PENTACHLOROBENZENE

DRAFT RISK MANAGEMENT EVALUATION

Draft prepared by the ad hoc working group on
Pentachlorobenzene
under the Persistent Organic Pollutants Review Committee
of the Stockholm Convention

March 2008

TABLE OF CONTENTS

Executive Summary

The European Community and its Member States being Parties to the Stockholm Convention have proposed pentachlorobenzene (PeCB) to be listed in Annex A, B and/or C to the Convention pursuant to paragraph 1 of Article 8 of the Convention. The risk profile of PeCB was adopted on the third meeting of the Persistent Organic Pollutants Review Committee in November 2007. The Committee decided, in accordance with paragraph 4 (a) of Article 8 of the Convention, that the screening criteria have been fulfilled for PeCB. The Committee recommended to make an additional effort in order to distinguish between the environmental burden caused by intentional use and the burden caused by unintentional production in order to support the risk management evaluation.

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Past uses mentioned in the risk profile concern PeCB as a component in PCB products, in dyestuff carriers, as a fungicide and a flame retardant and as a chemical intermediate e.g. for the production of quintozene. There is no quantitative information available on historic production and use. PeCB is presently only produced and used in relatively small amounts of analytical grade PeCB by laboratories for the preparation of standard solutions used for analytical purposes. Furthermore, the use in the worldwide production of quintozene can not be excluded. The information indicating that PeCB is not used anymore for the production of quintozene only covers the UNECE region.

The most efficient control measure would be the prohibition of all production and uses of PeCB and PeCB containing products. As no remaining production or uses of PeCB have been identified except the use in laboratories and the possibility that some use for quintozene production takes place outside the UNECE region, listing of PeCB in Annex A without any specific exemptions would be the primary control measure under the Convention. Listing of PeCB in Annex A would also ensure that the provisions of Article 3 on export and import and of Article 6 on identification and sound disposal of stockpiles and waste would apply. As the production of PeCB has ceased some decades ago in the main producing countries, there are now alternatives available with comparative efficacy, and without cost implications. Based on this background, significant negative impact on society of listing PeCB in Annex A is expected to be very limited. No requests have been received nor particular needs identified for specific exemptions on PeCB. A beneficial effect could be expected as any currently unidentified production and use around the world should end. Also re-introduction of PeCB is effectively excluded if listed in Annex A.

Un-intentional anthropogenic sources can be divided into point sources and diffuse sources. As regards point sources, combustion processes and industrial processes are most important and emissions are controlled by abatement techniques and/or legislation. For PeCB formed as by-product in combustion processes there is a clear relation to PCDD/F emissions formed by combustion. Most measures taken to reduce PCDD/F emissions will undoubtedly lead to a significant reduction of the emissions of PeCB. The most relevant diffuse sources are impurities in products such as, solvents, pesticides and wood preservative products, barrel burning, open fire places, accidental fires and forest burning for agricultural purposes. For these sources abatement techniques are not likely [comment: feasible?]and emission reduction measures can be obtained by legislation and/or providing information and education by the national and local authorities.

An Annex C listing would subject PeCB to the measures under Article 5 of the Convention and establish the goal of continuing minimization and, where feasible, ultimate elimination of PeCB emissions. This would include an obligation to promote best available techniques and best environmental practices for PeCB sources. Countries already have obligations to take these control measures for other un-intentionally produced POPs (PCDD/F and HCB) under the Convention.

1. Introduction

1.1 Chemical identity of the proposed substance

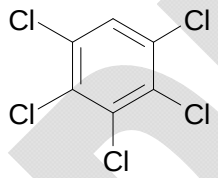
Background
The European Community and its Member States being Parties to the Stockholm Convention have proposed pentachlorobenzene (PeCB) to be listed in Annex A, B and/or C to the Convention pursuant to paragraph 1 of Article 8 of the Convention. The complete original proposal is contained in document UNEP/POPS/POPRC.2/INF/5. A summary of the proposal prepared by the Secretariat was provided in document UNEP/POPS/POPRC.2/13. The risk profile of PeCB was adopted on the third meeting of the Persistent Organic Pollutants Review Committee in November 2007 (UNEP/POPS/POPRC.3/20/Add.7).

Chemical identity of the proposed substance
PeCB belongs to the group of chlorobenzenes, which are characterised by a benzene ring in which the hydrogen atoms are substituted by one or more chlorines. The chlorobenzenes are neutral, thermally stable compounds with increasing stability and higher melting and boiling points with increasing chlorine substitution. PeCB has a very low solubility in water.

