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**ECONOMIC COMMISSION FOR EUROPE**

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

Working Group on Strategies and Review

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Geneva, 30 August–3 September 2010  
Item 5 of the provisional agenda

**OPTIONS FOR ADDING NEW SUBSTANCES TO THE PROTOCOL ON  
PERSISTENT ORGANIC POLLUTANTS**

Report by the Co-Chairs of the Task Force on Persistent Organic Pollutants

1. This report, mandated by item 1.5 of the 2010 workplan of the Convention (ECE/EB.AIR/99/Add.2) and the request by the Parties to the Protocol on Persistent Organic Pollutants (POPs) made at the twenty-seventh session of the Executive Body (ECE/EB.AIR/99, para. 31), presents the results of the eighth meeting of the Task Force on Persistent Organic Pollutants, held from 18 to 20 May 2010 in Montreal, Canada.
2. Experts from Austria, Belgium, Canada, the Czech Republic, Finland, France, Germany, Italy, the Netherlands, Norway, Poland, Sweden, the United States of America and the European Union participated in the meeting. Representatives from the Bromine Science and Environmental Forum (BSEF), the Canadian Electricity Association, Dow AgroSciences, the European HBCD Industry Working Group, the Pentachlorophenol Task Force, PFB Corporation, PlasticsEurope and the Utility Solid Waste Activities Group (United States) also attended the meeting. In addition, Gdansk University (Poland) and Lancaster University (United Kingdom), and the Dutch and German consulting companies, NL Agency and BiPRO, were represented.

3. Ms. C. Heathwood (Canada) and Mr. J. Sliggers (Netherlands) co-chaired the meeting.
4. Ms. T. MacQuarrie, Director General, Health Canada, Pest Management Regulatory Agency, opened the meeting and welcomed participants.
5. The Task Force acknowledged the work of the representatives of the Netherlands, Norway and the European Commission, who had prepared documents for the meeting and expressed its gratitude for their work. Furthermore, it thanked the peer reviewers for reviewing further information for the track A reviews of trifluralin and pentachlorophenol (PCP).
6. The present report and other documents of the eighth meeting, as well as presentations made at the meeting, are available from the Convention's website at:  
<http://www.unece.org/env/lrtap/TaskForce/popsxg/8th%20meeting.htm>.

## **I. OBJECTIVES OF THE MEETING**

7. The Task Force:
  - (a) Reviewed additional information related to PCP to assess its degradate, pentachloroanisole (PCA), against the guidance and indicative numerical values in Executive Body Decision 1998/2, and considered linkages of PCP to dioxins, furans and PCA in the environment. The track B review was continued in parallel with track A;
  - (b) Further assessed track A of trifluralin, taking into consideration the new information from Canada and continued the track B review in parallel; and
  - (c) Further assessed management options on endosulfan, dicofol and hexabromocyclododecane (HBCD).

## **II. PROGRESS IN THE WORK OF THE TASK FORCE**

8. The Task Force expressed its gratitude to Canada for hosting the meeting.
9. The Task Force regretted that increased workload and insufficient resources had prevented the secretariat from attending the Task Force meeting and noted that the guidance and support it had provided at past meetings were highly appreciated.
10. The Dutch Co-Chair of the Task Force reported on discussions and conclusions by the Working Group on Strategies and Review and the Executive Body concerning POPs.
11. The Task Force, at its seventh meeting in Plovdiv, Bulgaria, in 2009, had agreed to send a questionnaire to Parties and stakeholders, including industry, to gain additional information for the continued track A reviews of PCP and trifluralin and to gather further information on management strategies and options for dicofol, endosulfan, HBCD, trifluralin and PCP. The questionnaire had been sent in January 2010 and had resulted in 27 responses: 20 from Governments and 7 from industry. The information had been used to compile the addenda to the track A documents for PCP and trifluralin and for the exploration of management options for all

five substances under consideration.

12. The Task Force expressed the view that more comprehensive evaluations could have been undertaken if more time had been available to complete the documents for the Task Force meeting. As an example, time had not allowed for a comment period on the documents that explored management options for the five substances. That would have provided the opportunity to obtain the perspective of experts who were best placed to evaluate options for their country prior to the meeting.

13. Industry representatives noted that they needed an alternative to sharing information by posting it on the Convention's website. While respecting the principle of transparency, there was some information that they would prefer to submit to Task Force members discreetly, so as not to share it more broadly with competitors. Experts from industry highlighted that such information would not be considered confidential. One solution, which had already been used by the Task Force Co-Chairs, was for industry to notify the Task Force that members could obtain information directly from them. Another solution could be to ask experts from industry to distribute such information directly to the Task Force.

14. Addenda for PCP and trifluralin were presented by the representative of the European Commission for the further track A review of those substances.

15. An expert from Dow AgroSciences made a presentation on trifluralin. He referred to the conclusions of Hoferkamp et al. (2009), noting that the significance of low-level current use pesticides in the Arctic had not been adequately addressed, and provided information demonstrating a significant reduction (75%) in use in North America since 1994 with the introduction of genetically modified crops and the adoption of conservation tillage practices.

