UNITED
NATIONS

E

Economic and Social Council

Distr.
GENERAL

ECE/EB.AIR/WG.5/2006/10
26 July 2006

Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

EXECUTIVE BODY FOR THE CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

Working Group on Strategies and Review

Thirty-eighth session
Geneva, 19–22 September 2006
Item 4 of the provisional agenda

TECHNICAL INPUT FOR REVIEWING SUBSTANCES UNDER THE 1998 PROTOCOL ON PERSISTENT ORGANIC POLLUTANTS*

Report by the Co-Chairs of the Task Force on Persistent Organic Pollutants (POPs) prepared in consultation with the secretariat

1. This progress report of the Task Force on POPs includes the results of its fourth meeting, held on 6–8 February 2006 in Dessau (Germany), and its fifth meeting, held from 29 May to 1 June 2006 in Tallinn. The presentations made and the background information cited are available on the Internet at www.unece.org/env/tfpops.

2. Experts from Austria, Canada, the Czech Republic, Estonia, Finland, France, Germany, Italy, the Netherlands, Norway, Poland, Sweden, the United Kingdom, the United States and the European Community (EC) participated in at least one of the meetings. Representatives from the Meteorological Synthesizing Centre – East (MSC-E), the Arctic Monitoring and Assessment

* This document was submitted on the above date because of processing delays.

GE.06-24348

Programme (AMAP), Bromine Science and Environmental Forum (BSEF), the Canadian Chlorine Chemistry Council, the Chlorinated Paraffins Industry Association, the European Chemical Industry Council (CEFIC), the European Semiconductor Industry, Association Chemical Corporation, the International Council of Chemical Associations (ICCA), the Semiconductor Industry Association, Burston-Marsteller, E.I. DuPont de Nemours, Texas Instruments and 3M Company attended at least one of the meetings. A member of the secretariat was present.

3. Ms. C. Heathwood (Canada) and Mr. J. Sliggers (Netherlands) chaired the meetings.

4. The Task Force expressed its gratitude to Estonia and Germany for hosting the meetings.

I. MANDATE OF THE TASK FORCE AND OBJECTIVES OF THE MEETING

5. In accordance with its workplan (ECE/EB.AIR/WG.5/2006/10, item 1.5) the Task Force:

(a) Conducted a technical review of the dossiers forwarded by the Executive Body on hexachlorobutadiene (HCBD), octabromodiphenyl ether (OctaBDE), polychlorinated naphthalenes (PCN), pentachlorobenzene (PeCB) and short-chained chlorinated paraffins (SCCP) (section II A–C below);

(b) Explored management options for substances accepted as POPs by the Executive Body at its twenty-third session (track B reviews of pentabromodiphenyl ether (Penta-BDE) and perfluorooctane sulfonates (PFOS));

(c) Considered other items for which the Task Force requested guidance from the Working Group (section III below); and

(d) Agreed proposals for its future priorities and workplan for 2007 (section IV below).

II. PROGRESS IN THE WORK OF THE TASK FORCE

A. Technical reviews of HCBD, OctaBDE, PCN, PeCB and SCCP

6. The five dossiers forwarded by the Executive Body were reviewed in accordance with the generic guidelines for the technical review of dossiers on new substances (EB.AIR/WG.5/2004/1, annex III). The Task Force expressed its appreciation to the reviewers for their excellent work.

7. “Track A” reviews relate to the elements of the dossiers that are relevant to a decision on whether a substance should be considered a POP.

8. “Track B” reviews evaluate the parts of the dossiers concerning the extent of the release to the environment and socio-economic factors. Track B reviewers evaluated the information in the dossiers and identified additional information needed for developing a possible management strategy.

B. Track A reviews of HCBD, OctaBDE, PCN, PeCB and SCCP

9. The Task Force arranged for a team of peer reviewers to examine the dossiers and summaries of additional information. Reviewers worked and reported independently and agreed a summary report based on the individual reviews.

10. In its report, the Task Force employed the term “concluded” to refer to its evaluation of whether the risk profiles provided sufficient information on which to draw conclusions, rather than to indicate the Task Force’s concurrence or a new assessment of POP characteristics of the five substances.

1. Hexachlorobutadiene (HCBD)

11. Hexachlorobutadiene (HCBD) is a halogenated aliphatic compound.

Conclusions on the technical content of the dossier

12. 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 HCBD be considered a POP in the context of the Protocol. Two experts (including one from industry) disagreed with the dossier’s conclusion that HCBD be considered a POP in the context of the Protocol and recorded their views in paragraphs 13(c)–(d) and 14(b).

