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**TECHNICAL INPUT FOR REVIEWING
THE PROTOCOL ON PERSISTENT ORGANIC POLLUTANTS**

Report by the Co-Chairmen of the Task Force on Persistent Organic Pollutants (POPs)
prepared with the assistance of the secretariat

Introduction

1. This progress report of the Task Force on POPs includes the results of its third meeting, held in Vienna from 30 May to 2 June 2005 and of an informal meeting held in Rome on 28 February and 1 March 2005. The presentations made and background information cited are available on the Internet at: www.unece.org/env/tfpop.
2. Experts from Austria, Belgium, Canada, Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Russia, Spain, Sweden, Switzerland, United Kingdom, United States and the European Community (EC) participated in at least one of the meetings. Representatives from the secretariat, the Meteorological Synthesizing Centre-East (MSC-E) of EMEP, the Arctic Monitoring and Assessment Programme (AMAP), the Euro Chlor sector group of the European Chemical Industry Council (CEFIC), the International Council of Chemical Associations (ICCA) and 3M Company attended at least one of the meetings.

Documents prepared under the auspices or at the request of the Executive Body for the Convention on Long-range Transboundary Air Pollution for GENERAL circulation should be considered provisional unless APPROVED by the Executive Body.

3. Mr. David STONE (Canada) and Mr. Johan SLIGGERS (Netherlands) chaired the meetings.
4. The Task Force expressed its gratitude to Austria and Italy for hosting the meetings.

I. PROGRESS ON THE WORK OF THE TASK FORCE

5. In accordance with its workplan (ECE/EB.AIR/79/Add.2, annex XII, item 1.5), the Task Force:
 - (a) Prepared technical elements to assist the Working Group on Strategies and Review in the sufficiency and effectiveness review of the Protocol on Persistent Organic Pollutants (POPs) (section II);
 - (b) Conducted a technical review of the dossiers forwarded by the Executive Body on pentabromodiphenyl ether (PeBDE) and perfluorooctane sulfonate (PFOS) (section III);
6. Section IV presents an options paper on possibilities for dealing with amendments to the Protocol and for priority setting, prepared by the Co-Chairs of the Task Force and the Chairman of the Working Group on Strategies and Review, as requested by the Executive Body at its twenty-first session (EB.AIR/83 paragraph 29(f)).

II. TECHNICAL ELEMENTS FOR THE REVIEW OF SUFFICIENCY AND EFFECTIVENESS OF THE PROTOCOL

7. The Task Force reviewed and amended background documents prepared by experts and MSC-E and expressed its appreciation to those preparing the documents. A summary of the information reviewed is provided below.

A. Best available scientific information on the effects of deposition of POPs

8. This section provides a synthesis of the information on atmospheric transport and deposition, measured and modelled levels in environmental media and their potential toxicological effects.
9. Advances in modelling POP transport and deposition have improved the identification of chemicals having potential for long-range atmospheric transport (LRAT) based on their physical and chemical properties. Current models show transportation and deposition of POPs on global, hemispheric and regional scales. While these models demonstrate the importance of global POP sources, they indicate that most POPs deposited in the UNECE region originated from within the

region. Model simulations show how reduced emission levels in UNECE have resulted in corresponding decreases in deposition.

10. The body of information on polychlorinated biphenyls (PCBs) and 1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane (DDTs) is relatively extensive and permits the assessment of some spatial and temporal trends that can be attributed to changes in deposition from LRAT. Results suggest that levels of both substances have generally decreased over the past 15-30 years as indicated in natural deposition archives (e.g. sediment cores) and levels in biota. Over the past 10-15 years temporal data from atmospheric and biological monitoring suggest that environmental levels are still decreasing though at a much slower rate, particularly in remote environments such as the Arctic. Despite these trends a number of species continue to display γ -PCB levels, and to a lesser extent γ -DDT levels, that exceed various thresholds for toxic effects. Estimated daily intake of PCBs among the general human population can exceed some guidelines indicating continued risk of adverse health effects. The risks are greater for newborns where exposure levels can exceed adult exposure by an order of magnitude. In general, levels of γ -DDT exposure among the general human population are well below dietary intake guidelines. Highly exposed groups, such as Inuit from Greenland and Canada, who regularly exceed guidelines for PCB intake, also have levels of γ -DDT exposure that approach and occasionally exceed WHO guidelines.

11. The amount of information on environmental levels of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) is not as extensive as it is for most other POPs. Models of current atmospheric levels and deposition suggest decreasing trends in industrial regions of the UNECE that are in the order of 50% since the late 1980s. Similar trends have been observed in breast milk in some European countries. Monitoring results from remote areas such as the Arctic generally show no discernible trends for PCDDs and PCDFs in abiotic media or biota. These data also suggest that some of the more highly exposed species of marine mammals and fish eating birds may exceed some toxicity thresholds. The probability of adverse effects is further increased when exposure to dioxin-like PCBs is considered. PCDDs and PCDFs are ubiquitous in human tissues and together with dioxin-like PCBs can contribute to levels of dioxin-like exposure that regularly exceed WHO dietary intake guidelines in the general population.

