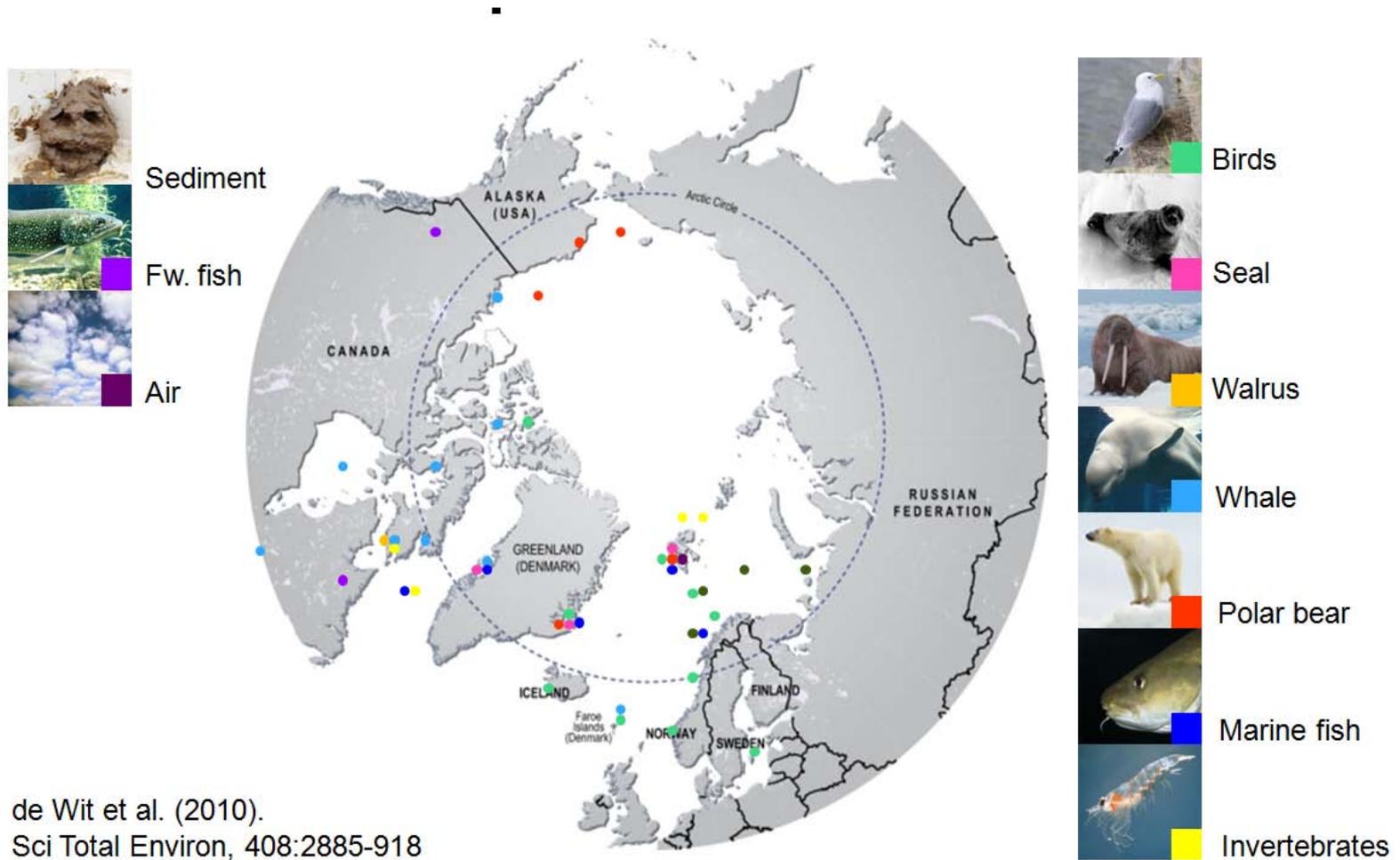
Additional information on alternatives to HBCD in EPS and XPS  
(UNEP/POPS/POPRC.8/4)  
**Recommendation to COP6 on listing, Decision POPRC-8/3, 2012**

# POPs characteristics

<b>Persistence</b>	<b><u>YES</u></b>	<b>t1/2 water &gt; 60 days</b> <b>Detected in biota in the Arctic</b> <b>Slow degradation in sediment</b>
<b>Bio-accumulation</b>	<b><u>YES</u></b>	<b>BCF 18,100 in fish</b> <b>BMF &gt;1 in aquatic ecosystems</b> <b>Log Kow 5.62</b> <b>Found in elevated concentrations in top predators</b>
<b>Potential for long-range environmental transport</b>	<b><u>YES</u></b>	<b>t1/2 air &gt; 2-3 days</b> <b>Found in the Arctic air and in many Arctic species</b>
<b>Adverse effects</b>	<b><u>YES</u></b>	<b>High chronic toxicity in aquatic species</b> <b>Neuroendocrine, developmental and reproductive toxicity in birds and mammals</b>