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

(a) The potential for long-range transboundary atmospheric transport (LRAT): the Task Force concluded that the risk profile provided sufficient information to support the dossier’s conclusion that HCBD has the potential for LRAT by satisfying the guidance and indicative values for vapour pressure and atmospheric half-life and by the existence of data showing that the substance was present in biota in Greenland and in air samples in Sweden in areas of no known release;

(b) Toxicity: the Task Force concluded that the risk profile provided sufficient information to support the dossier's conclusion that HCBD had the potential to adversely affect human health and/or the environment, based on its acute and long-term toxicity to aquatic organisms and nephrotoxicity observed in rat studies;

(c) Persistence: the Task Force generally concluded that the risk profile provided sufficient information that HCBD met the guidance and indicative values for persistence. Two experts (including one from industry) noted that there was conflicting and insufficient information to reach this conclusion;

(d) Bioaccumulation: the Task Force generally concluded that the risk profile provided sufficient information to support the dossier's conclusion that HCBD satisfied the guidance and indicative values for bioaccumulation. Two experts (including one from industry) noted that there was conflicting information to reach this conclusion.

14. When considering the contextual information described in Executive Body decision 1998/2 paragraphs 2(a)–(b):

(a) The Task Force concluded that monitoring information in remote locations (in biota in Greenland and in air from Sweden) supported the view that LRAT of HCBD was occurring and had led to residues in environments distant from source;

(b) The Task Force concluded that the hazard characteristics, together with the monitoring information, were indicative of the potential for environmental and/or human health effects due to LRAT. One expert noted there was not sufficient information available to suggest that HCBD was likely to have significant adverse effects on human health and/or the environment as a result of LRAT; an expert from industry noted that there was sufficient information to conclude that HCBD was not likely to have these effects and that environmental levels clearly attributable only to LRAT were below known environmental and human health thresholds for effects.

2. Octabromodiphenyl ether (OctaBDE)

15. C-OctaBDE (commercial OctaBDE) contains polybrominated diphenyl ethers with varying degrees of bromination, typically consisting of penta- to deca-bromodiphenyl ether isomers.

Conclusions on the technical content of the dossier

16. 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 commercial octabromodiphenyl ether (c-OctaBDE) be considered a POP in the context of the Protocol. Two experts (including one from industry) disagreed with the dossier's conclusion that c-OctaBDE be considered a POP in the context of the Protocol and recorded their views in paragraphs 17(d) and 18(b).

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

(a) Potential for LRAT: the Task Force concluded that the risk profile provided sufficient information to support the dossier's conclusion that c-OctaBDE had the potential for LRAT by satisfying the guidance and indicative values for vapour pressure. Moreover, c-OctaBDE satisfied the indicative value for atmospheric half-life. In addition, monitoring data in remote regions indicates that lower and higher brominated congeners of c-OctaBDE were susceptible to LRAT;

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

(c) Persistence: the Task Force generally concluded that the risk profile provided sufficient information that c-OctaBDE met the indicative values for persistence;

(d) Bioaccumulation: The assessment was complicated by the heterogeneous composition of c-OctaBDE. However, the Task Force generally concluded that the risk profile provided sufficient information to support the dossier's conclusion that c-OctaBDE satisfied the guidance and indicative values for bioaccumulation based on bioconcentration factors (BCF) of the hexa and penta congeners. Two experts (including one from industry) noted that the dossier did not contain sufficient information to reach this conclusion.

18. When considering the contextual information described in Executive Body decision 1998/2 paragraphs 2(a)–(b):

(a) The Task Force concluded that monitoring information in remote locations supported the view that some congeners contained in c-OctaBDE formulations, particularly the lower brominated components, were frequently found in remote locations;

(b) The Task Force generally concluded that the hazard characteristics of penta and hexa congeners contained in c-OctaBDE, together with the monitoring information on these components, were indicative of the potential for environmental and/or human health effects due to LRAT. Two experts (including one from industry) noted there was not sufficient information available to suggest that c-OctaBDE was likely to have significant adverse effects on human health and/or the environment as a result of LRAT.

3. Polychlorinated naphthalenes (PCN)

19. Polychlorinated naphthalenes (PCN) consist of 75 possible congeners in eight homolog groups with one to eight chlorines substituted around the planar aromatic naphthalene molecule. While PCN are considered as a class, physical-chemical and toxicological properties vary by congener and homolog group.

Conclusions on the technical content of the dossier

20. 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 PCN be considered a POP in the context of the Protocol. Two experts (including one from industry) disagreed with the dossier’s conclusion that PCN be considered a POP in the context of the Protocol and recorded their views in paragraphs 21(c) and 22(b).