12. The accumulated information on environmental levels and trends of hexachlorobenzene (HCB), hexachlorocyclohexane (HCHs), chlordanes, toxaphene and to a lesser extent dieldrin and heptachlor epoxide allows for the assessment of some spatial and temporal trends that can be attributed to deposition from LRAT. Data suggest that environmental levels of HCB, α -HCH, heptachlor epoxide, chlordanes and toxaphene have generally decreased over the past 30 years, however, the evidence for decreasing trends in dieldrin, lindane (γ -HCH) or β -HCH is not as

clear. Similar findings are also expressed in Arctic atmospheric monitoring data collected over the past 10-15 years. Tissue concentrations in the most highly exposed marine species (birds and mammals) generally do not exceed applicable thresholds of toxicity, however, some effects in highly exposed species have been associated with toxaphene, HCB, HCHs, heptachlor epoxide and chlordanes. Levels of exposure to these POPs among the general human population and resulting from LRAT are well below applicable guidelines. Exposure among Arctic populations that consume marine mammals, however, can exceed some guidelines for dietary intake.

13. Some modelling data have been generated for polycyclic aromatic hydrocarbons (PAHs), particularly for more industrialized parts of UNECE. Model results appear to compare well to atmospheric monitoring data and suggest that atmospheric levels and deposition of PAHs have decreased over the past 10-15 years. Since PAHs do not accumulate or concentrate in food webs, levels measured in biota are relatively low. Consequently, human dietary exposure to PAHs as a result of LRAT is relatively low and well below applicable guidelines. The greatest source of human dietary exposure to PAHs results from their formation during food preparation.

14. Once released into the environment aldrin is readily degraded to dieldrin and is therefore rarely measured. Endrin and mirex are occasionally measured in environmental media, however, the existing data are insufficient for assessing temporal trends. A comparison of some recent results with those of 20-30 years ago suggests environmental levels have decreased. The limited data for biotic levels of endrin suggest relatively low levels of exposure and little risk of adverse effects resulting from LRAT. Levels of mirex, while higher than endrin, are lower than other POPs and there seems to be no documented risk of adverse effects related to exposure from LRAT. Levels of exposure among the general human population are well below applicable guidelines for dietary intake. Mirex exposure among Inuit exceeded Health Canada guidelines for dietary intake in some individuals.

15. There is very little information about environmental levels of chlordecone and polybrominated biphenyls that is related to deposition from LRAT. What little information there is suggests that exposure to wildlife and humans is negligible.

16. A number of substances with POP characteristics have recently been measured in remote environments where local sources do not exist. These include brominated flame retardants (PBDEs and hexabromocyclododecane), fluorinated organic compounds (PFOS and related compounds), chlorinated industrial chemicals (short-chain chlorinated paraffins and polychlorinated naphthalenes) and current use pesticides (endosulfan). Endosulfan is now one of the most abundant and ubiquitous organochlorine pesticides in the North American atmosphere. Increasing temporal trends with doubling times of 4-5 years have been reported for the most abundant PBDE congener (BDE-47) and concentrations of PFOS have been measured in some species at levels that are among the highest for any POP or substance with POP characteristics.

PBDEs and PFOS are also being measured in human tissues with increasing regularity and in the case of ? PBDEs, levels are increasing, particularly in North America.

B. Assessments of technical developments

1. Production and use, including exemptions, of substances listed in annexes I and II to the Protocol

17. This section provides a synthesis of available information for the following substances: DDT, HCH (lindane), and PCBs. It is based on information reported to the Task Force in 2004. Related information in the 2004 Task Force report (EB.AIR/WG.5/2004/1) includes the re-evaluations and reassessments of substances required by the Protocol.

18. No Party with an economy in transition has requested an exemption to produce or use HCB or to produce PCBs. The secretariat has no information on production and/or use of PCBs for non-Parties.

19. Regarding the uses and availability of alternatives to DDT, recently developed long-lasting insecticide-treated bed nets incorporate a synthetic pyrethroid insecticide into the net fibers, extending the efficacy of the net to 2-5 years.

20. Regarding the use of HCH including Lindane, formerly isomers of technical HCH were used to manufacture trichlorobenzene (TCB). HCH is no longer needed for this. No other chemical products are made with technical HCH.

21. For PCBs, the most frequent alternatives used in transformers are mineral oils and silicone oils. Other alternatives may also be used, but they do not have similar commercial interest. Some alternatives currently in use, such as alkyl-substituted chlorodiphenyls, may also pose a risk to health and the environment. Mineral oils, silicone oils and ester-based materials all represent biodegradable alternatives and are preferable from an environmental perspective. Alternative engineering designs such as encapsulated transformers with air-cooling have been recommended for non-biodegradable PCB substitutes (DIVS 2000:825, Nordic Council of Ministers).

22. The Arctic Council initiated a project in 1998 to phase out PCBs in the Russian Federation. The project included a feasibility study with an evaluation of alternatives for larger capacitors and transformers. The combustibility of alternative liquids required adjustment of technologies for storage and filling of transformers and intensified fire safety measures. Alternatives did not require an upgrade of production technology for capacitors and transformers. Capacitors and transformers using alternatives have electric properties and service lives comparable with units using PCBs and cost less to destroy.

23. The Task Force noted the development of new technologies enabling the identification of PCBs in articles.

2. Waste management

24. New developments in environmentally sound destruction/disposal of substances listed in annexes I-III to the Protocol, adopted by the Basel Convention and supported by the Global Environment Facility (GEF), were examined.

