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**United Nations  
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Persistent Organic Pollutants Review Committee**

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Item 5 (c) of the provisional agenda\*

**Consideration of chemicals proposed for inclusion in  
Annexes A, B and C of the Convention: hexabromobiphenyl**

**Hexabromobiphenyl proposal\*\***

**Note by the Secretariat**

The annex to the present note contains a proposal by the European Union and its member States that are Party to the Stockholm Convention on Persistent Organic Pollutants for listing hexabromobiphenyl in Annex A of the Stockholm Convention pursuant to paragraph 1 of Article 8 of the Convention. The annex is being circulated as submitted and has not been formally edited by the Secretariat.

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\* UNEP/POPS/POPRC.1/1.

\*\* Stockholm Convention, Article 8, paragraph 1.

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**Proposal for listing**

**Hexabromobiphenyl**

**in Annex A of the Stockholm Convention**

**on Persistent Organic Pollutants**

## **Introduction**

Hexabromobiphenyl belongs to a wider group of polybrominated biphenyls. The term polybrominated biphenyls or polybromobiphenyls (PBBs) refers to a group of halogenated hydrocarbons, formed by substituting hydrogen by bromine in biphenyl. These intentionally produced chemicals have mainly been used as flame retardants in synthetic fibres and plastics. Technical PBBs contain several PBB compounds, isomers and congeners, hexabromobiphenyl being one of the main components.

Hexabromobiphenyl has been identified as a Persistent Organic Pollutant (POP) chemical under the Protocol to the Convention on Long-range Transboundary Air Pollution (CLRTAP) on Persistent Organic Pollutants and the provisions of the Protocol oblige Parties to phase out all production and uses of hexabromobiphenyl.

This dossier focuses solely on the information required under paragraphs 1 and 2 of Annex D of the Stockholm Convention and it is mainly based on information from the Environmental Health Criteria (EHC) report on PBBs<sup>1</sup>. This extensive review report also serves as a source of further information referred to in paragraph 3 of Annex D of the Stockholm Convention on this candidate POP chemical.

## **1 Identification of the chemical**

### **1.1 Names and registry numbers**

Hexabromobiphenyl, HBB

1,1'-Biphenyl, hexabromo-

Biphenyl, hexabromo

CAS No: 36355-01-8

EINECS No: 252-994-2

Common trade names: FireMaster

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<sup>1</sup> Environmental Health Criteria (EHC) 152: Polybrominated biphenyls. IPCS International Programme on Chemical Safety. United Nations Environment Programme. International Labour Organisation. World Health Organization. Geneva 1994. Available at: <http://www.inchem.org/documents/ehc/ehc/ehc152.htm>.

## 2 Structure

Chemical formula:  $C_{12}H_4Br_6$

Chemical structure:



(Structural Formula source: <http://webbook.nist.gov>)

Molecular weight: 627.58

## 2 Persistence

The EHC review concludes that polybrominated biphenyls (PBBs) are stable and persistent in the environment. The degradation of PBBs by purely abiotic chemical reactions (excluding photochemical reactions, see chapter 4 below) is considered unlikely.

PBBs have been reported to be persistent under field conditions. Soil samples from a former PBB manufacturing site, analysed several years after accidental release, still contained PBBs. However, the congener composition was different, indicating partial degradation of the PBB residue in the soil samples. According to the EHC Review, follow-up surveys over a three-year period following the termination of PBB production showed no significant decline in PBB levels in sediments from a river. In laboratory investigations, mixtures of PBBs appear to be fairly resistant to microbial degradation.

## 3 Bioaccumulation

The EHC review states that PBBs are lipophilic and able to bioconcentrate in the food chain. This is also supported by monitoring results from wildlife studies. For example, fathead minnows (*Pimephales promelas*) caged in a river, where water levels of PBB remained consistently at less than 0.1 µg/litre, concentrated these contaminants in their bodies more than 10 000 fold in two weeks of exposure.

Log Kow: 6.39 - 7

BCF: > 10 000 (fish)

#### **4 Potential for long-range environmental transport**

Vapour pressure of hexabromobiphenyl is  $6.9 \times 10^{-9}$  kPa. There is no information available about measured half-life of hexabromobiphenyl in the air. According to the EHC review, the photoreactivity of 2,2',4,4',5,5'-hexabromobiphenyl was found to be relatively high but on the other hand, the rates and extent of photolytic reactions of PBBs in the environment have not been determined in detail. The few field observations available indicate a high persistence of the original PBBs or a partial degradation to less brominated (and often more toxic) photoproducts. The EHC review concludes that long-range transport of PBBs in the atmosphere has not been proven, but that the presence of these compounds in Arctic seal samples indicates a wide geographical distribution.

#### **5 Adverse effects**

Only few data are available on the effects of PBBs on organisms in the environment. No information is available on the effects of PBBs on the ecosystems.

The EHC review concludes that polybrominated biphenyls are extremely persistent in living organisms and have been shown to produce chronic toxic effects and cancer in animals. Though the acute toxicity was low, cancer was induced at a dose of 0.5 mg/kg body weight per day and the no-observed-effect level was 0.15 mg/kg body weight per day. A number of chronic toxic effects have been observed in experimental animals at doses around 1 mg/kg body weight per day following long-term exposure. International Agency for Research on Cancer (IARC) has classified hexabromobiphenyl as a possible human carcinogen (IARC group 2B).

#### **6 Statement of the reasons for concern**

Hexabromobiphenyl is very persistent in the environment. It has a great potential for bioaccumulation and in addition it is assumed to have potential for biomagnification. Due to its physical and chemical properties and based on findings in environmental samples, it can be assumed that hexabromobiphenyl can be transported long distances in air, far from its sources. Hexabromobiphenyl is a possible human carcinogen and can also be regarded as a substance of endocrine disrupting activity.

Production and use of polybrominated biphenyls has been ceased over the last decades in developed countries but it cannot be excluded that these substances are still produced and used in some developing countries. In addition to emissions during manufacture or use, these substances enter the environment from the widespread use of flame-retarded products. A considerable part of the PBBs produced will probably reach the environment sooner or later because of the high stability of these compounds. Furthermore, some these chemicals may form toxic polybrominated dibenzofurans during combustion processes.

Neither single country nor groups of countries alone can abate the pollution caused by hexabromobiphenyl. Regional action has already been considered necessary and hexabromobiphenyl is totally banned under the CLRTAP Protocol on POPs. Due to the harmful POP properties and risks related to its possible continuing production and use, global action is warranted to eliminate this pollution.