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

(a) Potential for LRAT: the Task Force concluded that the risk profile provided sufficient information to support the dossier’s conclusion that PCN, particularly the tri- to octachloronaphthalenes, 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 on PCN in air samples in the Canadian and Norwegian Arctic. However the mono- and possibly the dichloronaphthalenes did not satisfy the indicative value for half-life; information on monitoring of these congeners was not available for the review;

(b) Toxicity: the Task Force concluded that the risk profile provided sufficient information to support the dossier’s conclusion that PCN had the potential to adversely affect human health and/or the environment, based on their acute and chronic toxicity and dioxin-like activity;

(c) Persistence: the Task Force generally concluded that the risk profile provided sufficient information that PCN met the guidance and indicative values for persistence. Two experts (including one from industry) noted there were limited data to reach this conclusion;

(d) Bioaccumulation: the Task Force concluded that the risk profile provided sufficient information to support the dossier's conclusion that PCN, particularly the di- to heptachloronaphthalenes, satisfied the guidance and indicative values for bioaccumulation.

22. When considering the contextual information described in Executive Body decision 1998/2 paragraphs 2(a)–(b):

(a) The Task Force concluded that monitoring information in remote locations was supportive of the view that LRAT of PCN was occurring and has led to residues in environments distant from source;

(b) The Task Force generally concluded that the hazard characteristics, together with the monitoring information, were indicative of the potential for environmental and/or human health effects due to long-range atmospheric transport. Most experts also noted that for some Arctic biota, the PCN contribution to total TEQ exceeded that derived from co-planar PCBs. Two experts (including one from industry) noted that there was not sufficient information available to suggest that PCN were likely to have significant adverse effects on human health and/or the environment as a result of LRAT.

4. Pentachlorobenzene (PeCB)

23. Pentachlorobenzene (PeCB) is a chlorobenzene with five chlorine atoms substituting for hydrogen atoms in the benzene ring.

Conclusions on the technical content of the dossier

24. 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 generally supported the dossier's conclusion that PeCB be considered a POP in the context of the Protocol. Two experts (including one from industry) disagreed with the dossier's conclusion that PeCB be considered a POP in the context of the Protocol and recorded their views in paragraph 26(b).

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

(a) Potential for LRAT: the Task Force concluded that the risk profile provided sufficient information to support the dossier's conclusion that PeCB 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 on PeCB from remote areas;

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

(c) Persistence: the Task Force generally concluded that the risk profile provided sufficient information that PeCB met the guidance and indicative values for persistence;

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

26. When considering the contextual information described in Executive Body decision 1998/2 paragraphs 2(a)–(b):

(a) The Task Force concluded that monitoring information in remote locations was supportive of the view that LRAT of PeCB was occurring and has led to residues in environments distant from source;

(b) The Task Force generally concluded that the hazard characteristics, together with the monitoring information, were indicative of the potential for environmental and/or human health effects due to LRAT. Two experts (including one from industry) noted there was not sufficient information available to suggest that PeCB was likely to have significant adverse effects on human health and/or the environment as a result of LRAT.

5. Short-chain chlorinated paraffins (SCCP)

27. Short-chain chlorinated paraffins (SCCP) are n-paraffins that have a carbon chain length of between 10 and 13 carbon atoms and a degree of chlorination of more than 48% by weight.

Conclusions on the technical content of the dossier

28. 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 SCCP be considered a POP in the context of the Protocol. Two experts

(including one from industry) disagreed with the dossier's conclusion that SCCP be considered a POP in the context of the Protocol and recorded their views in paragraphs 29(c) and 30(a)–(b).

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

(a) Potential for LRAT: the Task Force concluded that the risk profile provided sufficient information to support the dossier's conclusion that SCCP had the potential for LRAT by satisfying the guidance and indicative values for vapour pressure and atmospheric half-life and/or by the existence of monitoring data showing the substance was present in Arctic biota;

(b) Toxicity: the Task Force concluded that the risk profile provided sufficient information to support the dossier's conclusion that SCCP had the potential to adversely affect the environment owing to their toxicity to aquatic organisms;

(c) Persistence: the Task Force generally concluded that the risk profile provided sufficient information that SCCP were persistent, based upon a weight of evidence approach that included information on abiotic and biotic degradation and monitoring data. One expert from industry noted there was insufficient information on the persistence of SCCP in sediment;

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

30. When considering the contextual information described in Executive Body decision 1998/2 paragraphs 2(a)–(b):

(a) The Task Force concluded that monitoring information in remote locations was supportive of the weight of evidence view that LRAT of SCCP was occurring and has led to residues in environments distant from source. One expert from industry noted that levels of SCCP in remote areas were very low and might be the result of releases from local sources;

(b) The Task Force generally concluded that the hazard characteristics, together with the monitoring information, were indicative of the potential for environmental effects due to LRAT. The Task Force noted that the existing data did not allow the assessment of risks to human health, although certain subpopulations, e.g. high fish consumers and indigenous peoples in the Arctic, may have an elevated exposure. Two experts (including one from industry) noted that there was not sufficient information available to suggest that SCCP were likely to have significant adverse effects on human health and/or the environment as a result of LRAT.