16. An expert representing industry's Pentachlorophenol Task Force made a presentation expressing the view that PCP did not meet the criteria for listing under the POPs Protocol and PCA, a degradate of PCP, did not meet the criteria for persistence. She further noted that, although the Task Force had agreed PCP met the long-range transport criteria, it had not been detected in air, water, ice or soil in remote regions; it had been detected in biota as a result of metabolism of hexachlorobenzene (HCB) or hexachlorohexane (HCH).

17. An expert from BSEF made a presentation on HBCD. Among others, he noted that there was a need to ensure a continued supply of flame-retardant insulation, and that current markets and users needed flame-retardant (ignition resistant) polystyrene foams owing to existing codes and standards. He highlighted that industry was strongly committed to testing and implementing suitable alternatives to HBCD in polystyrene foam and that users of polystyrene foam building and construction materials and the industry needed a time-limited exemption for HBCD until a suitable alternative was commercially available.

**A. Further work on track A technical reviews of pentachlorophenol and trifluralin**

18. Track A reviews were related to elements of the dossiers that were relevant to a decision on whether a substance should be considered a POP.

19. The Task Force continued the track A review of trifluralin, taking into consideration new information from Canada and responses to the questionnaire and considering those against the criteria of Executive Body Decision 1998/2.

20. A further review of additional information on PCA was also conducted to assess it against the criteria of Executive Body Decision 1998/2. Additional information related to linkages of PCP to PCA, HCH and HCB was also considered.

21. The Task Force arranged for a team of six peer reviewers to examine the dossiers and additional information in conjunction with the information of the first track A review. Reviewers worked and reported independently and agreed on a summary track A report based on the individual reviews.

**1. Trifluralin**

22. The Task Force was not able to reach a consensus on trifluralin as a POP in the context of the Protocol after reviewing the additional information.

23. Many experts concluded<sup>1</sup> that there was sufficient information to determine that trifluralin was a POP in the context of the Protocol, while some experts concluded that it was not a POP because there was sufficient information to suggest that it was not likely to have significant adverse human health and/or environmental effects as a result of its long-range transboundary atmospheric transport (LRAT).

24. When considering POP characteristics in terms of paragraph 1 of Executive Body Decision 1998/2, the Task Force concluded that the risk profile and additional information provided sufficient information to confirm the conclusion of the dossier that the guidance and indicative numerical values of paragraphs 1 (a)–(d) were met; however, one expert had a reservation that, while the numerical values for bioaccumulation had been met, integration of all the available scientific information did not support the hypothesis that the substance was likely to bioaccumulate to levels which would have significant adverse human and/or environmental effects.

25. Regarding paragraph 2 (a) of Executive Body Decision 98/2, the Task Force reconfirmed that monitoring data provided sufficient evidence that trifluralin underwent LRAT.

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<sup>1</sup> In the present report, the term “concluded” refers to the Task Force’s evaluation of whether the risk profiles provided sufficient information on which to draw conclusions, rather than indicating the Task Force’s concurrence or a new assessment of POP characteristics of the five substances.

26. Concerning paragraph 2 (b) of Executive Body Decision 1998/2, there was no consensus on whether sufficient information existed to suggest that the substance was likely to have significant adverse human health and/or environmental effects as a result of its LRAT.

27. Some experts, however, concluded that there was sufficient information on trifluralin to conclude that it was not likely to have significant human health and/or environmental effects due to LRAT, using a risk-based approach that considered multiple lines of evidence, such as available toxicity and currently reported levels of trifluralin in remote areas, risks associated with near-field exposures, and trends in trifluralin use and occurrence. They determined there was a wide margin of exposure (4–6 orders of magnitude) in remote areas and that levels were unlikely to rise given indications that trifluralin uses were not likely to increase in the foreseeable future.

28. Many experts concluded that safe levels of exposure could not be determined for substances such as trifluralin — which were not only persistent and bioaccumulative, but also chronically toxic towards aquatic organisms — because of the uncertainties in assessing effects of long-term exposure to even low concentrations.

29. The Task Force agreed that, in the spirit of the Protocol, proactive measures should be taken, as warranted. Further, it was noted that if action was only taken when critical levels were reached in regions remote from sources, it might be too late for action owing to loads already present in the environment.

30. It was noted that the basis for a conclusion on paragraph 2 (b) varied considerably, for example, concerning monitoring exposure and trends in remote regions for substances that the Executive Body had already considered as POPs. In preparation for policy discussion within the Working Group, Parties might want to review the rationale for those previous decisions.

## **2. Pentachlorophenol/Pentachloroanisole**

31. The Task Force agreed not to reopen its previous conclusions on PCP, outlining that PCP itself should not be considered a POP in the context of the Protocol.

32. The Task Force was not able to reach a consensus about PCA as a POP in the context of the Protocol after reviewing the additional information of PCP's degradation product, PCA.

33. Many experts concluded that there was sufficient information to determine that PCP was a POP because of PCA, while some experts concluded that the information was insufficient to support PCA as a POP, and subsequently PCP as a POP. Two other experts indicated they could not reach a conclusion.