25. At its seventh meeting in October 2004, the Conference of the Parties to the Basel Convention adopted General Technical Guidelines¹ on the environmentally sound management of wastes consisting of, containing or contaminated with POPs. They describe commercially available operations for the environmentally sound destruction and irreversible transformation of the POP content in wastes. The document also provides guidance on reducing or eliminating releases into the environment from waste disposal and treatment processes.

26. A Review of Emerging, Innovative Technologies for the Destruction and Decontamination of POPs and the Identification of Promising Technologies for Use in Developing Countries², published by the GEF Scientific and Technical Advisory Panel (STAP) in 2004, identified five non-combustion technologies³ as promising, emerging and innovative. The report recommends that these technologies be further evaluated to provide funding for developing the technologies commercially in the near future.

3. By-products

(a) Technological developments in Best Available Control Techniques (BAT)

27. The following overview of the most recent technological BAT developments in relation to annex V of the Protocol covers both new and existing major stationary sources. Alternatives and emerging technologies are summarized for each category in the table.

28. Some experts noted that a possible way to reduce PAH air emissions further would be to address the production and use of creosote and carbolineum under annex I or II to the Protocol.

¹ The full text is available on the Internet at: http://www.basel.int/techmatters/pops/pops_guid_final.doc

² The full text is available on the Internet at: http://www.basel.int/techmatters/review_pop_feb04.pdf

³ The definition used for the purpose of the review includes processes which operate in a starved or ambient oxygen atmosphere. Such technologies may produce dioxins or furans but require less technology than an oxidized process such as a high-temperature rotary kiln.

Category	Alternatives	Emerging technologies
Incineration, including co-incineration of municipal, hazardous, medical waste, or of sewage sludge waste.	<p>For municipal waste: Zero waste management strategies; waste minimization, source separation and recycling; sanitary landfill; composting; mechanical biological treatment; high-temperature melting.</p> <p>For hazardous waste: Waste minimization and source separation with final disposal by other techniques or to appropriate landfill; Gas phase chemical reduction; Base-catalyzed decomposition; Sodium reduction; Supercritical water oxidation.</p> <p>For medical waste: Steam sterilization; advanced steam sterilization; microwave treatment; dry heat sterilization; alkaline hydrolysis (or heated alkali digestion); biological treatment; disposal to landfill.</p> <p>For sewage sludge: Disposal to landfill; landspreading of sewage sludge.</p>	Pyrolysis and gasification; thermal depolymerization; plasma technologies.
Sinter plants	FASTMET process; direct reduction processes; direct smelting processes.	Selective catalytic reduction; urea injection.
Primary and secondary production of copper	Consideration should be given to hydrometallurgical processes, where technically feasible, for new smelting facilities or smelting processes.	Catalytic oxidation.
Production of steel	There are no alternatives to the graphite electrode at the present time.	Selective catalytic reduction; CONTIARC furnace; COMELT furnace.
Smelting plants in the secondary aluminum industry		Catalytic oxidation; catalytic filter bags; use of electric arc furnaces for salt-free melting of drosses; reuse of filter dust; processing of salt slag in a dry state.
Combustion of fossil fuels in utility and industrial boilers with a thermal capacity above 50 MW	Annex V does not identify best available techniques for the specific purpose of PCDD/F removal. Studies in the U.S. have shown that sulfur concentrations in the flue gas inhibit dioxin formation.	
Residential combustion	Replacing poorly designed stoves with improved stoves that burn fuel more efficiently.	Heat Pumps.
Firing installations for wood with a thermal capacity below 50 MW	Downdraught boilers; modern pellet boilers; installation of accumulator tank.	Small-scale combined heat and power units; heat pumps; renewable energy technologies; fuel cells.
Coke production	European jumbo coking reactor (single chamber system); non-recovery cokemaking; antaeus continuous coke™ process.	Continuous cokemaking process; calderon cokemaking technology; Japanese SCOPE21 project.
Anode production	Dry adsorption; condensation with electrostatic precipitators	Regenerative afterburner.
Aluminum production using the Soederberg process	Use of centre-worked pre-baked cell (considered BAT in Europe); inert anodes; wettable cathodes; vertical electrodes low-temperature electrolysis (VELTE); drained cell; carbothermic technology; kaolinite reduction technology.	
Wood preservation installations	Strict restrictions on the use of creosote and carbolineum for wood preservation.	

(b) Technical developments with regard to limit values

29. Current international and national limit values for new and existing facilities in those sectors identified in annex IV were compiled for this review. In addition, current limit values for both new and existing facilities in sectors identified in annex VIII, not covered in annex IV, were considered.

30. For major stationary sources of PCDD/F identified in annex IV (municipal solid waste, medical solid waste and hazardous waste incineration) most countries have emission limit values (ELVs) below or equal to those set by the Protocol.⁴ ELVs used by most countries are mostly set at 0.1 ng TE/m³. The lowest value reported is 0.080 ng TE/m³ which applies to new and expanding facilities and will be applied to existing facilities in 2006. It is important to realize that different methods of measurement of dioxins can lead to different data. Details of the measuring method were in most cases not available.

31. ELVs for both PCDD/F and PAH have been adopted by many Parties to the Convention for sources in annex VIII. Several countries have ELVs for PCDD/F for all sectors of categories 1-5 in annex VIII but fewer ELVs for categories 6-11. A few countries have ELVs for PAHs. Values exist for PAHs for most source categories identified in annex VIII. ELVs for CO in flue gas are being used by some countries to control PAH emissions in the residential combustion sector. Only one country has reported values for HCB and this is for category 6. No ELVs for PCDD/F, PAH and HCB were found for the wood preservation sector (category 12). No ELVs for PAHs were found for the incineration sector.