C. Track B reviews of HCBD, OctaBDE , PCN, PeCB AND SCCP

31. The Task Force had arranged for a team of reviewers to examine track B aspects of the five dossiers. The information in the dossiers provided a starting point for gathering information necessary to determine possible risk management actions that could be taken. Supplementary information was needed to conduct a complete socio-economic evaluation of various risk management actions. Alternatives to candidate substances should be considered according to the relevant elements of Executive Body decision 1998/2. When potential control measures are explored, special attention should be given to the chemical identity of the candidate substances.

1. Hexachlorobutadiene (HCBD)

32. Overall the dossier for HCBD provided a good basis for further discussion on a potential management strategy. In some areas the information presented was not comprehensive, but it was recognized that additional data might become available.

33. HCBD has historically been used as a solvent for rubber and other polymers, in heat transfer fluids, as a transformer liquid, a hydraulic fluid and a washing liquor for removing hydrocarbons from gas streams. Other historical uses included as a seed dressing and fungicide and use in manufacturing processes such as production of aluminium and graphite rods. HCBD can also be formed as a by-product during certain processes.

34. The dossier covered current emissions from production of chlorinated hydrocarbons and wastes and emissions from magnesium production. Emissions from historic use were expected to be significantly greater than current emissions. Figures quoted on production and use were subject to uncertainties, particularly in relation to the possible use of HCBD as a fumigant for grapes.

35. The dossier provided a good overview with a broad coverage of the regulatory regimes in a number of different countries and regions. The remaining dominant release of HCBD to the environment was unintentional. Information on substitutes might be necessary if HCBD was still used. Information on any alternative routes for production of chlorinated hydrocarbons and for substitutes for use of chlorinated hydrocarbons in other industrial processes (e.g. magnesium production) that did not lead to emissions of HCBD would be useful. Furthermore, there were alternative routes to production of tetrachloroethylene (e.g. chlorination of propylene versus oxychlorination of 1,2-dichloroethane).

36. No information was provided on the potential costs and benefits of control measures.

2. Commercial octabromodiphenyl ether (c-OctaBDE)

37. Although the dossier would benefit from updating with more contemporary citations, the information provided was accurate.

38. C-octaBDE is a brominated flame retardant that was commonly used in acrylonitrile-butadiene-styrene polymers for the housings of office equipment and business machines.

39. Production, use and emission figures in the dossier pre-date the current ban of c-OctaBDE in the EU and the voluntary phase out in the United States in 2004. Releases from manufacturing and processing of c-OctaBDE in the European Union (EU) and North America have been eliminated. Releases to air may still occur from volatile losses over the life of products containing c-OctaBDE and have been estimated in the EU risk assessment as 0.54% of the c-OctaBDE over the lifetime of the product. In light of the ban and phase-out, it is important to focus on the fate of c-OctaBDE in products.

40. The dossier was incorrect and was not up-to-date on regulatory measures in Canada and the United States. It gave a good overview of the possible substitutes but no quantitative information. Based on the information available, it was difficult to determine whether alternatives would be less harmful to health or the environment than c-OctaBDE. Because c-OctaBDE was an additive-type flame retardant, an indication of whether any alternatives were reactive and therefore less likely to diffuse from treated material would be helpful. Although there were many uncertainties about alternatives and substitutes, a total ban on c-OctaBDE had been effective in the EU since August 2004. This showed that alternatives could be found for all mentioned uses of c-OctaBDE. With respect to emissions during the life cycle of products, more measures than those mentioned in the dossier were available. Concerning costs and benefits of control measures, assuming the dossier followed the 2002 risk reduction strategy report that preceded EU control measures, costs might in effect be lower.

3. Pentachlorobenzene (PeCB)

41. The dossier was found to be a good starting point for understanding the implications of management strategies of PeCB.

42. PeCB was used as both a fungicide and a flame retardant. Specifically, PeCB was used as a chemical intermediate in the production of pentachloronitrobenzene, also called quintozene (a fungicide).

43. The dossier provided a good overview of the historical uses and production of PeCB and presented general information about the primary and secondary pathways to the environment. Research indicated that there was still a considerable amount of PeCB in the environment due to historic uses. The dossier indicated that there appeared to be no current consumption and production of the chemical in the UNECE region. PeCB was currently a contaminant in some pesticides.

44. The dossier summarized information on national and international regulations of PeCB. Given that there appeared to no longer be production or use of PeCB in the UNECE region, restrictions on the chemical should have resulted in minimal socio-economic impacts. The dossier did not provide potential economic impacts of alternative management options, such as remediation requirements. Data on the quantity of release by source would be helpful in assessing the impacts of such options. Additional information would be helpful on potential emissions from fires and other combustion sources and production of tri- and hexachlorobenzene.