34. The Task Force drew the following conclusions on POP characteristics of PCA in terms of the guidance and indicative numerical values provided in paragraphs 1 (a)–(d) of Executive Body Decision 1998/2:

(a) Potential for LRAT: the Task Force concluded that there was sufficient information that PCA had the potential for LRAT because it was found in remote areas. Additionally, it had a half-life in air above two days and a vapour pressure below 1000 Pa. Two

experts noted that the information on sources of the PCA in the Arctic was unclear as to its origin and questioned if it had resulted from LRAT of PCP or if it had also come from transformation from other organic chlorinated substances transported and found in the Arctic;

(b) Toxicity: the Task Force concluded that information on PCA supported that it was toxic, based on its effects on aquatic organisms. Most concluded that it had the potential to adversely affect human health and/or the environment. Many experts also concluded that there was potential for carcinogenicity, mutagenicity and reproductive effects to human health. One expert noted the paucity of toxicity data, but supported the Task Force conclusion;

(c) Persistence: the Task Force could not reach consensus about the persistence of PCA. Many experts concluded that PCA was persistent based on a weight-of-evidence approach that included consideration of its presence in remote areas, the overall persistence of PCP and PCA, as well as a quantitative structure-activity relationship (QSAR) estimate. Some experts concluded there was insufficient information on the persistence of PCA in water, soil and sediments. They also noted that its presence in remote areas did not mean it was persistent, but rather was an indication of continuous loading and/or other sources of PCA;

(d) Bioaccumulation: Based on log octanol-water partitioning coefficient (log Kow), bioconcentration factor (BCF) values above 5,000, and levels in biota, the Task Force concluded that PCA was bioaccumulative.

35. When considering the contextual information described in Executive Body Decision 98/2, paragraph 2 (a), the Task Force concluded that monitoring data from Arctic and remote regions provided sufficient information to indicate the PCA was undergoing LRAT.

36. On the contextual information in Executive Body Decision 98/2, paragraph 2 (b), the Task Force could not reach consensus.

37. Many experts concluded that there was sufficient evidence to suggest PCA was likely to have significant adverse human health and/or environmental effects as a result of its LRAT, based on its intrinsic properties such as the high bioaccumulation potential of PCA and monitoring data in remote regions.

38. Some experts concluded that the information was insufficient to support a conclusion regarding paragraph 2 (b) because there was no evidence to conclude that measured levels would result in adverse human health and/or environmental effects. Experts also questioned whether or not the primary source of PCA was from LRAT.

39. Sources of PCA were further discussed. The findings of the previous Task Force meeting — that there were several potential sources of PCA including PCP and other organic chlorinated substances found or transported to remote regions — were reiterated. Many experts concluded that the source of PCA was primarily from LRAT of PCP. Though decreasing trends in environmental levels of potential precursors of PCA (e.g., alpha and gamma HCH and HCB) and decreased usage of PCP were reported, PCA had remained stable in Arctic air.

40. Some experts concluded that more research was needed to determine the main sources of PCA, and noted that the additional information did not enable an adequate exploration of other potential sources.

**B. Exploration of management options for dicofol, endosulfan, hexabromocyclododecane, pentachlorophenol and trifluralin**

41. Documents on the exploration of management options were prepared for all five substances, and comments on HBCD, PCP and trifluralin were received from representatives of industry. That information had been made available to the members of the Task Force either on the website or electronically. Peer reviewers were not used to prepare the management options documents.

42. The exploration of management options for dicofol, endosulfan, HBCD, PCP and trifluralin were presented by the lead authors representing NL Agency, BiPRO and Norway.

43. The reports for each substance were structured as follows: (a) substance definition and uses; (b) information on production, use and emissions; (c) management options, including regulatory actions taken in the United Nations Economic Commission for Europe (UNECE) region, alternatives and costs; and (d) options for inclusion in the Protocol.

44. It was noted that the Executive Body had not reached the conclusion that Trifluralin and PCP were POPs in the context of the Protocol, and as a result two Task Force members expressed reservation about the extent to which management options should be explored.

**1. Dicofol**

45. Dicofol (Chemical Abstracts Service (CAS) name: 1,1-bis(4-chlorophenyl)-2,2,2-trichloroethanol, CAS number 115-32-2) was comprised of two isomers: p,p'-dicofol and o,p'-dicofol. The typical isomer content in existing technical material was approximately 80% of p,p'-isomer and 20% of o,p'-isomer.

46. Dicofol was structurally similar to dichlorodiphenyltrichloroethane (DDT). It differed from DDT by the replacement of the hydrogen (H) on C-1 by a hydroxyl (OH) functional group. In the most used production process, DDT was an intermediate for the synthesis of dicofol. That DDT then had to be separated from the produced dicofol to produce commercial dicofol.

47. Dicofol, an organochlorine pesticide, was used as an acaricide in many countries around the world on a wide range of crops, including fruits, vines, vegetables, ornamentals, cotton and field crops. It was used to control mites.

**(a) Production, use and emissions**

48. In the UNECE region dicofol had been produced in Spain until 2008, in amounts of about 1,500 tons per year. Currently, there was no commercial production of dicofol in the UNECE region. Worldwide production took place in China, India and possibly in Brazil and Israel.

