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Working Group on Strategies and Review
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# FURTHER ASSESSMENT OF PERSISTENT ORGANIC POLLUTANTS (POPs)

Report by the Chairman of the Expert Group on POPs
prepared with the assistance of the secretariat

## Introduction

1. This report presents progress in the work of the Expert Group on POPs since the thirty-fourth session of the Working Group on Strategies and Review, in particular the results of its fourth meeting in Oslo on 17-19 March 2003.

2. Experts from Austria, Canada, Croatia, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Republic of Moldova, Sweden, United Kingdom, United States and European Community participated in the meeting. Representatives from the UNECE secretariat, the Meteorological Synthesizing Centre East (MSC-E) of EMEP, the Euro Chlor sector group of the European Chemical Industry Council (CEFIC) and the World Wide Fund for Nature (WWF) also participated.

3. Mr. David STONE (Canada) chaired the meeting.



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## I. BACKGROUND TO THE WORK OF THE EXPERT GROUP

4. According to the work-plan for the implementation of the Convention (ECE/EB.AIR/77/Add.2, annex XIII, item 1.5), the Expert Group is expected to:

(a) Continue, where appropriate, the review of available information provided by experts relating to the existing obligations for substances listed in annex I, II or III to the Protocol on POPs, together with expert judgement on this material;

(b) Prepare an addendum to the compendium of information provided by national experts on substances not included in the Protocol after technical evaluation of this material.

5. The Expert Group revisited the information collected on existing reassessment tasks relating to substances included in annexes I, II and III as summarized in its report to the Working Group on Strategies and Review (EB.AIR/WG.5/2002/2, annex I). It noted that neither any relevant new information nor any comments that required updating or correcting the information had been received.

6. As in previous years, the Expert Group was informed about the work of other international organizations of relevance to its work, including:

(a) The selection of priority substances by the dynamic selection and prioritization mechanism for hazardous substances (DYNAMEC) of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) – http://www.ospar.org;

(b) The Report on Arctic Pollution in 2002 prepared by the Arctic Monitoring and Assessment Programme (AMAP) – http://www.amap.no;

(c) A workshop to develop a global monitoring framework for POPs conducted under the Stockholm Convention on POPs – http://irptc.unep.ch/pops/.

7. The Expert Group was also informed that Canada had released an assessment report under its Northern Contaminants Program, which runs in parallel to AMAP in timing and in scope. Information on the programme and on the assessment can be found at http://www.ainc-inac.gc.ca/ncp/.

## II. REVIEW OF DOSSIERS ON SUBSTANCES NOT INCLUDED IN THE PROTOCOL

8. At its third meeting, the Expert Group had reviewed dossiers on the following substances: hexachlorobutadiene; pentabromodiphenyl ether; pentachlorobenzene; and polychlorinated naphthalenes. It had presented summaries on these dossiers in its report to the Working Group on Strategies and Review (EB.AIR/WG.5/2002/2, annex II).

9. At its fourth meeting, the Expert Group discussed three additional draft dossiers for inclusion in an addendum to the compendium on substances that may be candidates for inclusion in the Protocol. The dossiers were based on input provided by Parties through the questionnaire circulated in 2002 (EB.AIR/WG.5/2002/2, para. 5), on comments provided by experts and on information from other sources. The following substances were covered in the work:

(a) Dicofol - led by Mr. E. van de Plassche (Netherlands);

(b) Short-chain chlorinated paraffins – led by Mr. G. Filyk (Canada); and

(c) Endosulfan – led by Mr. M. Herrmann (Germany).

10. The Expert Group assisted the Parties that had taken the initiative to prepare the dossiers by providing additional information or technical comments. It thanked the lead experts for their valuable contributions.

11. After a technical evaluation of the draft dossiers, the Expert Group agreed on the summaries presented in the annex to this report. It noted, however, that all conclusions presented therein reflected the view of the Parties' experts that had prepared the dossiers and not necessarily that of the Expert Group. The addendum to the compendium with the full dossiers is published separately.