4. Polychlorinated naphthalenes (PCN)

45. The dossier for PCN was considered adequate and provided a good basis for further discussions on a potential management strategy.

46. Until the 1970s, PCN were high production volume chemicals. The most important uses, in terms of volume, had been in cable insulation, wood preservation, engine oil additives, electroplating masking compounds, feedstocks for dye productions, dye carriers, capacitors and in refracting index oils.

47. Besides these uses, PCN were also present in technical PCB formulations and could be formed in thermal processes, of which waste incineration was the most important.

48. The dossier gave a good overview of the production and use of PCN over time. There were however indications on unknown or illegal production. The information on PCN emissions was satisfactory for Europe but data on the PCN emissions from North America needed to be further explored. The environmental levels in air measured across the European continent indicated that there were also emissions from technical mixtures of PCN. This required further exploration.

49. The information regarding socio-economic factors was limited. However, the need to explore this information any further was probably not urgent due to the fact that there was no longer a demand for PCN, although there were costs associated with remediation of

contaminated sites. The use of PCBs and waste incineration were assumed to be the most important remaining sources of emissions of PCN. The emissions of PCN from these sources were reduced by the same measures that were already taken to reduce the emission of PCBs from the use of PCBs and to reduce emissions of PCBs and dioxins from incineration.

5. Short-chain chlorinated paraffins (SCCP)

50. The information in the dossier seemed accurate, though supplementary information was needed for many aspects of a socio-economic evaluation of various risk management actions.

51. SCCP are synthetic compounds that are mainly used in metal working fluids, sealants, as flame retardants in rubbers and textiles, in leather processing and in paints and coatings.

52. The information on the production and use in the dossier was outdated. Recent production data were not available. Due to a EU directive, the use of SCCP in EU countries in metal-working fluids and in leather finishing had been rapidly decreasing. The dossier described emissions and pathways of SCCP to the environment for the EU. A distinction was made between emissive (metal-working fluids and leather finishing) and non-emissive applications.

53. The overview of regulation of SCCP in the dossier did not adequately reflect the historical review of the chemical outside the EU. The dossier provided information on the potential risks of alternatives to SCCP for the emissive uses but did not address issues of efficacy or cost of the identified alternatives. It was unclear how the alternatives compared to SCCP with respect to POP characteristics. In general, the emissions of SCCP could be reduced by the use of common techniques to control emissions of aerosols or hydrocarbons. Further study was needed on the disposal of products containing SCCP.

D. Track B reviews and exploration of management options for PentaBDE and PFOS

54. In 2005, the Task Force reviewed the dossiers for pentabromodiphenyl ether (Penta-BDE) and perfluorooctane sulfonates (PFOS) and reported to the Working Group on Strategies and Review (EB.AIR/WG.5/2005/1). The Executive Body decided, at its twenty-third session, that both substances be considered POPs under the Protocol on POPs. Furthermore, the Executive Body requested the Task Force to explore management options for both substances and report to it through the Working Group in 2006.

55. Ms. L. Säll (Norway) and Mr. B. Wahlström (Sweden) presented papers on the exploration of management options for PeBDE and PFOS.

56. The Task Force reviewed draft papers prepared by authors from the nominating Parties on “Exploration of Management Options” for each substance. The Task Force took note of the limited time available to the drafters and to the Task Force to review these draft documents. It emphasized that these documents and the elements summarized below were works in progress that reflected the information that was available at the time of drafting, and that in some cases the supporting information for these elements required further elaboration and discussion. The information summarized below does not necessarily reflect the complete views of the members of the Task Force.

57. The Task Force identified work that should be undertaken to clarify and further develop these elements: (a) additional elaboration and evaluation of management options; (b) identification of additional management options, (c) identification of cost information associated with the options; (d) identification of alternative substances, their efficacy, and any known adverse environmental or human health effects associated with them; (e) identification of relevant national and regional legislation; (f) quantification of releases and uses and (g) possible implications of management options for other regions.

58. The Task Force raised the possibility of soliciting this additional information through means of a questionnaire to be circulated to countries and stakeholders including industry within the UNECE region. The Task Force also took note of the difficult task borne by the nominating country at the stage of elaborating management options across the UNECE region and suggested that the tasks could be shared.

1. PentaBDE

59. C- PentaBDE (commercial PentaBDE) contains PentaBDE (50–62% w/w), tetraBDE (24–38% w/w), hexaBDE (4–12%) and small amounts of triBDE (0–1%), and heptaBDE (trace).

60. C-PentaBDE is a flame retardant. Brominated flame retardants are a group of organic substances that are used to comply with fire safety standards. They are used in electrical and electronic appliances (EE-appliances), textiles, plastics, building materials, furniture, paints and insulation foam.