IUPAC Name: benzene, pentachloro-
CAS Chemical Name:
Synonyms: 1,2,3,4,5-pentachlorobenzene; Pentachlorobenzene; PCB; PeCB; QCB; quintochlorobenzene
CAS Registry Number: 608-93-5
EINECS Number: 210-172-0
Trade names: -

Structure:

1,2,3,4,5-Pentachlorobenzene



1.2 Conclusion of the Review Committee, Annex E information

The Committee has conducted and evaluated the risk profile in accordance with Annex E at the third meeting in Geneva 19-23 November 2007 (UNEP, 2007). The Committee decided, in accordance with paragraph 4 (a) of Article 8 of the Convention, that it is satisfied that the screening criteria have been fulfilled for pentachlorobenzene.

PeCB is persistent in the environment and is bioaccumulative. The small spatial variability in the ranges of air concentrations across the Northern Hemisphere indicates that PeCB has a very long atmospheric residence time and is widely distributed in the global hemisphere. There are monitoring data from remote areas, backed up by modelling results that suggest that PeCB can be transported over long distances. PeCB is moderately toxic to humans, but is very toxic to aquatic organisms.

As a result of the long range transport of PeCB, neither a single country nor a group of countries alone can abate the pollution caused by this substance. Unintentional release of PeCB as a byproduct of incomplete combustion appears to be the largest current source.

Measures to reduce these releases can only be taken at a global scale. Although the production and use of PeCB is ceased in most countries, its reintroduction remains possible. This reintroduction could lead to increased releases and levels in the environment. Based on the available evidence, PeCB is likely, as a result of its long range environmental transport, to lead to significant adverse human health and/or environment effects, such that global action is warranted.

As the distinction between the environmental burden caused by intentional use and the burden caused by unintentional production could support the preparation of the risk management evaluation and making the final recommendation, the Committee considers that an additional effort should be made to fill this gap.

1.3 Data sources

The draft Risk Management Evaluation is based on information that has been provided by Parties to the Convention and observers. The following parties and observers have answered the request for information specified in Annex F of the Stockholm Convention (risk management): Armenia, Canada, Croatia, Czech Republic, International POPs Elimination Network (IPEN), Moldova, Monaco, Mozambique, Myanmar, Netherlands, Qatar, United States and World Chlorine Council (WCC).

In addition, information is gathered from the open literature. Relating to the UN-ECE region also additional information is obtained from a paper 'Exploration of management option for Pentachlorobenzene (PeCB)' prepared for the 6th meeting of the UNECE CLRTAP Task Force on Persistent Organic Pollutants (4-7 June 2007) (UNECE, 2007) and papers produced within the UNECE framework (UNECE, 2008).

1.4 Status of the chemical under international conventions

PeCB is not included in any international convention. The European Commission has submitted a proposal to include PeCB to the Protocol on Persistent Organic Pollutants to the 1979 Convention on Long Range Transboundary Air Pollution (LRTAP) to the Executive Secretariat of the United Nations Economic Commission for Europe in 2006 (European Commission, 2007). The objective of the LRTAP POPs protocol is to control, reduce or eliminate discharges, emissions and losses of persistent organic pollutants. The UNECE Task Force on POPs identified the following options for possible inclusion of PeCB into the Protocol:
(a) Listing of PeCB in annex I to the Protocol in order to prevent production and use;
(b) Listing of PeCB in annex I and annex III to the Protocol.
The conclusions of the Task Force have been discussed at the 40th session of the Working Group of Strategies and Review (WGSR) under the UNECE POP protocol. The WGSR took note of the Task Force conclusions on PeCB and agreed to submit it to the Executive Body for consideration. In their meeting of December 2007 the Executive Body mandated the WGSR to negotiate draft amendments to the Protocol on POPs for presentation to the twenty-sixth session of the Executive Body in 2008 that covers inclusion of PeCB in the Protocol Annexes (UNECE, 2008).

1.5 Any national or regional control actions taken

Canada
In Canada PeCB is included under the *Prohibition of Certain Toxic Substances Regulations, 2005* (hereinafter referred to as the Regulations) under the Prohibited Toxic Substances List in Schedule 2, Part 2 of the Regulations. These regulations enacted a ban on the manufacture, use, sale, offer for sale and import of PeCB or any mixture or product containing these

substances, but allow use exemptions where they are used with PCBs. PCBs are regulated under the *Chlorobiphenyls Regulations* and *Storage of PCB Material Regulations*.

Various initiatives indirectly contribute to reductions in PeCB emissions in Canada, such as:

- the Canada-wide Standards for dioxins and furans;
- the regulatory approaches in other Canadian jurisdictions to either prohibit open burning, or permit it only under pre-approved conditions;
- proposed revisions to the PCB regulatory framework;
- the Wood Preservation Strategic Options Process; and
- the regulations for the control of tetrachloroethylene from the dry-cleaning sector.