12. The Expert Group recognized that Executive Body decision 1998/2 on information to be submitted and the procedures for adding substances to annexes I, II and III to the Protocol did not refer to specific criteria. The decision required a proposal, inter alia, to contain information on the characteristics, following the guidance and indicative numerical values, which demonstrate potential for long-range atmospheric transport, toxicity, persistence and bioaccumulation. While the draft dossiers often referred to "criteria", this term did not appear in the decision or the Protocol. In all instances where the term was used, it should be understood to refer to the characteristics and the guidance and indicative numerical values as stated in the decision.

13. In the course of its discussion on the dossiers for substances not included in the Protocol, the Expert Group noted that it might be important to consider, when appropriate, information on transformation products in the context of the characteristics and indicative values given in Executive Body decision 1998/2. For example, the dossier on endosulfan indicates that a degradation product from endosulfan (endosulfan sulphates) is more persistent than and as toxic as the parent compound. The Protocol on POPs and the decision do not explicitly refer to such transformation products. The Working Group on Strategies and Review may wish to consider this issue.

14. After its second meeting, Mr. J. Zurek (Poland) had offered to prepare a draft dossier on pentachlorophenol. The first results of the work conducted by experts from Poland (Mr. M. Borysiewicz and Mr. W. Kolsut) had been presented at the third meeting of the Expert Group. The Expert Group provided comments on the first draft of the dossier, and the lead expert offered to finalize the dossier taking into account the comments received and to present a revised draft at a future meeting of the Expert Group. At its fourth meeting, the Expert Group was informed about the progress in the work on the dossier.

15. The Meteorological Synthesizing Centre East (MSC-E) of EMEP presented to the Expert Group its model approach to the evaluation of potential candidate POPs. The approach focused on the assessment of two of the characteristics to be reviewed: long-range transport potential and overall persistence. MSC-E had used its multi-compartment hemispheric model to illustrate the approach for some of the substances reviewed by the Expert Group. The model parameters were based on the physico-chemical properties as provided in the draft dossiers or taken from the scientific literature. The model was being evaluated through a model intercomparison exercise conducted by EMEP. MSC-E offered to support interested experts preparing substance dossiers by conducting model calculations for them.

16. The Expert Group showed much interest in the modelling approach and welcomed the offer. Experts agreed that such modelling work could provide useful data to evaluate the long-range transport and persistence characteristics and give helpful illustrations to present such data. The lead experts responsible for the dossiers on dicofol and endosulfan expressed interest in cooperating with MSC-E and in using the model to develop some additional data for their dossiers.

17. The Expert Group was informed that the Swedish Government had commissioned its National Chemicals Inspectorate and Environmental Protection Agency to prioritize chemicals likely to fulfil the criteria for POPs set out in the Protocol on POPs and the Stockholm Convention on POPs. The prioritization should include consideration of environmental benefits as well as economic consequences. The interim report had been published. An English summary was made available for information. The Swedish experts invited other experts to provide comments to them on the work.

## III. FURTHER WORK

18. The experts who had prepared dossiers indicated their interest in continuing to be made aware of any information relevant to their dossiers. Lead experts also expressed interest in cooperating with MSC-E and using the model to develop some additional data for their dossiers on long-range transport and persistence characteristics and provide illustrations for such data.

19. The Expert Group noted that, with the expected entry into force of the Protocol on POPs, its tasks had probably been accomplished. The participating experts were, however, reminded that their participation might become necessary in the expert body that would be entrusted by the Parties to the Protocol to conduct any technical review of information related to the Protocol. The Chairman invited experts to be ready to contribute to such tasks in the future.