49. Dicofol was not authorized in the EU member States. As a consequence, the use of dicofol in the EU had ended in March 2010. In Canada, dicofol registration had been voluntarily withdrawn in 2008, and its use would end in December 2010. Use in the United States (27 tons in 2007) was declining. Dicofol might be used in several countries in Eastern Europe, the Caucasus and Central Asia and South-Eastern European countries, but it was unclear whether it was actually used or not. Overall, use within the UNECE region had declined over recent decades. The yearly use of dicofol within the region had declined from an estimated 600 tons in 2000, to at most 32 tons in 2010. As its use had already ended in the EU and would end in Canada in 2010, remaining use occurred in only a few UNECE countries.

50. It was noted that, due to slow degradation, all of the previously used dicofol had become available to the environment. That meant that total emissions equalled the amount of dicofol used, estimated to be less than 32 tons annually in the UNECE region (10% was directly emitted into the air). Use of dicofol could lead to unintentional emissions of DDT, as pesticides based on dicofol could contain up to 34% DDT. Regulatory action in the United States had voluntarily cancelled registrations for dicofol-containing products unless the upper limit concentration of DDT of the active ingredient used to formulate the products had been certified at 2.5%. Up until 2009, legislation in Canada, the United States and the EU had prohibited the use of commercial dicofol containing more than 0.1% DDT. There were no known natural sources of dicofol.

#### **(b) Management options**

51. As for other pesticides, the use of dicofol could lead to resistance in certain species of mite. Applying specific strategies for resistance management and prevention could control resistance of pests. Those strategies were based on a limited use of a certain chemical, on switching between acaricides from different chemical backgrounds or by biological pest control.

52. Many chemical substitutes were available as an alternative to dicofol. In general, those substances were estimated to have lower bioaccumulation and persistence than dicofol. For a common pest like the carmine spider mite, several chemical substances were available, such as abamectin or clofentezin. For some species of mite, acaricides based on natural oils were becoming available. For protection of crops that were grown in greenhouses, biological pest control could be applied.

53. Eliminating production and use of dicofol did not entail extra costs for the EU member States and Canada, as the use had already ended or was planned to end soon. Costs of eliminating the use for other UNECE countries were expected to be low, as the current use was low and substitutes were commonly available and used. Extra costs for Government budgets and consumers were not expected.

#### **(c) Options for possible inclusion into the Protocol**

54. The Task Force identified the following option for possible inclusion of dicofol in the Protocol: listing dicofol in Annex I to the Protocol to prevent production and use.



## 2. Endosulfan

55. Endosulfan (CAS Nos. 959-98-8 ( $\alpha$ -endosulfan), 33213-65-9 ( $\beta$ -endosulfan), 1031-07-8 (endosulfan sulphate)) was an organochlorine compound, which was developed in the early 1950s. Technical grade endosulfan was a diastereomeric mixture of two biologically active isomers ( $\alpha$ - and  $\beta$ -) in approximately 2:1 to 7:3 ratios, along with impurities and degradation products. The  $\beta$ -isomer was easily converted to  $\alpha$ -endosulfan, but not vice versa.

56. Endosulfan was an insecticide used to control chewing, sucking and boring insects, including aphids, thrips, beetles, foliar feeding caterpillars, mites, borers, cutworms, bollworms, bugs, white fliers, leafhoppers, snails in rice paddies, earthworms in turf, and tsetse flies. It was used on a wide range of crops. Major crops to which it was applied were soy, cotton, rice and tea. Other crops included vegetables, fruits, nuts, berries, grapes, cereals, pulses, corn, oilseeds, potatoes, coffee, mushrooms, olives, hops, sorghum, tobacco and cacao. It was used on ornamentals and forest trees and had been used in the past as an industrial and domestic wood preservative. In 2006, the United States Environmental Protection Agency (EPA) had registered the use of endosulfan as a veterinary insecticide to control ectoparasites for beef and lactating cattle.

### (a) Production, use and emissions

57. Historically, production in Europe had been approximately 10,000 to 50,000 tons per year, but now production in Europe had stopped. The current annual production of endosulfan worldwide was estimated to be between 18,000 and 20,000 tons. Production took place in India (10,500 tons), China (2,400 tons), Brazil, Israel and the Republic of Korea.

58. The substance was widely registered for use throughout the world although its use was banned in more than 60 countries, including the EU member States. Endosulfan was used in varying amounts in Argentina, Australia, Brazil, Canada, China, India, the United States and some other countries. Global use quantities corresponded to current production quantities. Current annual use in the United States and Canada were approximately 180 and 22 tons per year, respectively. In Europe there was no more known use of endosulfan.

59. As a result of the use of endosulfan in agriculture, endosulfan was released to the environment. The amount of endosulfan emitted into the air was estimated to be 50% of its use. From manufacturing and formulation operations, local-scale environmental releases into the air, wastewater or surface waters might also occur. Natural sources of the compound were not known.

