

## Decision POPRC-1/6: Lindane

*The Persistent Organic Pollutants Review Committee,*

*Having examined* the proposal by Mexico, which is a Party to the Stockholm Convention on Persistent Organic Pollutants, to list lindane (Chemical Abstracts Service Number 58-89-9) in Annex A to the Convention and having applied the screening criteria specified in Annex D to the Convention,

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 lindane, 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-1/6

#### Evaluation of lindane 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 Mexico, contained in document UNEP/POPS/POPRC.1/8.

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. Information was provided to the Committee about further trade names for this substance;

(ii) The chemical structure was provided. Lindane is one of several hexachlorocyclohexane (HCH) isomers, i.e., the gamma isomer;

The chemical identity of lindane is clearly established;

###### (b) Persistence:

(i) The half-life in soil is reported to be two years. This exceeds the criterion value of six months. The half-life in water is 30–300 days (Ref. 1), although it has also been reported to have a half-life in sea water ranging from 1.2 to 19 years depending on water temperature (Refs. 2, 3 and 4). These values exceed the criteria value for water of two months;

(ii) No data provided;

There is sufficient evidence that lindane meets the persistence criterion;

###### (c) Bioaccumulation:

(i) Data found in Environmental Health Criteria 124 (Ref. 5) indicated that bioconcentration factors ranged from 13 to 1,240. The bioconcentration factor values, obtained and peer-reviewed by Japan, were between 327 to 893 in accordance with OECD Test Guidelines. Other references provide measured bioconcentration factors in mussels, daphnia and fish species ranging from 43 to 4,240, depending on the lipid content of the organism. Regarding the bioaccumulation factor, the only information provided was a value of 12,500 in

the Mexican proposal which may be based on the physico-chemical properties and environmental fate for lindane. The log Kow value in the Mexican proposal is 3.5;

- (i) The bioaccumulation of lindane has been observed for most taxonomic groups, from plants and algae to vertebrates. The environmental consequences of the combination of this bioaccumulation potential with a high toxicity – no-observed-adverse-effect levels (NOAELs) as low as 0.3 mg/kg body weight/day – and ecotoxicity – aquatic ecosystem no-observable-effect concentration (NOEC) below 1 µg/l (Refs. 5 and 6) – should be considered. For example, when measured field levels in earthworms (0.3 mg/kg for a soil containing 80 µg/kg) are weighed against mammalian toxicity data (Ref. 5) using a realistic food intake ratio of 0.63 (Ref. 7) the comparison indicates an area of ecotoxicological concern which should be further explored;
- (ii) Lindane has been reported in seabirds, fish and mammals in the Arctic (Ref. 1). Lindane concentrations in marine mammals are found at equivalent or even higher levels than some of the more hydrophobic contaminants such as polychlorinated biphenyls (PCBs) and DDT (Ref. 1). In addition, lindane has been reported in human breast milk among Inuit in the Arctic and in marine mammals (Ref. 8);

There is sufficient evidence that lindane meets the bioaccumulation criterion;

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

- (i) Lindane has been measured in Arctic air (Ref. 9);
- (ii) Lindane appears consistently in Arctic sea water and fresh water bodies (Ref. 9) and in marine mammals (Ref. 1) indicating that it has travelled long distances. Lindane, as a volatile compound, can be found in other remote regions according to the proposal;
- (iii) Estimations of lindane and technical-HCH global usage have been presented based on atmospheric concentrations and modelling of estimated emissions throughout the world (Ref. 1). The vapour pressure of lindane is  $3.8 \times 10^{-3}$  Pa, photodegradation is insignificant and its half-life in air is 2.3–13 days (Ref. 1). Other authors have measured longer half-lives of 56 days (Ref. 10);

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

**(e) Adverse effects:**

- (i) and (ii) Lindane has been identified as a 2B carcinogen, i.e., possibly carcinogenic to humans by IARC (Ref. 1). It is also highly toxic to aquatic organisms (Ref. 5). In the proposal, there are several other toxic endpoints listed that are relevant to humans and animals;

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

## C. Conclusion

- 4. The Committee concluded that lindane meets the screening criteria specified in Annex D.

### References

1. UNEP/POPS/POPRC.1/8
2. Nagabe, et al., *Environmental Science and Technology*. 27: 1930–1933. 1993.
3. Harner, T. et al., *Environmental Science and Technology*. 33: 1157–1164. 1999.
4. Harner, T. et al., *Geophysical Research Letters*. 27: 1155–1158. 2000.
5. *Environmental Health Criteria No. 124: Lindane*. International Programme on Chemical Safety. UNEP, ILO, WHO. Geneva. 1991. (<http://www.inchem.org/documents/ehc/ehc/ehc124.htm>).
6. Brock et al., *Alterra Report 89*, Netherlands. 2000.

7. *Guidance document on risk assessment for birds and mammals under Council Directive 91/414/EEC*. European Union. SANCO/4145/2000 – final, Brussels. 2002.
8. Arctic Monitoring and Assessment Programme. Norway. 2002.
9. Gregor, D., et al., *Environmental Science and Technology*. 23: 561–565, 1989.
10. Brubaker, W. W., and Hites, R.A. 1998. *Environmental Science and Technology* 32 : 766–769.