## Annex

## SUMMARY OF INFORMATION REVIEWED ON SUBSTANCES NOT INCLUDED IN THE PROTOCOL ON POPS

1. One of the tasks of the Expert Group has been to assist Parties in preparing preliminary risk profiles for substances that may be candidates for inclusion in the Protocol and to prepare a compendium of information provided by national experts after technical evaluation of this material. At its fourth meeting, the Expert Group reviewed dossiers on the following substances: dicofol; endosulfan; and short-chain chlorinated paraffins. The full compendium with the information submitted by national experts that were lead authors for specific substances will be published as a separate document. This annex provides the summaries of the dossiers.

2. The Expert Group on POPs evaluated the dossiers and the following summaries at its fourth meeting on 17-19 March 2003 in Oslo. The Expert Group assisted the Parties in preparing the dossiers by providing additional information or technical comments, but all conclusions in the dossiers and in the summaries below reflect the position of the Parties' experts that prepared the dossiers.

### I. DICOFOL

Introduction

3. The Expert Group reviewed a preliminary dossier provided by Mr. E. van de Plassche (Netherlands). Dicofol is an organochlorine pesticide. The substance is a miticidal pesticide and acaricide used in many countries around the world on a wide variety of fruit, vegetables, ornamental and field crops.

Characteristics (in relation to the indicative criteria outlined in Executive Body decision 1998/2)

4. The dossier concludes that dicofol meets the criteria (see table below).

| Criterion | | Meets the criterion (Yes/No) | Remarks |
|---|---|---|---|
| Potential long-range atmospheric transport | | Yes | Vapour pressure < 1 Pa and estimated half-life of 3.1 days; no monitoring data available. |
| Persistence | Water | Yes | Half-life o,p'-isomer: 47, 0.3 and <0.1 days for pH 5, 7 and 9. Half life p,p'-isomer: 85, 4 and <0.1 days for pH 5, 7 and 9. |
| | Sediment | No | Half-life <1 day for o,p' and p,p'-isomer (pH water phase 7.6-7.8). Half-life metabolites: 7-429 days. |
| | Soil | No | Half-life o,p'-isomer: 8-35 days. Half-life p,p'-isomer: 21-60 days. |
| Bioaccumulation | | Yes | Log Kow: 4.08-5.02. Bioconcentration factor (BCF) in fish: 8050-13,000. |
| Toxicity and ecotoxicity | | Yes | Dicofol is moderately toxic to mammals and not carcinogenic. In wildlife it is reported to be repro-toxic. In birds, dicofol may reduce eggshell quality. Dicofol is very toxic for the aquatic environment based on acute (L(E)C50 values of 15-120 µg/l) and chronic (no observed effect concentration (NOEC) values of 4.4-125 µg/l) toxicity tests. Metabolites are equally or less toxic for the aquatic environment (based on range-finding studies and quantity structure activity relationship (QSAR) model estimations). |

5. Critical in the evaluation is the persistency criterion. Dicofol is degraded in water, sediment and soil. Hydrolysis is strongly pH-dependent, being much faster under alkaline conditions. In water, only p,p'-dicofol meets the persistency criterion of a half-life of 2 months at a pH of 5. Most European and United States water bodies are not acidic with pH values typically around 7-8. However, there are sensitive, ecologically valuable water bodies in some regions in many countries with lower, more acidic pH values.

6. Dicofol meets the criterion for long-range atmospheric transport based on the vapour pressure and the estimated half-life value in air. It is noted that no monitoring results are available yet in remote areas. If dicofol is monitored in remote areas, metabolites will have to be considered, as they may have longer half-lives than dicofol and ecotoxicological properties comparable to dicofol.

Emission characteristics

7. Dicofol is produced in Spain under contract to Dow AgroSciences in an amount of around 1500 tons per year. DDT is produced as a site-limited intermediate in the production of dicofol. All production is sent to an Italian plant for formulation.

8. According to a database of the European Chemicals Bureau, dicofol is also produced by Mariano Fernendez Tarrats in Spain. In Israel dicofol is sold and probably manufactured by Maktheshim Agan. No further information was obtained from or about these companies. Production in other UNECE countries was not reported.