(a) Production, use and emissions

61. The most common use of c-PentaBDE was in flame retarded flexible polyurethane (PUR) foam. This foam contained between 10 and 18% of the c-PentaBDE formulation. PUR foam was used mainly for furniture and upholstery in domestic furnishing, automotive and the aviation industry.

62. Other uses were in rigid polyurethane elastomers in instrument casings, in epoxy resins and phenol resins in electric and electronic appliances, and construction materials. C-PentaBDE could also be present in minor amounts in textiles, paints, lacquers, rubber goods (conveyor belt, coating and floor panels) and oil drilling fluids. Levels ranged from 5% to 30% by weight.

63. In the beginning of the 1990s the amount of c-PentaBDE used in textile treatment was 60% of total usage in the EU. Up to the early 1990s c-PentaBDE was used in printed circuit boards used in household electronics (television, radio, and video), vehicle electronics, white goods (washing machines, kitchen appliances, etc.). According to information obtained from the bromine industry, the use of c-PentaBDE as hydraulic fluid (in the form of a mixture) in petroleum borings and mining was discontinued 10–20 years ago. There was reported use of c-PentaBDE in the aircraft industry. Currently there was no use of c-PentaBDE in newer aircraft for the public, but c-PentaBDE was still used in military aircraft.

64. Global market demand of c-PentaBDE in 2001 was estimated at 7,500 tons of which more than 95% in the UNECE region. Since then all major producers in the UNECE region had ended their production. Production in EU ceased in 1997. The sole producer of c-PentaBDE in the United States voluntarily ended its production of c-PentaBDE in 2004. The use of c-PentaBDE was banned in the EU in 2004. Use in the EU in EE-appliances would be phased out by July 1, 2006. No information was found for East European countries outside the EU. Global demand for flame retardants was forecast to have a strong growth in the future.

65. Major releases to air were the emissions from products during use, through volatilization of c-PentaBDE and dustborne c-PentaBDE. Volatilization from flexible PUR containing c-PentaBDE was estimated at 585–1,055 tons/year. Emissions during manufacture of products containing c-PentaBDE were minor in comparison to the emissions during the use of products containing c-PentaBDE. Major releases from this production occurred with waste water or solid waste.

66. Manufacturing processes of c-PentaBDE containing products generated mostly solid wastes that were disposed in landfills or incinerated. Given the physico-chemical properties of c-PentaBDE it was considered very unlikely that significant amounts of c-PentaBDE would be volatilised or leached from landfills as the substance would be expected to adsorb strongly onto soils. At the operating temperatures of municipal waste incinerators, almost all flame retardants would be destroyed. Potentially toxic products, as brominated dibenzo-*p*-dioxins and dibenzofurans, might be generated during incineration of articles containing c-PentaBDE.

67. Emissions of c-PentaBDE could occur from recycling and dismantling activities such as electronic waste recycling plants, dismantling of vehicles and dismantling of buildings and

constructions. A recycling process for EE-appliances that was not equipped with an efficient air pollution control device might give a significant flow of dust-borne c-PentaBDEs into the environment.

68. Presumably there were emissions and diffuse pollution from vehicle shredder plants, but they had not been estimated. The conditions for emissions could be assumed to be similar as for recycling plants of EE-appliances. For plants not equipped with an efficient air pollution control device a significant flow of dust-borne c-PentaBDEs might be transferred to the environment. In plants with off-gas filtering a large portion of c-PentaBDE would end in the collected fraction of particulate matter.

69. In buildings and constructions insulating foams and thermoplastic sheeting were used that could contain c-PentaBDE. Emissions of dust-borne c-PentaBDE could be assumed to be emitted during dismantling activities. There was limited information to quantify those emissions.

(b) Management options

70. There were currently today less hazardous alternatives to all uses of c-PentaBDE. Production and use was already phased out in the EU and North America. There might however be a need for exemptions for uses in new military planes due to the lack of alternatives compared to the demands for fire safety. Additional costs of ending production and eliminate the uses of c-PentaBDE in the UNECE region should be very low.

71. C-PentaBDE flame retardants in products could be replaced in three ways:

i. A different flame retardant could be substituted in a given material (i.e. plastic or foam);
ii. A different flame retardant in a different type of plastic or foam could be substituted; or
iii. A product could be redesigned so that its very structure eliminated the need for flame retardants.

72. The alternative flame retardants for c-PentaBDE in PUR foam and other applications had been identified. The human health or environmental impacts of these alternatives made them preferable alternatives over c-PentaBDE. However, some alternatives currently in use caused concern because of their chemical properties.

73. Most alternatives for c-PentaBDE in PUR foam were drop-in replacement chemicals. Existing storage and transfer equipment as well as foam production equipment could be used

without significant modification. Alternatives compatible with existing process equipment at foam manufacturing facilities were the most cost effective, because they did not require the plants to modify their processes or purchase new equipment.