32. Information compiled on medical and hazardous waste incineration standards in this report indicate that ELVs in the Protocol are generally higher than those set by many Parties. Annex IV of the Protocol only includes limits for incineration of municipal solid waste, medical solid waste and hazardous waste. The present compilation indicates that several Parties have set emission standards for sources in annex VIII, most notably for PCDD/F for categories 1-5.

(c) Technological developments regarding measures to control emissions from mobile sources

33. National and international emission standards applying to mobile sources and their fuels, as well as to technical developments with respect to annex VII of the Protocol, were reviewed.

34. Regarding petrol engines, in the past alkyl-lead compounds were widely used in petrol to

⁴ Limit values for dioxins and furans referred to in the Protocol are expressed in TEQ/m³ using TEQ suggested by the North Atlantic Treaty Organization (NATO)/CCMS, while currently there is another classification of TEQ given by the World Health Organization (WHO).

protect engines from "knocking" effects. Additives were used to avoid lead deposits. During combustion these halogenated scavengers created PCDD/PCDF. Today electronic fuel injection and combustion control (3-way catalytic converters) are routinely fitted to petrol vehicles and effectively eliminate PAH from exhaust. Since catalysts are intolerant to lead, unleaded fuel was phased in and addition of halogenated scavengers became obsolete. With leaded petrol phased out in most parts of the UNECE region, petrol cars have stopped being a source of PCDD/PCDF.

35. Due to their heterogeneous nature of combustion, diesel-powered engines are one of the major sources of fine particulate matter (PM). The amount of PM formed depends primarily on the operating conditions and the fuel quality. A major fraction of low-volatile hydrocarbons, including PAH, becomes associated with PM. However, all existing emission standards for diesel engines refer to PM rather than PAH. In recent years design of these combustion systems has improved resulting in substantial reduction of PM emissions. Further cuts require particulate filter trap systems. Such devices proved to be the most efficient tailpipe reduction technology available, capable not only of decreasing the total amount of particulates in diesel exhaust but also of retaining the full range of particle size down to those less than 100 nm. The EC has taken action to phase out the use of PAH-rich extender oils in tyre production. This will decrease PAH emissions from tyre abrasion.

36. Performance of catalysts and electronic control devices are severely affected by poor fuel quality. Hence, advanced exhaust after treatment systems require enhanced fuel standards, e.g. low sulphur content. Refinery processes can produce petrol and diesel fuels with less than 10 ppm sulphur. In addition, low aromatic content fuels (e.g. alkylated petrol) may decrease PAH and other pollutant emissions efficiently in small 2-stroke and 4-stroke engines.

37. With the phasing out of leaded gasoline, petrol-fuelled vehicles are no longer a relevant source of dioxins and furans. Diesel-powered engines, formally a main source of fine particulates, with PAH as a major component, are subject to stricter controls for PM. Further tightening of ELVs, particularly for off-road machinery will further curb PM emissions from diesel engines. Some countries use fiscal incentives to accelerate phasing-in of cleaner technologies. In addition, car makers strive for better control technologies to cope with tightening of emission standards. Given the large number of limit values for specific categories of vehicles and taking into account rapid development of PM abatement technology, the Working Group on Strategies and Review may wish to consider the most appropriate mechanism for addressing PM emissions from mobile sources.

C. Emissions

38. The data required from Parties to the Protocol to show that they are meeting the obligations on emission levels for annex III sources are not yet available for review as Parties will

not report 2004 emission data until 2006. As a result this review is limited. However, the Task Force on POPs invited MSC-E to prepare a synthesis document on the best available emission data submitted by countries, including 1990 and more recent years. A short overview of emissions data as noted in article 3, para 8, is presented below. Available data are also provided for annex I and II substances. The emission data submitted by countries in 2004 are available in EB.AIR/GE.1/2004/10.

1. Substances included in annex III to the Protocol

39. In 2004, 31 countries submitted information on emissions of PCDD/Fs and PAHs and 22 countries on emissions of HCB for the period from 1990 to 2002 (for at least one year).

40. For dioxins and furans, according to submitted data, most countries showed a general decrease within the period indicated. The overall PCDD/F emissions in 17 countries for 1990 and 2002 decreased by 68% (Fig.1). The maximum decrease of the PCDD/F emissions for a country was 90%, while the maximum increase was 50%. The data on PCDD/F emissions for each year (1990-2002) are available for 10 countries.

41. Information on the spatial distribution of PCDD/F emissions was submitted by 12 countries. Information on the nomenclature for reporting (NFR) PCDD/F sector emissions is available for 20 countries for 2002. The maximum contribution to the total PCDD/F emissions in these countries was from the residential source sector (31%).