9. The total worldwide consumption of dicofol is 2750 tons/year according to an OSPAR report. For the different regions the volumes are: Western Europe: 290 tons/year; Africa and Western Asia: 180 tons/year; Asia: 1820 tons/year; and South America: 170 tons/year. For North America a volume of 290 tons/year is reported. This is lower than the volume of 390 tons/year reported by the United States Environmental Protection Agency (US-EPA) for the United States alone.

10. As dicofol is used as a pesticide, the total production will enter the environment. Dicofol will be released to soil and - via drift - also to surface water and air.

Environmental levels and bioavailability

11. No information is available on dicofol levels in remote areas. Results from a three-year monitoring programme in three geographically distinct areas of extensive use in the United States indicate no high residues in biotic and abiotic matrices and no accumulation over the study period. Probably most dicofol is degraded and/or remains in the area of application in the soil.

Socio-economic factors

12. In 1986, use of dicofol was temporarily banned by US-EPA. It was reinstated when it was shown that modern manufacturing processes could produce technical-grade dicofol which contained less than 0.1% DDTr (DDT and related substances). In Canada the level of DDTr in dicofol is not permitted to exceed 0.1%. The DDTr content in commercial dicofol in other countries in and outside UNECE is unknown.

13. The European Union (EU) Council Directive 79/117/EEC prohibits the use and marketing of products containing less than 78% p,p'-dicofol or more than 1 g/kg (=0.1%) of DDTr. In the EU the use of dicofol is authorized in several countries. In the framework of EU Regulation 451/2000 on plant-protection products, dicofol was notified. Spain is nominated as the rapporteur for this work. This means that industry will support the substance for listing in annex I to the Regulation, i.e. approval of the product in the EU. The decision whether the substance will be included in annex I is expected in 2006 or later.

14. Dicofol is on the OSPAR list of chemicals for priority action. Finland is lead country for the preparation of a background document. A final document will be published in 2003.

Conclusion

15. According to the dossier, dicofol may be a candidate for inclusion into the Protocol on POPs. The dossier provides information to satisfy all the POP characteristics in line with Executive Body decision 1998/2, noting the areas where further work is needed (ecotoxicity of metabolites, monitoring in remote areas of dicofol and metabolites).

## II. SHORT-CHAIN CHLORINATED PARAFFINS (SCCP)

Introduction

16. The Expert Group reviewed a second draft dossier provided by Mr. G. Filyk (Canada). Chlorinated paraffin products are complex mixtures of homologues and isomers, varying in chain length and degree of chlorination. Chlorinated paraffins with carbon chains containing 10–13 carbon atoms (C10–13) and a chlorine content between 30% and 70% by weight are termed "short-chain chlorinated paraffins" (SCCPs). As a result of the large number of SCCP congeners, analytical measurements are difficult.

Characteristics (in relation to the indicative criteria outlined in Executive Body decision 1998/2)

17. The dossier concludes that short-chain chlorinated paraffins meet the criteria (see table below).

| **Criterion** | **Meets the criterion (Yes/No)** | **Remarks** |
|---|---|---|
| Potential for long-range transport | Yes | • Monitoring data show presence of SCCPs in Arctic air, biota and lake sediments (comprised mainly of the more volatile, shorter carbon chain length and lower degree of chlorination congeners);<br>• Predicted vapour pressures range from $2.8 \times 10^{-7}$ to 0.5 Pa;<br>• Predicted atmospheric half-life > 2 days for a large number of SCCP structures (note – the dossier calculations were mainly for low-vapour pressure congeners, < 0.002 Pa). |
| Toxicity | Yes | • Carcinogenic to rats and mice;<br>• Toxic to aquatic invertebrates and fish at the µg/l level;<br>• Predicted to be toxic to benthic invertebrates at the µg/g level. |
| Persistence | Yes | • SCCP residues detected in lake sediments more than 50 years old;<br>• Weight of evidence suggests half-life in sediment greater than 6 months. |
| Bioaccumulation | Yes | • Bioaccumulation factors (BAFs)/BCFs for aquatic organisms greater than 21,000;<br>• Calculated and measured Log $K_{ow}$ range 5.06-8.12. |