Czech Republic

In the Czech Republic, PeCB is part of an integrated monitoring program on POPs. This program will provide information on the Central European levels of POPs, the long-term trends in those levels and the impact of various sources and the effectiveness of measures applied to reduce the impact.

European Union

In the EU quintozene is not included as an active substance in Annex I to Directive 91/414/EEC, which means that Member States shall ensure that authorizations for plant protection products containing quintozene are withdrawn and that no authorizations will be granted or renewed (the use of quintozene has stoppped after June 2002).

The EU has identified a number of priority substances within the European Water Framework Directive (2000/60/EC). Within the list of these priority substances so-called priority hazardous substances are identified which are of particular concern for the freshwater, coastal and marine environment. These substances will be subject to cessation or phasing out of discharges, emissions and losses within 20 years after adoption of the Directive. The European Commission has proposed to include pentachlorobenzene as a priority hazardous substance. PeCB is listed on the OSPAR 1998 List of Candidate Substances (UNEP, 2007).

Moldova

PeCB is not included in the official register of permitted of permitted substances for import and use in agriculture, including and individual farms, forestry and household. This substance will be banned in Moldova by the new national Chemicals Management Law, which now is under development. Quintozene was banned in former Soviet Union on 21 March 1986. This prohibition is in force in the Republic of Moldova before approval of new national Chemicals Management Law.

United States

PeCB is subject to a US Toxic Substances Control Act (TSCA) Significant New Use Role of requiring notification to EPA prior to manufacture, import or processing of 10,000 pounds (4,536 kg) or more of PeCB per year per facility for any use subject to TSCA. No such notification has been received.

The other countries who submitted information did not provide information on specific actions taken to control PeCB. In the submission from IPEN a list of countries is given in which the use of quintozene and several other biocides and pesticides, which may contain PeCB, is prohibited.

2. Summary information relevant to the risk management evaluation

2.1 Additional information

2.1.1 General information on sources, emissions and measures

At the third meeting of the POPs Review Committee, it was noted that there were information gaps in the risk profile regarding environmental burden caused by intentional use and un-intentional releases of PeCB. Because the emissions of PeCB in the past from several sources -like waste burning and pesticide use- are not known and changed over time, it is not possible to distinguish the environmental burden from intentional use and un-intentional releases. Assuming that historical contaminations, in sediments and soils are already controlled by national and international legislation contaminated sites are not involved in this document. In the past PeCB was used in PCB applications. These PCB applications are worldwide still in use. But since PCBs are listed on Annex A of the Stockholm Convention, this potential PeCB source is already controlled. The focus will be, therefore, on the actual intentional and un-intentional sources, processes and possible measures. A concise overview of the various current emission sources and related reduction measures is given in Figure 1.

Anthropogenic sources can be divided into intentional and un-intentional sources.

Past uses mentioned in the risk profile are PeCB as a component in PCB products, in dyestuff carriers, as a fungicide and a flame retardant and as a chemical intermediate e.g. for the production of quintozene. There is no quantitative information available on historic production and use. Based on the information from the risk profile, from the Annex F submissions from parties and observers and from an internet search, there is no indication that (large scale) production or intentional use of PeCB still takes place. However, the use in the production of quintozene outside the UNECE region cannot be excluded. The information indicating that PeCB is not used anymore for the production of quintozene only covers the UNECE region. PeCB is presently only produced and used in relatively small amounts of analytical grade PeCB by laboratories for the preparation of standard solutions used for analytical purposes. According to article 3.5 of the Stockholm convention such an application is not included in the convention.

Un-intentional anthropogenic sources can be divided into point sources and diffuse sources. As regards point sources, combustion processes and industrial processes are most important and emissions are controlled by abatement techniques and/or legislation.

The most relevant diffuse sources are;

- impurities in products such as, solvents, pesticides and wood preservative products,
- barrel burning,
- open fire places,
- accidental fires and
- forest burning for agricultural purposes.

For these sources abatement techniques are not likely and emission reduction measures can be obtained by legislation and/or providing information and education by the national and local authorities.

Since natural sources and the remaining intentional use (laboratories) are excluded from the Stockholm convention, this risk management evaluation will mainly focus on possible measures relating to un-intentional anthropogenic emission sources of PeCB.

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Comment [A1]: There is considerable uncertainty in estimates of dioxins from forest fires and we believe the conclusions are unsubstantiated.