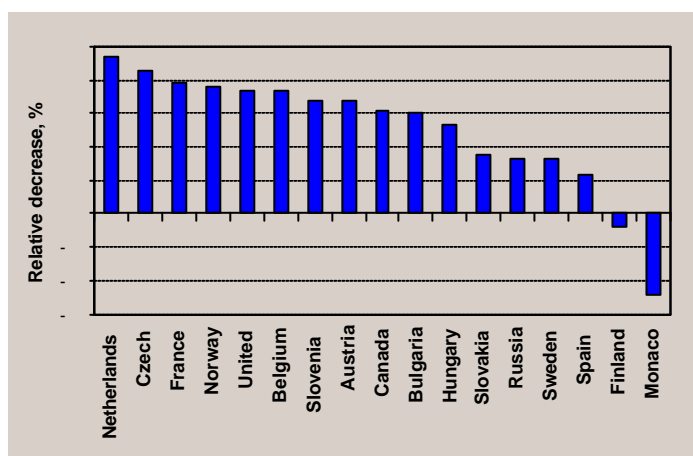


Fig.1. Relative decreases of PCDD/F emissions for 1990-2002 in 17 countries

42. For PAHs, 19 countries reported total emissions for four indicator compounds, listed in annex III of the Protocol. PAH emissions from nine countries decreased by 29% between 1990 and 2002 (Fig.2). The maximum national decrease in PAH emissions was 90%, while the maximum increase was 40%. Data on PAH emissions for each year (1990-2002) are available for

eight countries. Eleven countries provided spatial distribution of PAH emissions and 13 countries submitted information on the PAH sector emissions for 2002. The greatest contribution to the total emission of PAHs is from the residential sector (63%).

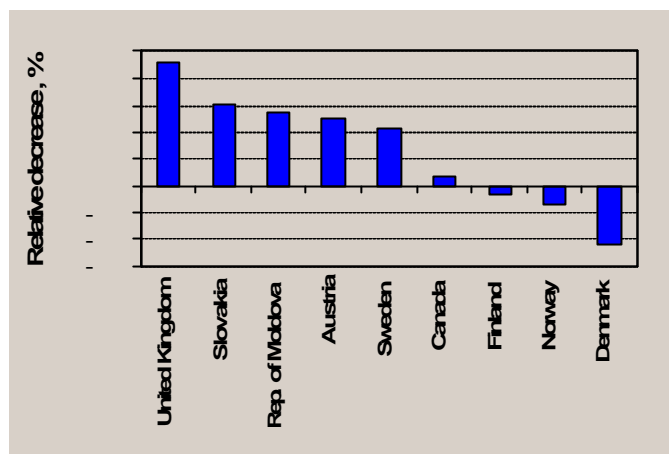


Fig.2. Relative decreases of PAH emissions for 1990-2002 in 9 countries

43. The total HCB emissions for eight countries decreased by 20% between 1990 and 2002 (Fig.3)⁵. The maximum national decrease of HCB emissions was 90%, while the maximum increase was 200%. Information on HCB sector emissions is available for 12 countries for 2002. The greatest contribution to the total HCB emissions is from the manufacturing industries and construction sector (35%).

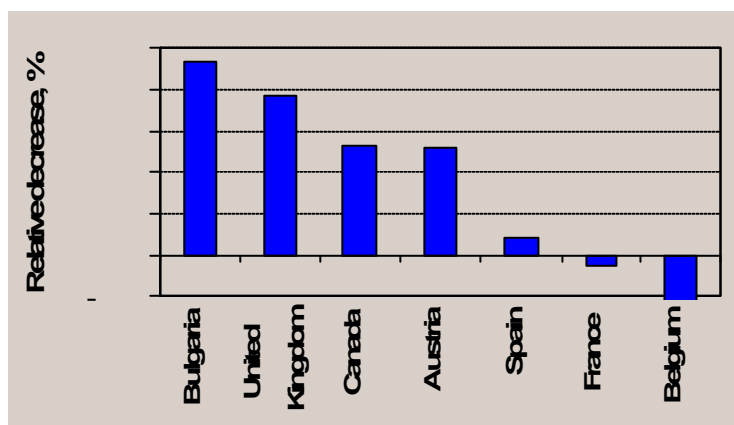


Fig.3. Relative decreases of HCB emissions for 1990-2002 in 7 countries

44. To estimate total emissions for annex III substances from the European region and their time series (1990-2002), expert estimates must be used. To meet the requirements of article 9 of the Protocol, i.e. to provide “information on the long-range transport and deposition of persistent

⁵ At the Task Force meeting, it was noted that the emission inventory for Hungary for HCB was under review. Therefore, at the request of Hungary, their information was removed from figure 3.

organic pollutants,” official emission data and expert estimates will be used by EMEP. Currently available emission data for modelling give a two or three-fold underestimate of levels compared with available measured data. However, for substances in annex III, a more reliable comparison between calculations and measurements will be possible following extension of the EMEP monitoring network with implementation of the monitoring strategy for 2004-2009.

2. Substances included in annex I and II

45. Nineteen countries submitted information on emissions of PCBs and 12 countries on emissions of HCH for the period from 1990 to 2002 (for at least one year). From the data, the total PCB emissions decreased by 75% between 1990 and 2002. The maximum national decrease of PCB emissions was 90%, while the maximum increase was 50%.

46. According to submitted emission data for 1990 and 2002, emissions of HCH decreased by 80% in one country and increased by 3% and 9% in two others. HCH emissions in one country have remained at zero since 1998.

47. Emission data on aldrin, chlordane, chlordecone, dieldrin, endrin, heptachlor, hexabromobiphenyl, mirex, toxaphene and DDT for the period from 1990 to 2002 (for at least one year) were also submitted by 11 countries. Ten of the 11 countries reported no use of these substances.

