

## Decision POPRC-1/3: Pentabromodiphenyl ether

*The Persistent Organic Pollutants Review Committee,*

*Having examined* the proposal by Norway, which is a Party to the Stockholm Convention on Persistent Organic Pollutants, to list pentabromodiphenyl ether in Annex A to the Convention and having applied the screening criteria specified in Annex D to the Convention,

*Noting* that the commercial product hereinunder termed PentaBDE is a mixture and does not have a Chemical Abstracts Service number, but that its identified individual components have the following Chemical Abstracts Service numbers:

- (a) Pentabromodiphenyl ether (CAS No. 32534-81-9) 50–62% w/w;
- (b) Tetrabromodiphenyl ether (CAS No. 40088-47-9) 24–38% w/w;
- (c) Tribromodiphenyl ether (CAS No. 49690-94-0) 0–1% w/w;
- (d) Hexabromodiphenyl ether (CAS No. 36483-60-0) 4–12% w/w;
- (e) Heptabromodiphenyl ether (CAS No. 68928-80-3) trace,

1. *Decides*, in accordance with paragraph 4 (a) of Article 8 of the Convention, that it is satisfied that the screening criteria have been fulfilled for PentaBDE, as set out in the evaluation contained in the annex to the present decision;

2. *Decides furthermore*, in accordance with paragraph 6 of Article 8 of the Convention and paragraph 29 of decision SC-1/7 of the Conference of the Parties to the Stockholm Convention, to establish an ad hoc working group to review the proposal further and to prepare a draft risk profile in accordance with Annex E to the Convention;

3. *Invites*, in accordance with paragraph 4 (a) of Article 8 of the Convention, Parties and observers to submit to the Secretariat the information specified in Annex E before 27 January 2006.

### Annex to decision POPRC-1/3

#### Evaluation of pentabromodiphenyl ether against the criteria of Annex D

##### A. Background

1. The primary source of information for the preparation of this evaluation was the proposal submitted by Norway, contained in document UNEP/POPS/POPRC.1/5.
2. Additional sources of scientific information included critical reviews prepared by recognized authorities and peer-reviewed scientific papers.

##### B. Evaluation

3. The proposal was evaluated in the light of the requirements of Annex D, regarding the identification of the chemical (paragraph 1 (a)) and the screening criteria (paragraphs 1 (b)–(e)):

- (a) **Chemical identity:**
  - (i) Adequate information was provided in the proposal and supporting documents;
  - (ii) The chemical structure was provided;The chemical identity of PentaBDE is clearly established;

(b) **Persistence:**

- (i) The estimated half-life in water for two polybrominated diphenyl ether (PBDE) congeners (PBDE-47 and PBDE-99)<sup>1</sup> is 150 days, which exceeds the BCF criteria (Refs. 1, 3 and 7);
- (ii) Deposits of PBDE congeners that were present in marine sediments a few decades ago are still present in clearly quantifiable amounts (Refs. 1,4 and 7);

There is sufficient evidence that PentaBDE meets the persistence criterion;

(c) **Bioaccumulation:**

- (i) Log Kow is greater than 5 (log Kow values 6.46–6.97). The reported bioconcentration factors for *Cyprinus carpio* are 66,700 for PBDE-47 and 17,700 for PBDE-99 (Refs. 1 and 3);
- (ii) and (iii) Data from around the world demonstrate increasing levels of PentaBDE congeners with rising trophic position (Refs. 3 and 4). Recent publications confirm food chain transfer in the Arctic (Refs. 5 and 6);

There is sufficient evidence that PentaBDE meets the bioaccumulation criterion;

(d) **Potential for long-range environmental transport:**

- (i) and (iii) PentaBDE has a low vapour pressure ( $9.6 \cdot 10^{-8}$ – $4.7 \cdot 10^{-5}$  Pa) and modelling data show an estimated half-life in air greater than two days. The estimated half-lives for PBDE-47 and PBDE-99 in air are between 10 and 20 days (Refs. 1, 3 and 7);
- (ii) Monitoring data show that the substance is found in remote areas (Refs. 1, 2 and 7). PentaBDE congeners have been found in Arctic air with a concentration range from <1 to 20 pg/m<sup>3</sup> (Refs. 1 and 7). There is also a substantial amount of monitoring data in marine mammals, birds, fish, lake sediments, etc., in remote areas (Refs. 1, 3, 4 and 7);

There is sufficient evidence that PentaBDE meets the criterion on potential for long-range environmental transport;

**Adverse effects:**

- (i) There are no data provided on the direct toxicological effects of PentaBDE or PBDE congeners in humans;
- (ii) There is evidence of reproductive toxicity in invertebrates and fish. The EC<sub>50</sub> for larval development for marine copepod ranged between 13 and 4 mg/L for PBDE-47 and PBDE-99, respectively. The lowest-observed-adverse effect level (LOAEL) in rodents for developmental neurotoxicity and liver toxicity ranged from 0.6 to 10 mg/kg body weight/day (Refs. 1, 2, 3, 4 and 7);

There is sufficient evidence that PentaBDE meets the criterion on adverse effects.

## C. Conclusion

4. The Committee concluded that commercial pentabromodiphenyl ether (PentaBDE) meets the screening criteria specified in Annex D.

### References

1. UNEP/POPS/POPRC.1/5.
2. *Environmental Health Criteria No. 162: Brominated Diphenyl Ethers*. International Programme on Chemical Safety, UNEP, ILO, WHO. Geneva. 1994. (<http://www.inchem.org/documents/ehc/ehc/ehc162.htm>).
3. *Risk Assessment Report for Diphenyl Ether, Pentabromo Derivative (Pentabromodiphenyl Ether), Final Report of August 2000*. European Commission. 2000.

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<sup>1</sup> PBDE-47 and PBDE-99 are two congeners within the family of polybrominated diphenyl ethers (i.e., 2,2',4,4'-tetrabromodiphenyl ether and 2,2',4,4',5-pentabromodiphenyl ether respectively).

4. *Brominated Flame Retardants*. Report 5065 (author C.A. de Wit), Swedish Environmental Protection Agency, Stockholm. 2000. ISBN 91-620-5065-6.
5. Wolkers H., van Bavel B., Derocher A.E., Wiig O., Kovacs K.M.; Lydersen C., Lindstrom G. "Congener-specific accumulation and food chain transfer of polybrominated diphenyl ethers in two Arctic food chains". *Environmental Science and Technology*. 2004. 38:1667–1674.
6. Personal communication based on a scientific paper submitted for publication to the *Journal of Environmental Toxicology and Chemistry*. (Sormo, E.G., Salmer, M.P., Jenssen B.M., Hop H., Baek K., Kovacs, K.M., Lydersen, C., Falk-Peterssen S., Gabrielsen, G.W., Lie, Elisabeth and Skaare, J.U., 2005).
7. *TemaNord* 2001: 579, 72 pp., Nordic Council of Ministers 2001.