### (b) Management options

60. The use of endosulfan was currently banned in more than 60 countries, including 31 UNECE countries. In countries where endosulfan was still applied, use was restricted to specific authorized uses and specific use conditions. The extent of the ban in more than 60 countries demonstrated that economically viable alternatives were available in many different geographical situations and in developed and developing countries.

61. Alternatives to endosulfan included not only alternative substances that could be used without major changes in the process design, but also innovative changes such as agricultural processes or other practices that did not require the use of endosulfan or chemical substitutes. Information on numerous chemical alternatives and a considerable number of biological control measures and semiochemicals had been identified for a very wide range of applications and different geographical situations. Information on several risk indicators indicated that many available alternatives were safer than endosulfan. Within the UNECE region, Canada provided information on specific crop-pest combinations for which chemical alternatives were currently not registered. Consultation with Canadian growers would be needed to determine if alternatives available in other countries would meet their specific pest-control needs.

62. Costs of eliminating the use of endosulfan were expected to be low. Cost impacts on industry were expected to be nil to negligible in countries where endosulfan was not produced or already banned. It was expected that the losses would be more or less outweighed by sales of chemical and non-chemical alternatives.

63. Information on costs of chemical alternatives indicated that those might be significantly higher. However, examples concerning production of cotton and other crops where the use of endosulfan had been banned showed that alternatives were economically comparable or could even lead to reduced costs for farmers and increased incomes. It was estimated that a ban on endosulfan would bring low additional annual costs for agriculture and correspondingly low impacts on society within the UNECE region. Canada would undertake consultations with stakeholders later in 2010 on costs and availability of alternatives to endosulfan.

64. Costs for Governments and authorities would arise in those UNECE countries where endosulfan was still used. The one-time costs for implementation within the region — for redrafting and reissuing of guidance and notifying of regional authorities — were assumed to be low. Also, non-quantified one-time costs might arise in some countries for the registration of suitable alternatives to endosulfan. Extra costs for State budgets and consumers were estimated to be low. One expert thought information was insufficient to reach that conclusion, and noted that registration costs could be significant.

### (c) Possible management options under the Protocol

65. The Task Force identified the following option for possible inclusion of endosulfan in the Protocol: listing endosulfan in Annex I to the Protocol to prevent production and use.

### 3. Hexabromocyclododecane (HBCD)

66. Commercially available hexabromocyclododecane (C-HBCD, CAS No. 3194-55-6 and 25637-99-4) was a white, odourless, non-volatile solid compound. Technical HBCD was often characterized as a mix of diastereomers, with 70–95 %  $\gamma$ -HBCD (CAS No. 134237-52-8) and 5–30 %  $\alpha$ -HBCD (CAS No. 134237-50-6) and  $\beta$ -HBCD (CAS No. 134237-51-7).

67. HBCD was used as an additive flame retardant on its own, or in combination with other flame retardants. The main downstream uses of HBCD were in the polymer and textile

industries. HBCD was added to polystyrenes used in building and construction materials and in electronic articles and products. In the textile industry it was used as a coating.

**(a) Production, use and emissions**

68. The global demand for HBCD had increased from 16,500 tons in 2001 to 21,000 tons in 2008. The United States EPA estimated that the demand in the United States in 2005 had been between 4,540 and 22,900 tons. The total volume of HBCD used in the EU in 2006 was estimated to be 11,580 tons, of which approximately 6,000 tons had been imported.

69. The highest demand and use of HBCD was inside the EU. The demand for and production of HBCD was increasing in the UNECE region. HBCD was used in four principal product types: Expandable Polystyrene (EPS), Extruded Polystyrene (XPS), High Impact Polystyrene (HIPS) and polymer dispersion for textiles. The main use (90%) of HBCD was in EPS and XPS in buildings and construction. About 2% of the total use of HBCD was in HIPS used in electronic products and articles. The remaining use was mainly in textile coating for vehicles, bed mattresses, furniture and textiles.

70. HBCD was released into the environment during the manufacturing process, in the manufacture of products downstream in the product chain, during their use and after they had been discarded as waste. Products had a relatively long service life and were disposed of by different means, through incineration, recycling or landfilling.

71. The release of HBCD from manufacture and use of insulation boards and textiles in 2007 in the 27 countries of the expanded EU was estimated at 3 tons, of which 50% went into wastewater, 29% into surface water and 21% into the air. Diffuse emissions of HBCD from construction and buildings would continue for several decades and be potentially long-term sources of HBCD leaching or volatilizing into the environment, as well as representing larger releases when buildings constructed with materials containing HBCD were demolished or renovated. According to a study under the EU regulatory framework for the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), those emissions might become significant in the future, particularly from about 2025 onwards as buildings containing flame-retardant EPS became subject to demolition. Only very low amounts of brominated dioxins and dibenzofurans were formed during controlled incineration.

72. Insulation board formed the majority of HBCD-containing waste. It was understood that most of that material went into landfill or was incinerated. Using figures for 2006, estimated releases in the EU from insulation boards turned into waste would be approximately 9 tons per year. Increasing quantities of waste was a potential long-term source of HBCD releases. The significance of that source depended, however, on the waste management strategies chosen in a given country, i.e., if the waste was incinerated, or disposed of in a landfill. Recycled products that contain HBCD were potential emission sources in the same way as virgin products. In a substance-flow analysis in Switzerland, emissions from recycling vehicles, insulation panels and electronic and electric equipment (E&E) were estimated to account for about 2% of the total releases of HBCD. There were no known natural sources of HBCD.