74. Non-chemical alternatives were also identified. Three currently available, alternative technologies for flame retarding furniture included barrier technologies, graphite impregnated foam and surface treatment. Graphite impregnated foam and surface treatments had limited commercial uses. Barrier technologies were predominantly used in mattress manufacturing rather than residential upholstered furniture. But there was considerable interest in future applications of these technologies for the furniture industry as well.

75. As of mid-November 2005, a number of major manufacturers of EE-appliances were phasing out all PolyBDEs, including c-PentaBDE. Examples of alternative flame retardants processes currently being utilized included non-halogenated flame retardants and inherently flame retarded polymers.

76. Manufacturers within and outside the UNECE region expected price increases of 5%–10% due to compliance with the EU ban on use of hazardous chemicals in EE-appliances, including c-PentaBDE.

77. For textiles there were alternative bromine free flame retardants. There were also durable flame retardant materials, such as wool and polyester fibres.

78. *Recycling and waste.* Many countries already had restrictions that required off-gas filtering of the emissions from recycling and shredder plants that captured particulates containing c-PentaBDE. Restrictions on emissions from recycling and shredder plants might require installation of air pollution control devices, which could be costly for some plants.

79. In the EU, certain waste containing c-PentaBDE was collected and handled as hazardous waste. For some products it would be difficult to sort out all components containing c-PentaBDE. Some wastes would, therefore, end up in landfills or be incinerated. A modern municipal solid waste incineration facility that was equipped to prevent emissions from dioxins and furans would also minimize brominated dibenzo-*p*-dioxins and dibenzofurans. An obligation to treat c-PentaBDE containing waste as hazardous waste could be an extra cost for some sectors. There were no economic calculations available.

80. *Costs for consumers.* Except where there was no substitute, price increases for consumers were generally expected to be very low.

81. *Financial costs for Governments.* These would depend on the management action taken. There might be costs associated with mandated control measures e.g. recycling and shredder plants, collecting and disposal of waste. There might also be costs associated with monitoring and controlling consumer products containing c-PentaBDE, especially imported.

2. PFOS

82. PFOS is an intentionally produced substance with no natural occurrence. It is a fully fluorinated anion, which is commonly used as a salt or incorporated into larger polymers.

83. PFOS can be formed by degradation from a large group of related substances, referred to as PFOS-related substances. PFOS and its related substances are defined as: Perfluoroctane sulfonates $C_8F_{17}SO_2X$ (X= OH, metal salt, halide, amide, and other derivatives including polymers).

84. Due to its surface-active properties it has been used in a wide variety of applications e.g. in textiles and leather products; metal plating; food packaging; fire fighting foams; floor polishes; denture cleansers; shampoos; coatings and coating additives; in the photographic and photolithographic industry; and in hydraulic fluids in the aviation industry.

(a) Production, use and emissions

85. The total production of PFOS had been significantly reduced from 2000 to 2005 due to a voluntary phase out by industry. The total production volume currently in the UNECE region or globally was not known.

86. The use of PFOS in carpets, leather, textiles, paper and packaging, coatings, cleaning products, fire fighting foam and pesticides/insecticides was largely phased out. Current uses of PFOS were limited to applications where suitable alternatives had not yet been identified. In the EU (in 2004), uses included metallic plating (10,000 kg), some uses related to photography-photolithography (1,000 kg), semiconductor manufacturing (470 kg), and hydraulic fluids used in aviation (730 kg).

87. Emissions from manufacturing operations prior to the PFOS phase-out were primarily in the form of process wastewater discharge to industrial or municipal treatment facilities. The estimated quantity for fire fighting foams, held in current stock for the European Union, was 122 tonnes in 2004. Average emission/use rates for aqueous film fire fighting foams in Canada were estimated to be around 10%–12% per year.

88. Potential emissions to wastewater effluent had been identified from the washing of fabrics and to air from the vacuuming of rugs and carpets. A study showed that 50% of the FC (fluorochemical) treatment would be removed over the nine-year life of the carpet due to walking and vacuuming, while an additional 45% of the FC treatment would be removed in steam cleaning throughout the carpet life.

89. Emissions from most consumer products were low but might continue after disposal. Paper recycling facilities might continue to be a source of PFOS emissions as there might also be releases of PFOS during the recycling process. For the semiconductor industry emissions from critical uses were 54 kg in 2004 in Europe, which was approximately 10% of its use.

90. Releases of PFOS and its related substances were likely to occur during all stages of their life-cycle, e.g. production, product application, distribution, industrial and/or consumer use and disposal. No comprehensive data on present emissions in the UNECE area were available.

(b) Management options

91. *Surface protection and pesticides/insecticides.* For the uses of PFOS, for example in carpets, leather, textiles, paper and packaging, coatings, cleaning products and for pesticides/insecticides, substitution had largely occurred. Further investigation of some of the alternatives with respect to their costs and environmental and health effects was needed.