*Long-range atmospheric transport potential*

18. SCCPs have low vapour pressures, ranging from $2.8 \times 10^{-7}$ to 0.5 Pa, and estimates of atmospheric half-life for SCCPs are greater than 2 days for a large number of structures. Vapour pressures tend to increase with decreasing carbon chain length and decreasing degree of chlorination. SCCP vapour pressures are within the range of some POPs shown to undergo long-range transport. For some congeners, transport on particles may be an important pathway, especially at low temperatures.

19. The detection of the more volatile shorter carbon chain length and lower degree of chlorination congeners of SCCPs in Arctic air, biota and in Arctic lake sediments in the absence of significant sources of SCCPs in this region provides monitoring evidence that SCCPs are undergoing long-range atmospheric transport. Fluxes of SCCPs to Arctic lake sediments are greater than fluxes of polychlorinated biphenyls (PCBs).

20. Therefore, SCCPs meet all of the characteristics for long-range atmospheric transport as described in Executive Body decision 1998/2, paragraph 1 (a).

*Toxicity*

21. The Canadian risk assessment of chlorinated paraffins concludes that SCCPs are carcinogenic, and therefore toxic to human health as defined under the Canadian Environmental Protection Act of 1988. Toxicity studies with aquatic invertebrates and fish show SCCPs to be toxic at the µg/l level, while toxicity to benthic invertebrates is predicted at the µg/g level.

22. Therefore, SCCPs meet the characteristics for toxicity described in Executive Body decision 1998/2, paragraph 1 (b).

*Persistence*

23. SCCP residues are detected in Canadian lake sediment cores dating back over 50 years. In the absence of information on loading for any of the years at any of these locations, it is not possible to calculate half-lives from these data for comparison with the criterion for persistence in sediment stipulated in paragraph 1 (c) of Executive Body decision 1998/2. However, the fact that such old SCCP residues have been found is convincing evidence that SCCPs are persistent in sediment. Therefore, SCCPs meet the indicative criteria for persistence in sediment as described in Executive Body decision 1998/2, paragraph 1 (c).

*Bioaccumulation*

24. Bioaccumulation factors/bioconcentration factors (BAFs/BCFs) for SCCPs in fish and mussels are greater than 21,000. Calculated and measured log $K_{ow}$ values range from 5.06 to 8.12.

25. It is concluded that SCCPs are a bioaccumulative substance according to the indicative criteria stipulated in Executive Body decision 1998/2, paragraph 1 (d).

Emission characteristics

26. The major application (71%, 1995 in the EU) of SCCP is as an extreme pressure additive in metal working fluids. Minor applications include plasticizers in paints, coatings and sealants; flame retardants in rubbers and textiles, and in leather processing. These activities represent potential emission sources.

27. Estimated total production in the UNECE region:

- European Union - 15,000 tons per year (Euro-Chlor, 1994);
- United States - 20,000 tons per year (2001 survey).

Estimated use in the UNECE region:

- Use of SCCPs in Europe decreased from 13,000 tons in 1994 to 4,000 tons in 1998 (OSPAR, 2001). Use in the EU is expected to further decrease with the implementation of EU Directive 2002/45/EC on SCCPs (June 2002);
- United States - 25,500 tons (2001 survey);
- Besides Canada, the Czech Republic, Georgia, Norway, Switzerland, the United States and the European Union also report current use (2001 survey).

Outside of the UNECE region, production and use take place in several countries, e.g. China.

Environmental levels and bioavailability

28. SCCPs are detected over a wide range of locations in waste-water effluents, surface waters, lake sediments, air samples, biota and food products. For example, SCCPs were detected in air samples (at $pg/m^3$ levels) from remote monitoring stations in the Arctic at Alert, Canada (<1 to 8.5) and Svalbard, Norway (9 to 57), and at semi-rural locations in Egbert, Canada (<65 to 925) and Lancaster, United Kingdom (99).