**(b) Management options**

73. Several national and international initiatives to assess and regulate HBCD were under way. Canada, Norway and the United States were in various stages of assessing the risks of HBCD. In Norway, a proposal for a national regulation with a ban on the use of HBCD in products was under consideration. The EU had identified HBCD as a “Substance of Very High Concern”. In 2009, HBCD had been included in the European Chemicals Agency (ECHA) recommendation list of priority substances subject to authorization under REACH. As a consequence, producers or importers would be faced with notification and information requirements.

74. Technically feasible and commercially available alternatives existed for textiles’ back coating and HIPS in electronic products. Currently, there were no drop-in chemical substitutes for use of HBCD in polystyrene foam that were considered environmentally sound. There were, however, ongoing initiatives in industry to find sustainable long-term alternatives. It was noted that redesign of end products and alternative types of insulation materials existed. In Scandinavia, the use of HBCD had been voluntarily phased out, while applying the same fire-safety requirements as other countries in the EU. Fulfilment of the fire-safety requirements had been achieved by means of technical standards and building codes specified for different uses of insulation boards in buildings and constructions, allowing for the use of thermal barriers, and not exclusively specified for the individual insulation board.

75. The management options document for HBCD prepared by Norway concluded that the cost implications of eliminating production and use for producers would be moderate to low, if enough time were allowed for its phase-out. Some members of the Task Force felt, however, that those assumptions needed to be substantiated, for example, by quantifying or evaluating economic impacts, as there was currently little information upon which to base those conclusions.

76. According to the management options document, economic losses from switching to other flame retardants would likely be offset by gains realized by producers of alternatives. EPS and XPS without flame retardants were commercially available and technical feasible and would not represent a higher cost to the manufacturer of insulation boards. Fire-safety requirements, however, varied in the UNECE region and those alternatives were not currently feasible for most other countries in the region because of current national technical standards and building codes. EPS and XPS insulation boards treated with HBCD were most often built-in by means of other materials in buildings and constructions. Modifying the construction methods, combined with use of thermal barriers, allowed for the use EPS and XPS without flame retardants.

77. The management options document concluded that flame retardants were only a limited factor in the price of polystyrene products. Polystyrene boards were relatively inexpensive products and the use of more expensive flame retardants would be unlikely to influence their market price. Alternative thermal barriers were also relatively inexpensive. Price increases were not expected for other products since the substitutes were already in use and were relatively inexpensive to produce. While the report concluded that the building and construction sector would be able to fulfil fire-safety needs, some Task Force members indicated that that conclusion would need to be further explored to address costs and barriers that might be related to changing fire and building codes, among other considerations.

78. The management options report also concluded that increases in costs for manufacturers of HIPS and textile coating were not expected since substitutes were already in use. To address the emissions of HBCD of insulation boards in the waste phase, such boards would need to be collected and disposed of in a landfill or to be incinerated. The costs of controlling the emissions in the waste phase might be significant and required further consideration.

79. Some Task Force members indicated that the cost assumptions made in the report needed to be substantiated, for example quantification of job losses, cost increases to consumers and other socio-economic impacts that had not been enumerated.

### **(c) Options for possible inclusion into the Protocol**

80. The Task Force identified the following options for possible inclusion of HBCD in the Protocol: (a) listing HBCD in Annex I to the Protocol to eliminate production and use; and (b) listing HBCD in Annex II to the Protocol to restrict certain uses.

81. Some members of the Task Force concluded that listing might be premature owing to the fact that the socio-economic impacts had not been adequately explored, as outlined above.

82. In either Annex I or II, time-limited exemptions or reassessments might be required. Listing in Annex I or II could require changes in technical standards, building codes and policies before XPS and EPS without HBCD in combination with use of thermal barriers could be used in all parts of the UNECE region. In terms of chemical substitution, because of the extensive use of EPS and XPS insulation, it might take 5 to 10 years to phase out HBCD in the building and construction sector.

83. Due to potential of releases during recycling of building materials and electronic appliances, Parties might decide to take related management measures.

84. Some members of the Task Force noted that guidance on waste management techniques for HBCD-containing waste could be developed or existing guidance could be used.

## **4. Pentachlorophenol (PCP)**

85. Pentachlorophenol (C<sub>6</sub>Cl<sub>5</sub>OH with CAS No. 87-86-5) was an aromatic hydrocarbon of the chlorophenol family. Sodium pentachlorophenate (Na-PCP) readily degraded to PCP, as did the ester pentachlorophenyl laurate (PCPL). Na-PCP was registered with CAS No. 131-52-2 and PCPL with CAS No. 3772-94-9. The environmental toxicity, fate and behaviour profile of all three substances was quite similar.