III. TECHNICAL REVIEWS OF PENTA-BDE AND PFOS

48. The two dossiers forwarded by the Executive Body were reviewed in accordance with the generic guidelines/procedures for the technical review of dossiers on new substances, presented to the Working Group on Strategies and Review at its thirty-sixth session (EB. AIR/WG.5/2004/1, annex III). The Task Force expressed its appreciation to the reviewers for their excellent work.

A. Track A peer and technical reviews

49. The Task Force arranged for a team of peer reviewers to examine the dossiers in a similar manner to those routinely submitted for peer-reviewed journal articles. Reviewers worked and reported independently. Only information contained in the dossiers was addressed.

50. The reviewers agreed upon a summary report prepared by one of them for each dossier, based upon their individual reviews.

51. The Task Force reviewed the dossiers, the individual peer review reports and the peer review summaries. The Task Force was in general agreement with the findings of the peer

reviewers and decided to base its Track A technical review report to the Working Group on Strategies and Review upon the dossiers, the peer review reports, which may be consulted by Parties if necessary, and other information brought forward by experts. In its report, the Task Force, like the peer reviewers, employed the terms “concluded” or “agreed” to refer to their evaluations of whether the risk profile provides sufficient information to draw its stated conclusions, rather than a Task Force concurrence or a new assessment of the POPs characteristics of the two substances.

1. Pentabromodiphenyl ether

Conclusions on the technical content of the dossier

52. In general, the Task Force concluded that the dossier contained sufficient information for screening in relation to the requirements of Executive Body Decision 1998/2 and supported the dossier’s conclusion that PeBDE be considered a POP in the context of the Protocol. One expert disagreed with the dossier’s conclusion that PeBDE be considered a POP in the context of the Protocol and recorded his view in paragraph 55 below.

Introduction

53. Commercial PeBDE is a brominated flame retardant most commonly used in the production of polyurethane foam, although production for this use has ceased in North America and Europe. Commercial PeBDE is a mixture of polybrominated diphenylethers, particularly those with four bromines (tetrabromodiphenyl ethers; TeBDE), five bromines (pentabromodiphenyl ethers; PeBDE) and, to a lesser extent, six bromines (hexabromodiphenyl ethers; HxBDE). Within each of these groups there are different congener arrangements of the bromine atoms, which may exhibit different toxicities (e.g. BDE-47 in the TeBDE group, BDE-99 in the PeBDE group, etc).

54. When considering POP characteristics, in terms of the guidance and indicative numerical values provided in Executive Body decision 1998/2 paras 1(a) – 1(d), for:

(a) Potential for long-range transboundary atmospheric transport: the Task Force agreed that the risk profile provided sufficient information to support the dossier’s conclusion that PeBDE had the potential for LRAT by satisfying the guidance and indicative values for vapour pressure and atmospheric half life and by the existence of monitoring data showing that the substance was present in remote regions;

(b) Toxicity: the Task Force agreed that the risk profile provided sufficient information to support the dossier's conclusion that PeBDE had the potential to adversely affect human health and/or the environment;

(c) Persistence: the Task Force agreed that the risk profile provided sufficient information to support the dossier's conclusion that PeBDE was persistent in the environment, exceeding the guidance and indicative values;

(d) Bioaccumulation: the Task Force agreed that the risk profile provided sufficient information to support the dossier's conclusion that PeBDE satisfied the guidance and indicative values for bioaccumulation and bioconcentration.

55. Considerations related to decision 1998/2, paras 2(a), 2(b) and para. 3: the Task Force noted that the dossier partially met the requirement of paragraph 2(b). It was observed that the combination of the potential for atmospheric transport, measured environmental and biotic levels, the exponential increases in these levels in some environments and the relation to toxic endpoints, indicated that PeBDE had the potential to adversely affect human health and/or the environment as a result of LRAT. One expert expressed the view that there was not sufficient information in the dossier to determine that PeBDE was likely to have significant adverse human health and/or environmental effects resulting from LRAT.

2. Perfluorooctone sulfonate

Conclusions on the technical content of the dossier

56. The Task Force generally concluded that the dossier contained sufficient information for screening in relation to the requirements of Executive Body decision 1998/2, and to support the dossier's conclusion that PFOS be considered as a POP in the context of the Protocol. The Task Force observed that several recent publications could have been cited and noted the potential complexity and paucity of information on the 96 PFOS-related substances. One expert disagreed with the dossier's conclusion that PFOS be considered a POP in the context of the Protocol and recorded his views in paragraph 59, including his concern that additional information, not available to the Executive Body at its twenty-second session, could not be considered during the technical reviews of the dossier prior to and during the third meeting of the Task Force.

Introduction

57. Perfluorooctane sulfonate (PFOS; $\text{CF}_3(\text{CF}_2)_7\text{SO}_3^-$) is a sulfonate ion with a fully fluorinated alkyl chain. PFOS is used in this form or incorporated into larger molecules and polymers. Due to its surface-active properties, it is used in a wide variety of applications such as

stain repellent and cleaning products, hydraulic fluids, fire-fighting foams, and semiconductor chip manufacture. PFOS may be formed in the environment by degradation of substances containing the core PFOS moiety, referred to as PFOS-related substances. The dossier refers to PFOS and ninety-six PFOS-related substances. However, the dossier only elaborates on the indicative numerical values in Executive Body decision 1998/2 for PFOS. Based on measurements of the widespread distribution of PFOS in biota, the principal global manufacturer of PFOS phased out production between 2000 and 2002, although other companies continue production and issues remain regarding the availability of suitable alternatives to replace certain important uses.