- High chronic toxicity to aquatic organisms
- Reproductive toxicity to mammals & birds
- Effects on the thyroid-hormone system and the nervous system in mammals
- PNEC for secondary effects in wildlife exceeded in source regions
- Risk of adverse effects in Arctic top predators and marine mammals

# Arctic pollutant



- Releases to air, water and soil occur during
  - Production of HBCD (estimated as small)
  - Manufacture of products (estimated as small)
  - Use of products containing HBCD (more significant)
  - Waste management (most significant) - insulation boards form the majority of HBCD containing waste
- Releases can be point-source or diffuse
- By-product PBDDs and PBDFs from incineration





The **increasing amount** of construction materials are potentially long-term sources of HBCD to the environment when buildings are demolished or renovated

- lifespan of PS foams in buildings is 30-50 years
- likely that releases of HBCD will be more significant in the future particularly from 2025 onwards

- The developmental and neurotoxic potential of HBCD observed in animal studies give cause for concern, particularly for unborn babies and young children
- HBCD measured in household dust samples
- Increasing environmental levels have been mirrored in breast milk
- HBCD tissue concentrations are currently much below those reported to induce adverse effects in other mammals

- Chemical alternatives to replace HBCD
  - Commercially available for HIPS and textile backcoatings
  - Not yet fully commercially available to replace HBCD in most common production process for EPS and XPS
- Alternative materials to those requiring HBCD use
  - Alternative insulation materials (to PS) – glass wool, rock wool, wool, cellulose, phenolic foams
  - Alternative construction techniques are available with PS – use of thermal barriers, product redesign (sandwich panels)
  - Alternatives to HIPS (electrical products) and other HBCD applications with textiles are available

- **Polymeric FR - brominated styrene/butadiene polymer**
  - Suitable for one-step EPS and XPS processes
  - Apparently no significant impact on costs of products
  - Reportedly essentially equivalent flame retardant efficiency to HBCD when used at equivalent bromine content
  - Commercially available now – sales started Q4 2012/ production being scaled up
  - Sufficient amounts for complete replacement of HBCD expected in 2-4 years
  - Time needed to be phased in by PS foam industry / product fire rating certification
  - According to industry information:
    - Potentially persistent (not biodegradable)
    - Low potential for bioaccumulation
    - Low potential for human toxicity, No data available on aquatic toxicity

- If listed in SC, waste management measures in accordance with Article 6(1)(d) would apply to HBCD containing products and articles on becoming waste
  - This would require identifying HBCD containing materials eg when buildings dismantled
    - To facilitate destruction of POP content
    - To prevent practices leading to recycling of POP content
  - But similar identification/separation problems to PBDEs
  - Unknown extent of landfilling, incineration, recycling – municipal waste likely to be landfilled
  - Controlled incineration is one way of disposing of HBCD containing waste

- HBCD containing products and articles commonly recycled – varies between countries
  - Recycling potential greater than for other BFRs
  - Recycling of EPS – to make new foamed products, or make compact PS – plant pots, coat hangars, trays, as mixed plastic waste it can be used for fence posts/road signs, fragmented EPS can be used for soil treatment
- Recycled products are also sources of emissions
- Contaminated products difficult to identify

- Decision POPRC-8/3:
  - Recommends HBCD\* for listing by the Conference of the Parties in Annex A to the Convention, with specific exemptions for production and use in EPS and XPS, in buildings
  - Notes:
    - Issues with end-of-life disposal of products and articles containing HBCD – waste management in accordance with Article 6(1)(d)
    - Recycling of EPS/XPS does occur – means to distinguish HBCD containing materials desirable but challenges here
    - Concerns about waste materials and articles in use being exported to developing countries and countries with economies in transition
    - Some developing countries may need more time than developed countries to phase out any exempted production and use of HBCD

\* hexabromocyclododecane (CAS No.: 25637-99-4),  
1,2,5,6,9,10-hexabromocyclododecane (CAS No.:  
3194-55-6) and its main diastereoisomers:  
alpha-hexabromocyclododecane (CAS No.: 134237-50-  
6);  
beta-hexabromocyclododecane (CAS No.: 134237-51-  
7); and  
gamma-hexabromocyclododecane (CAS No: 134237-  
52-8)



Thank You