86. PCP was first introduced for use as a wood preservative in the 1930s. Since its introduction, PCP had had a variety of other applications. Within the UNECE region it was widely used as a biocide, a pesticide, a disinfectant, a defoliant, an anti-sap stain agent, an antimicrobial agent and a wood preservative. Wood preservation was by far the major application. The salt sodium pentachlorophenate (Na-PCP) was used for similar purposes as PCP. The ester pentachlorophenyl laurate (PCPL) was used in textiles.

**(a) Production, use and emissions**

87. Production and consumption levels of PCP had decreased over the years. In North America there was only one company manufacturing PCP, in Mexico. The production volume in 2009 had been 7,257 tons, which had been marketed to the United States, Canada and Mexico for wood preservation. In Europe and in Canada production had stopped several years ago.

88. In the UNECE region, PCP was solely used as wood preservative in the industrial market. In the EU, Norway and Switzerland, and in some other non-EU countries, the use of PCP was no longer allowed. PCP was one of the three major wood preservatives used in the industrial market in North America. The other two were chromated copper arsenate (CCA) and creosote. The majority of PCP used in North America was for treatment of poles: utility poles and cross-arms accounted for more than 90% of PCP consumption. The total amount used in Canada was estimated at 150 tons, whereas United States consumption was estimated to be 5,000 tons in 2002.

89. PCPL was no longer used in the UNECE region. Na-PCP was only used for wood preservation, like PCP. Both substances were not produced in the UNECE region anymore.

90. Commercial PCP contained contaminants. Those of concern were dioxins, furans and HCB. PCP and its contaminants were released into the environment when PCP was produced, used, or when PCP articles were used or disposed of as waste. PCP-treated wood should not be burned in the open, as that led to the formation of dioxins and furans. In the United States approximately 2,600 kg PCP had been released by industry in 2008, as registered by the Toxic Release Inventory (TRI), of which 172 kg had been released into the air, 513 kg into the water and 1,865 kg had been disposed of in landfill. The wood products industry (North American Industry Classification System (NAICS) code 321) and the hazardous waste/solvent recovery industry (NAICS code 562) were sources of a significant portion of PCP emissions reported in the TRI; however, there was a large gap between the amounts of PCP used and the releases registered in the TRI. PCP was likely to be released from other sources besides the industries that reported to the TRI, e.g., articles in use through volatilization and leaching (volatilization from the surface is estimated to be 2% per year), waste handling, contaminated areas (migration) and other non-registered sources. On that basis a very rough conservative estimate of yearly air emissions in the United States could be hundreds of tons. There were no known natural sources of PCP.

**(b) Management options**

91. The relatively large volumes of PCP-treated poles in service, as well as treated-wood poles in the waste phase, volatilized and leached PCP and contaminants into the environment. Environment Canada and the Utilities Solid Waste Activities Group had developed voluntary guidelines for proper handling, use and disposal of wood poles.

92. For use as a wood preservative, alternative chemicals to PCP and alternate materials were generally available and applicable. Which alternative performed comparably to PCP varied with the type of product and application. Although some of the alternative chemicals were more or less as toxic as PCP, they did not contain the persistent contaminants that characterized

formulated PCP products. For workers who were frequently exposed to PCP-treated wood, like electrical utility linemen, occupational health risks due to PCP-exposure might be reduced when other chemicals or alternative materials were used. Chemical and material alternatives, however, presented their own health and occupational hazards that would need to be fully assessed.

93. In the EU, when discarded, wood treated with PCP or Na-PCP was considered hazardous waste. In the United States, after service, wood poles were burned for energy recovery, disposed of in landfills, reused or recycled. In the EU incineration under controlled conditions was preferred over disposal in landfills for reasons of energy recovery and reduced toxic emissions. The measures to control emissions of dioxins, furans and HCB from waste incineration was already covered in annex V to the 1998 POPs Protocol and had been included in the Guidance document on best available technology (BAT) adopted by the Executive Body at its twenty-seventh session. Those techniques were effective for PCP-containing waste as well. The costs for incineration were higher than for disposal in landfills.

94. The existing electrical transmission and distribution system in the United States and Canada was mainly supported by wood poles, of which about half were treated with PCP.

95. In North America risk-reduction measures had been implemented to reduce potential exposure of workers and the environment to PCP and its contaminants. For example, in Canada best practices for the design and operation of wood treatment plants have been developed and adopted by over 90% of the wood preservation industry.

96. Since wood preservation was the only remaining use for PCP in the UNECE region, a ban on the use for applications other than wood preservation would have a negligible impact.

97. Regarding a transition of PCP-treated wood to alternatives, in the short term, end-users such as utility companies could experience fluctuating product prices and production shortages. It was anticipated that those users would experience only a small impact related to product prices, since most chemical alternatives were available at reasonable costs. Price levels of wood poles treated with other chemicals were about the same as that of PCP-treated poles. Alternate materials like concrete, steel and fibre-reinforced composite were more expensive, but the longer service life of poles made with those materials might counterbalance the increased initial cost. Life-cycle costs and other considerations for those products would need to be explored to better understand the potential management options.