58. When considering POP characteristics, in terms of the guidance and indicative numerical values provided in Executive Body decision 1998/2, paras 1(a) – 1(d), for:

(a) Potential for long-range transboundary atmospheric transport: the Task Force noted the paucity of experimental information on PFOS behaviour and presence in the atmosphere. It also noted the low volatility of PFOS reported in the dossier, which suggested that vapour-phase atmospheric transport was unlikely. However, the Task Force considered that monitoring information on PFOS presence in biota in remote areas and the possibility of entrainment on particles or of the transport of more volatile PFOS precursors was supportive of the dossier's conclusions on the potential for long-range atmospheric transport;

(b) Toxicity: it was noted that PFOS satisfied a variety of criteria for determining toxicity, particularly those of the European Union (EU). The Task Force agreed that the risk profile provided sufficient information to support the dossier's conclusion that PFOS had the potential to adversely affect human health and/or the environment;

(c) Persistence: the Task Force agreed that the risk profile provided sufficient information to support the dossier's conclusion that PFOS was persistent in the environment, exceeding the guidance and indicative values;

(d) Bioaccumulation: due to the physical and chemical characteristics of PFOS, and the fact that it binds to proteins in serum and liver, the use of the octanol-water partition coefficient could not be used to indicate bioaccumulation potential. It was noted that measured bioconcentration factors (BCF) values were lower than the indicative value of 5,000. The Task Force took note of evidence of high levels of PFOS in certain species including polar bears, seals, certain fish and seabirds, and of information suggesting long residence times in humans, and in this context agreed that the risk profile provided sufficient information to support the dossier's conclusion that the requirements of Executive Body decision 1998/2 concerning bioaccumulation had been satisfied.

59. Considerations related to Executive Body decision 1998/2, paras 2(a), 2(b) and para. 3: the Task Force noted the general paucity of information that specifically related environmental levels to potential effects. The Task Force also took note of the information on toxicity, potential for long-range atmospheric transport, bioaccumulation and persistence, and the monitoring information included in the dossier and in the sufficiency and effectiveness review. Thus, it was generally agreed that sufficient information existed to support the dossier's conclusions indicating that PFOS had the potential to adversely affect human health and the environment as a result of LRAT. One expert expressed the view that there was not sufficient information in the dossier to determine that PFOS was likely to have significant adverse human health and/or environmental effects resulting from LRAT.

60. The Task Force received a report (available at: www.unece.org/env/tfpops) and a presentation from the 3M Company, the former major producer of PFOS. In view of its duties, as specified in Executive Body decision 2003/10, the Task Force did not review this material. However, it observed that the Working Group on Strategies and Review may wish to take note of this material in its future consideration of the PFOS dossier. In addition, the Task Force noted the view of the Scientific Committee on Health and Environmental Risks (SCHER) in its report "PFOS Risk Reduction Strategy and Analysis of Advantages and Drawbacks."

(http://europa.eu.int/comm/health/ph_risk/committees/04_scher/docs/scher_o_014.pdf)

B. Track B

61. The Task Force arranged for a team of specialist reviewers to examine the Track B aspects of the dossiers and this was conducted in a cooperative manner.

1. Pentabromodiphenyl ether

62. The information provided in the dossier was accurate and pointed to possible risk management actions that could be taken.

63. The dossier provided information on production and marketing up to 2000. Production and use of PeBDE would now be significantly lower due to the phase-out in the United States and the EU. Available information on releases from products during the whole of their life cycle was not exhaustive. The dossier noted the most important sources of PeBDE were diffuse pollution during and after the service life of the articles, and "small-scale point source pollution" from disposal and recycling. Challenges included how to address releases due to weathering and wearing of articles; disposal in sewage sludge; releases from landfills; incinerator emissions, and releases from recycling plants. Even with the phasing out of PeBDE, existing stocks of products containing the chemical were still used in the applications described above. Major potential emission routes were identified and release estimates provided.

64. The dossier identified potential alternatives, chemical and non-chemical, to PeBDE. The dossier discussed flame retardants now used in furniture, noting TBBE and chlorinated phosphate esters (e.g. TCPP) as alternatives for PeBDE in particular. Costs were not addressed and benefits were only mentioned in the dossier.

2. Perfluorooctane Sulfonate

65. The information on the use and the production volume of PFOS and 96 PFOS-related substances was extremely limited. The dossier contained only limited information on PFOS releases and emissions, but generally reflected the best information available at the time it was prepared. Releases of PFOS and its precursors were likely to occur during the whole life cycle. No data were presented on air emissions, but they were probably small compared to releases into soil and water. There was strong evidence that air emissions must take place during PFOS production. The dossier recognized that PFOS may be formed through the degradation of PFOS-related substances, which added complexity to estimating releases of PFOS into the air.

66. The dossier provided a good overview of the available information on technical aspects of alternatives to PFOS. It recognized that no alternatives to PFOS were currently available for use in certain photographic processes, in semiconductor manufacture and aviation hydraulic fluids, and that alternatives to the use of PFOS in chemical mist suppression for hard chrome plating needed to be explored in more detail. It was noted that those uses were limited and were amenable to emission control techniques. The dossier noted that the health and environmental implications of fluorinated telomers, which replace PFOS in many applications, were not understood.