29. The Joint Task Force on the Health Aspect of Air Pollution in its report, the Health Risks of POPs from Long-range Transboundary Air Pollution, concluded that Europeans might be exposed to SCCPs at levels above the World Health Organization (WHO) daily guideline of 11 µg/kg of body weight. High concentrations of SCCPs (100-770 µg/kg wet wt.) have been found in Arctic aquatic biota. Aboriginal peoples living in the Arctic consume these animals as food, and therefore may be exposed to SCCPs at concentrations greater than the WHO health guideline.

Socio-economic factors

30. There are national and international regulations for SCCPs in the UNECE region. In Europe, the Paris Commission (PARCOM) decision 95/1 and European Union Directive 2000/60/EC and most recently Directive 2002/45/EC place phase-out targets and severe restrictions on the use and discharge of SCCPs. In the United States, three categories of SCCPs are manufactured and used as reported in the Toxic Substances Control Act inventory. Canada is currently re-evaluating the environmental risk of SCCPs based on new environmental concentration data. A report is expected to be completed in late 2003.

31. Although some possible alternatives and substitutes for SCCPs have been proposed, the alternatives themselves may present health and environmental risks (for example higher chain chlorinated paraffins and bromine-based substitutes). The dossier briefly discusses costs of control, including possible higher costs of substitutes, environmental and health benefits of control, and research and development costs to identify substitutes.

Conclusions

32. The dossier concludes that SCCPs are a candidate for inclusion into the Protocol on POPs.

## III. ENDOSULFAN

Introduction

33. The Expert Group reviewed a preliminary dossier provided by Mr. M. Herrmann (Germany). Endosulfan is a chlorinated hydrocarbon compound consisting of two isomeric forms. It is widely used on a wide variety of pests on food and non-food crops in many countries.

Characteristics (in relation to the indicative criteria outlined in Executive Body decision 1998/2)

34. The dossier concludes that endosulfan meets the criteria (see tables below).

*Long-range atmospheric transport*

| Criterion | Criterion met? | Remarks |
|---|---|---|
| Vapour pressure | Yes | 1.9 x $10^{-3}$ Pa (alpha-isomer)<br>9.2 x 10-5 Pa (beta-isomer) |
| Half-life in air | Yes | Indicate values are available on atmospheric degradation from measured data |
| Measured data in remote areas | Yes | Endosulfan has been detected in air, snow and biota of Arctic regions, including marine mammals |

35. Considerable parts of endosulfan have been shown to evaporate from treated crops to undergo airborne transport via the gas phase and adsorbed phase. The substance also meets the vapour pressure criterion of < 1000 Pa. There is strong indication from laboratory tests and from QSAR model calculations that degradation in the atmosphere is not sufficiently effective to prevent long-range transport. This is supported by measured data of endosulfan in Arctic regions.

*Bioaccumulation*

| Criterion | Criterion met? | Remarks |
|---|---|---|
| Log Kow | No | 4.74 (alpha-isomer)<br>4.79 (beta-isomer) |
| Bioconcentration | Yes | BCF values = 2800–11600 in fish (limited quality of data)<br>Depuration within few days |

36. Data on bioaccumulation are reported within a broad range, with BCF values up to 10,000 and higher. However, most of the studies suffer from poor study design and do not allow for scientifically sound evaluation.

*Persistence*

| Criterion | Criterion met? | Remarks |
|---|---|---|
| Persistence in water | No<br>No<br>Yes | Half-life < 1 day at pH 9<br>Half-life < 19 days at pH 7<br>Half-life > 200 days at pH 5 |
| Persistence in sediment | No | Half-life = 10-12 days under aerobic conditions |
| | Yes | Half-life > 6 months under anaerobic conditions |
| Persistence in soil | Yes | Half-life < 6 months for alpha and beta-isomer, but > 6 months when endosulfan sulphate is included |

37. Endosulfan is hydrolysed very slowly in acidic waters, but rapidly in alkaline waters. Most European and United States surface water bodies are not acidic, with a pH value typically around 7-8.