98. Since a ban already existed in the EU, the cost of a ban on PCP for EU member States was zero.

### **(c) Possible management options under the Protocol**

99. Noting that Parties to the Protocol had not made a decision on PCP as a POP, the Task Force identified the following options for possible inclusion of PCP in the Protocol: (a) listing PCP, Na-PCP and PCPL in Annex I to the Protocol to eliminate production and use; and (b) listing PCP, Na-PCP and PCPL in Annex II to the Protocol to restrict certain uses.

100. Two members of the Task Force concluded that further consideration of the socio-economic impacts of a ban on PCP in the region was premature and that the conclusions drawn in the management options document regarding socio-economic and environmental impacts were not adequately supported for the North American situation. The use of equally efficacious alternatives had not been explored in that context.

101. Some members of the Task Force noted that guidance on waste management techniques for PCP-containing waste could be developed or existing guidance could be used.

## **5. Trifluralin**

102. Trifluralin (CAS name: 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)benzenamine and CAS No. 1582-09-8) was first registered in 1963 and was marketed under many trade names and in a number of formulations, often in combination with other active ingredients.

103. Trifluralin was a synthetic fluorinated dinitroaniline herbicide, which was used in the control of annual grasses and broad-leaved weeds in agriculture, horticulture, viticulture, amenity and home gardens. The major crops on which it was used were oilseed rape and sunflowers and, to a lesser extent, cotton, cereals and other high-value crops.

### **(a) Production, use and emissions**

104. Trifluralin was produced in a number of countries inside and outside the UNECE region, including Italy, Hungary, the United States, Argentina, Australia and China. Information on current production in the UNECE and worldwide was not available. The demand within the UNECE region was decreasing.

105. Currently, trifluralin was widely registered for use throughout the world, although the authorization within the EU had been withdrawn in March 2008 and, use of trifluralin in the EU had stopped in March 2009. Previously, annual use in the EU had been approximately 3,200 tons per year. Currently, the annual use in Switzerland was 2 tons and, in the United States, 2,500 to 3,000 tons. Information on use in the remaining UNECE region was not available.

106. Given the specific herbicidal uses of trifluralin, practically all amounts applied were ultimately released into the environment through its agricultural use. The herbicide was usually incorporated into the soil and had with that application an emission into the air of up to 2% of the applied substance in 24 hours. That was the case when trifluralin was mainly used in oilseed rape and sunflower production with incorporation into soil; however, when it was applied to the soil surface without incorporation (only in cereal production), approximately 60% in 24 hours volatilized into the atmosphere due to its high vapour pressure. Soil-surface application without incorporation was not approved in North America or the EU. Natural sources of trifluralin were not known.

### **(b) Management options**

107. Trifluralin was currently banned in the EU member States and Norway, where economically viable alternatives were available. Trifluralin was a choice among other numerous



synthetic pesticides. Various chemical and non-chemical alternatives to trifluralin could be used, but there might be cases in which direct alternatives were not available. Several non-chemical alternatives were an option to reduce and prevent the need for chemical alternatives. For some crops there was no need for chemical alternatives. For other crops, different combinations of herbicides in combination with application of other agro-technical measures were sufficient.

108. Information on several risk indicators prepared by the Persistent Organic Pollutants Review Committee of the Stockholm Convention on Persistent Organic Pollutants indicated that many available alternatives were safer than trifluralin.

109. Two experts noted that further analysis would be needed for assessing feasibility and safety of alternatives for specific crop-pest combinations.

110. It was difficult to assess the impact of banning trifluralin since there were a range of possible alternative weed-control strategies for different crops, each of which could entail different costs in different situations. Chemical alternatives were usually more expensive than trifluralin. Alternatives to trifluralin might have positive economic impacts if they contributed to increased yield, higher output prices and lower production costs. Cost impacts on industry were expected to be nil to negligible in countries where trifluralin was not produced or already banned. Non-quantified annual losses for manufacturers could be expected in countries where trifluralin was still produced. It was expected that the losses would be more or less outweighed by sales of chemical and non-chemical alternatives. For Governments in UNECE countries where trifluralin was not banned one-time administrative costs and costs for redrafting and issuing guidance for use could be expected to vary significantly, while extra costs for State budgets and for consumers were estimated to be low. Two experts, however, were of the opinion that the information was insufficient to support cost assumptions for countries where trifluralin was still in use.

### **(c) Options for possible inclusion into the Protocol**

111. Noting that the Parties to the Protocol in the Executive Body had not made a decision on trifluralin as a POP, the Task Force identified the following options for possible inclusion of trifluralin in the Protocol: (a) listing trifluralin in annex I to the Protocol to prevent production and use; and (b) listing trifluralin in annex II to the Protocol to restrict certain uses.

112. Two members of the Task Force concluded that consideration of management options was premature because the scientific evidence did not support that trifluralin was a POP. Moreover, they held that the socio-economic impacts had not been adequately explored, as outlined above.

## **III. 2011 DRAFT WORKPLAN**

113. The Task Force proposed the following items for its 2011 draft workplan: (a) to initiate new track A and track B reviews of dossiers, as requested by the Executive Body; and (b) to carry out any other work, as requested by the Executive Body.

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