67. More information about markets, available alternative chemicals or technologies and costs of the substitutes, along with their efficacy, would be helpful to evaluate substitute chemicals and technologies. The costs and benefit section did not provide much information to decision-makers wanting to consider a strategy for controlling the risks from PFOS and provided no information for the 96 related substances.

68. References in the dossier to risk management actions already taken or proposed in the United States, the EU and the United Kingdom were suggestive of measures that could be undertaken throughout UNECE countries to limit PFOS production, use and emissions. The dossier fell short of providing adequate information for the likely success of various strategies that might be adopted to manage risks from PFOS.

3. Management Strategy Options

69. Since the finalization of both dossiers, information has become available that could be valuable in the development of any management strategy (e.g. 2005 OECD report on PFOS, the United States report on the phase-out of PeBDE available in the Track B review report, and the 3M report on PFOS risk assessment distributed to the Task Force).

70. Additional information, as available, was needed on: production and use, costs and technical feasibility of possible control measures, and actual environmental release measurements, where feasible, or emission estimates.

71. When possible control measures are to be evaluated, special attention should be given to the chemical identity of PeBDE. The dossier focused on commercial PeBDE which consists of a number of homologue groups of diphenylethers.

72. The Task Force highlighted several issues during its first technical review of proposed dossiers:

(a) The ever-increasing base of scientific knowledge and data, which emphasized the importance for the most complete and up-to-date dossiers as was practical;

(b) The need for a transparent and clearly articulated process to ensure that interested entities had an adequate opportunity to provide information for the technical review;

(c) Difficulties in interpreting how para 2(b) of Executive Body decision 1998/2 should be operationally addressed. The Working Group on Strategies and Review may wish to consider whether it would be helpful for the Task Force to prepare additional clarification in the guidance document approved by the Executive Body at its twenty-second session.

IV. OPTIONS FOR PRIORITY SETTING AND POSSIBLE AMENDMENTS TO THE 1998 PROTOCOL ON POPS

73. In the near future, Parties at the Executive Body may wish to consider several amendments to the Protocol. Possible elements for amendments include:

(a) The outcome of the reassessments/re-evaluations required by the Protocol, as reported on by the Task Force in 2004;

(b) The outcome of the sufficiency and effectiveness review;

(c) The inclusion of new substances;

(d) The need to increase the flexibility of the Protocol to accommodate the need for regular changes (e.g. additional substances, improvements of emission control technology).

74. There are two ways in which changes may be introduced: by negotiating a new protocol or amending the present one.

75. Historically, the approach used by the Convention has been to negotiate new protocols and such a protocol could be formally introduced at any time by one or more Parties to the Convention. This option would engage all Parties to the Convention and would enable all of the presently envisaged changes to be made at one time. A new protocol could also solve the problem of a series of changes where each would need to be ratified.

76. The negotiators of the present Protocol wanted a longer standing instrument which could be updated taking into consideration the evolution of knowledge, and could easily integrate new substances into the existing annexes without the need to renegotiate the whole protocol. Therefore, article 14 provides a mechanism for possible amendments to be made at any time. The amended Protocol would have the same legal status as the first and will be subject to the same rules of ratification. After two-thirds of the Parties to the Protocol have ratified an amendment, it will enter into force and be binding for the Parties to the amended version. Only Parties to the Protocol may negotiate amendments.

77. The long-term result of using this procedure may be a much amended Protocol where many Parties have ratified different amendments. The problematic administration of such an instrument and the confusion over who is Party to different amendments to the Protocol are not appealing. This can only be avoided by a new protocol by decision of all Parties to the Convention.

78. Possible changes to the Protocol may extend beyond amendments to annexes. The large number of potential amendments may provide good reason to consider full revision of the Protocol. Most articles of the present Protocol could be used as a basis for a revised text.

79. Work on POPs requested by the Executive Body to support decisions required under the Protocol relies on the Task Force. For POPs, the relevant technical expertise is limited and the needs of the Convention must compete with the other needs of Parties. As a result, the Task Force has relied upon contributions from a very small number of Convention Parties. The Executive Body may wish to consider ways for acquiring the necessary resources (expertise) from Parties. Alternatively the limited capacity of the Task Force should be recognized when developing the annual workplan and priorities given to proposed work items.

80. The priority setting for 2006 will depend on the number of new substances submitted and deemed acceptable and the timing of any new or amended protocol. Current priority settings for the Task Force could be summarized as:

- (a) To review further submitted substances that are deemed acceptable by the Executive Body;
- (b) To assist the Working Group on Strategies and Review by exploring options for a management strategy for substances which are accepted as POPs by the Parties to the Protocol at the twenty-third session of the Executive Body;
- (c) To explore options for a management strategy for substances which are deemed acceptable for review;
- (d) At the Executive Body session in December 2006, the Parties could mandate the Working Group on Strategies and Review to start negotiations on an updated or amended protocol which could already be finalized in 2007 or at the latest in 2008 (10 years after the signature of the Aarhus Protocol). In order to assist the Working Group on Strategies and Review, the Task Force could be asked to draft a revised text for (elements of) a POP Protocol in 2006, so that the Working Group on Strategies and Review would have a working document ready for its meeting(s) in 2007.