92. *Fire-fighting foam.* No significant management costs were anticipated with turnover of existing PFOS based stock. In Europe the cost of destruction of PFOS fire-fighting foam (€1,000 per tonne) and the replacement costs of new foam (€5,000 per tonne) was low compared to emission reduction options from other uses. The environmental and health effects of some alternatives were not yet sufficiently investigated.

93. *Photography.* The potential alternatives identified for the photographic industry were: digital techniques, telomer-based products, C3 and C4 perfluorinated compounds, hydrocarbon surfactants and silicone products. The reduction by 83% in the EU photographic industry since 2000 was estimated to cost €20–40 million/year. Further reductions would cost more per unit since the uses that were easy to substitute had been eliminated first and the remaining were most likely more difficult to substitute.

94. *Photolithography in the semiconductor industry.* For some uses in the semiconductor industry PFOS was presently vital. Once substitutes were identified, the bulk of the costs was likely to be related to the change in technology, i.e. investment costs, rather than running the new processes. New techniques were being developed for semi-conductors where PFOS-related

substances were not being used, but there were no alternatives available that would allow for the comprehensive substitution of PFOS uses in critical applications.

95. The global semiconductor industry had recently announced a commitment to curtail PFOS use and its intention to work to identify substitutes in critical applications. The industry was committed to end non-critical uses in the UNECE region by May 2007. Management options should consider time frames for availability of substitutes.

96. *Metal plating.* For decorative chromium plating, alternative processes already existed. In this process, chromium(III) was used and no PFOS-chemicals were necessary. For hard plating, however, the process with chromium(III) did not function as well. Instead, larger closed tanks, or increased ventilation combined with extraction of chromium(VI) were suggested as alternative solutions for the applications where a use of chromium(III) was not yet possible. In both cases exposure to chromium(VI), a known human carcinogen, would decrease, which was an added benefit to the alternatives.

97. The financial gain of not using PFOS might vary among enterprises according to their size and could be as high as the cost of a new system.

98. *Hydraulic fluids.* For hydraulic oils a change in the formulation of the oil would demand a comprehensive testing together with an approval from the airplane manufacturers, as safety standards within this industry were very high. At present there was uncertainty about alternative technologies/substances. Also, no economic calculations were available.

99. *Waste containing PFOS.* Consideration should be given to implementing collection programmes for fire fighting foam and aviation hydraulic fluids. In the EU, hydraulic fluids used in aviation were managed as hazardous waste.

100. *Costs for consumers.* Except where there was no substitute, price increases for consumers were generally expected to be very low.

101. *Financial costs for governments.* These would depend on management actions taken. There might be costs associated with mandated control measures such as in metal plating, photographic industry and airplane maintenance. There might also be costs for monitoring and controlling consumer products containing PFOS, especially imported products.

III. OTHER ITEMS FOR WHICH FURTHER GUIDANCE IS REQUESTED FROM THE WORKING GROUP

102. Several experts requested clarification from the Working Group on the roles of observers in the Task Force, in particular with regard to conclusions and recommendations in the Co-Chair's report to the Working Group.

103. The Task Force noted that due to different interpretations of paragraph 2(b) of Executive Body decision 1998/2 there was difficulty in reaching agreement on whether sufficient information existed to suggest that a substance was likely to have significant adverse human health and/or environmental effects as a result of its LRAT taking in to consideration paragraph 3 of the decision.

104. The Task Force requested that the Working Group take note of this issue and provide further guidance.

105. There were some concerns raised with regard to how the additional information and comments on the dossiers were summarized. The Task Force noted that it was essential that these summaries be objective and accurate.

106. The Task Force noted that the summaries of the track A review reports did not in all cases accurately reflect the peer reviews, and appeared in some cases to provide subjective interpretations. In the future the Task Force might not use such summaries. Guidance given to reviewers would be transmitted to Task Force members.

IV. PRIORITY SETTING AND 2007 WORKPLAN

107. The Task Force proposed its workplan as follows:

(a) Initiate Track A and Track B reviews of dossiers as requested by the Executive Body;

(b) Continue work on PentaBDE, PFOS and other substances as decided by the Executive Body;

(c) Update the generic guidelines for the technical review of dossiers of new substances that may be proposed by Parties for inclusion into Annexes I, II and III to the Protocol (EB.AIR/WG.5/2004/1, annex);

(d) Prepare and circulate to Parties' experts and observers a questionnaire to gather further information on management strategies and options for PentaBDE, PFOS and other substances as in (b) above;

(e) Consider issues related to paragraph 2(b) of Executive Body decision 1998/2 as a priority at its next meeting;

(f) Hold its sixth meeting in 2007 (date and venue to be decided).