However, there are sensitive, ecologically valuable water bodies in some regions in many countries with lower, more acidic pH values. Persistence in soil is reported to exceed a half-life of six months if the equally toxic metabolite endosulfan sulphate is included. Unlike in aerobic sediments, half-lives in anaerobic sediments exceed six months as well.

*Toxicity*

| **Criterion** | **Criterion met?** | **Remarks** |
|---|---|---|
| Acute toxicity, aquatic organisms | Yes | $LC_{50}$(96-h) = 0.37-2.1 µg/l for freshwater fish[a/]<br>$LC_{50}$(96-h) = 0.1-0.32 µg/l for marine fish<br>$EC_{50}$ (48-h) = 6-166 µg/l for freshwater invertebrates[b/]<br>$EC_{50}$ (96 h) = 0.45-460 µg/l for marine invertebrates |
| Chronic toxicity, aquatic organisms | Yes | NOEC = 0.05-0.4 µg/l in freshwater fish<br>Lowest observed effect concentration (LOEC) = 7 µg/l for freshwater invertebrates<br>LOEC = 0.5 µg/l for marine invertebrates |
| Acute toxicity, mammals | Yes | Toxic via oral ($LD_{50}$ = 10 - 23 mg/kg bw) and inhalative ($LC_{50}$ = 0.1 – 0.3 mg/l) exposure in rats. |
| Chronic toxicity, mammals | Yes | No observed adverse effect level (NOAEL) = 0.6 mg/kg/d based on altered body and organ growth in rats. |

a/ LC50 (Lethal Concentration 50) is the concentration of a chemical which kills 50% of a sample population. (Source: Physical and Theoretical Chemistry Laboratory, Oxford University)
b/ EC50 (Effective concentration 50) is the concentration of a chemical which causes a response in 50% of a sample population.

38. Endosulfan is very toxic to aquatic organisms, particularly to fish, and is also toxic to mammals on an acute and chronic basis. Its main transformation product (endosulfan sulphate) is as toxic as the parent compound.

Emission characteristics

39. Production has been reported within the UNECE region for only one company at one site in Germany at around 5000 tons/year. There are, however, further production sites in other non-UNECE countries.

40. Use of endosulfan within the EU has steadily decreased for the past few years. Almost 90% of the 490 tons/year consumed in 1999 were used in Mediterranean parts of the EU. The United States uses an average annual amount of 1.38 million pounds (about 616 tons/year).

41. As endosulfan is manufactured exclusively for plant protection purposes, the entire volume produced can be expected to end up spreading on agricultural land. From spray drift and volatilization part of it ends up in air, and part in surface waters following wash-off and run-off events.

Environmental levels and bioavailability

42. Measured concentrations of endosulfan are generally low outside areas of application. Nevertheless, data are available indicating off-site flow to remote areas particularly during seasons of application. Endosulfan has been measured in marine mammals in remote areas.

Socio-economic factors

43. Endosulfan has been banned, has not been approved, or has been severely restricted in a number of countries mainly from temperate and boreal zones. Existing bans in countries which formerly used endosulfan products demonstrate that substitutes are available to take the place of endosulfan. In the opinion of some there are at presently no viable alternative for all uses of endosulfan.

44. A review in the EU may decide on the further authorization of endosulfan-containing products. Endosulfan is further being considered by a number of organizations. For example, it is on the OSPAR list of chemicals for priority action and on the priority list of the EU Water Framework Directive.

Conclusion

45. According to the dossier, endosulfan may be a candidate for inclusion into the Protocol on POPs.

Note

In United Nations documents, the term “ton” refers to metric tons.