

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)¹ 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/m³ (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 EC₅₀ 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.

¹ 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.