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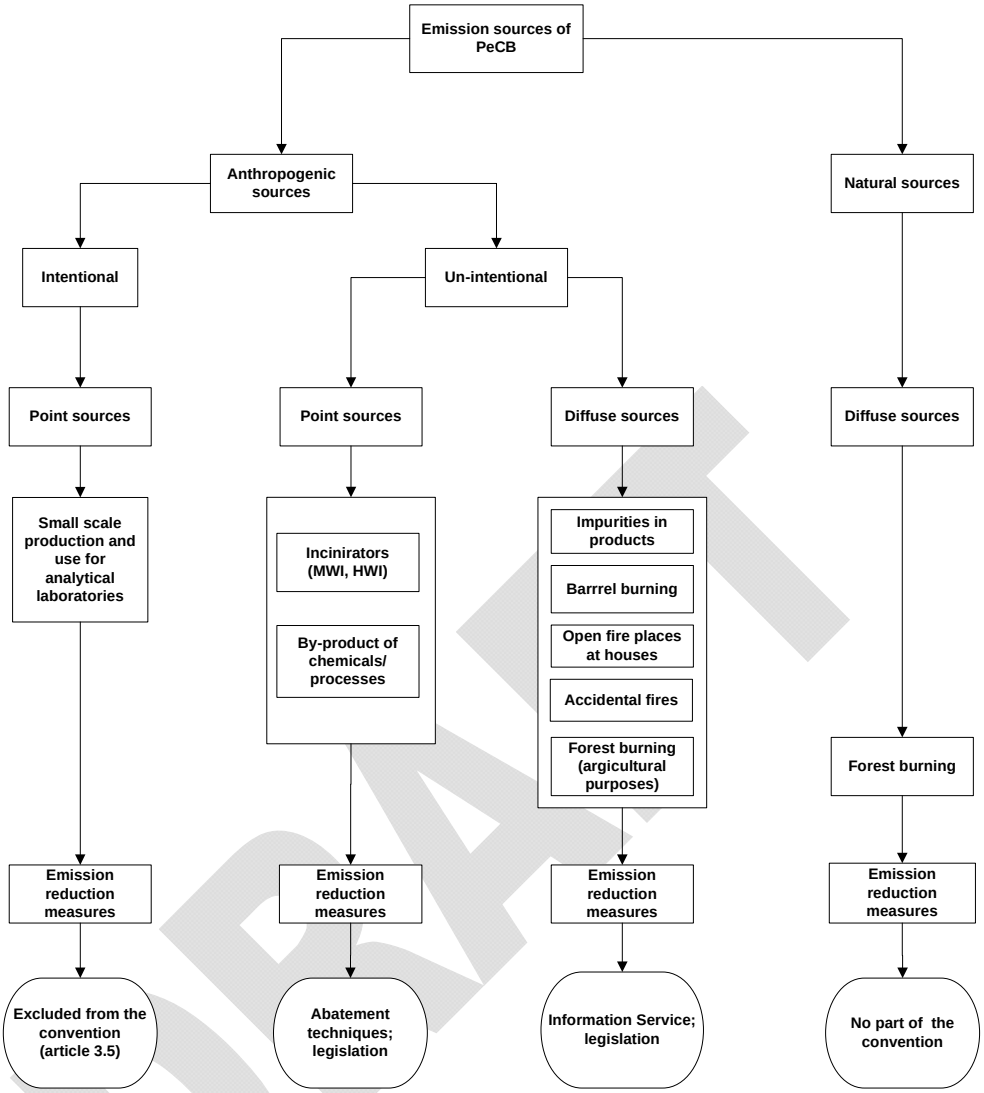

Figure 1. Emission sources of PeCB of current activities and related possible emission reduction measures

2.1.2 Pentachlorobenzene production and use

Pentachlorobenzene can be used as an intermediate in the production of quintozene. Major U.S. and European manufacturers of quintozene have changed their manufacturing process to eliminate this use of PeCB. Also the use of quintozene has been stopped in most UN-ECE countries. The situation outside the UNECE region on production and use at this stage is unknown.

The annex F submissions did not contain much information on quintozene except for the the submissions of Canada, Moldova, US, IPEN and World Chlorine Council. Canada reports that Pentachlorobenzene is present as an impurity in this fungicide. Quintozene is currently used, but not produced, in Canada. Moldova reports that quintozene was banned from the USSR in 1986. The US reports that PeCB was formerly used for producing quintozene, but the submission does not report on quintozene production and use in the US. IPEN reports that quintozene was banned in the EU in 1991 and that it is not registered for use in Burkina Faso,

Cameroon, Cape Verde, Chad, Gambia, Madagascar, Niger, Tanzania, Uganda, India, Sri Lanka, and Belize. The World Chlorine Council reports that PeCB has been used as an intermediate in the production of quintozene, and that there is an alternative production procedure without PeCB. The available information at this stage does not allow to draw a general conclusion on PeCB content of quintozene and the worldwide production and use of quintozene.

Production in the US was estimated to be 1,300,000 kg in 1972 of which 30-40% was exported (ICPS, 1984). Other data on sales could not be traced back. The Government of British Colombia reported sales for quintozene to be 15,581 kg in 1995 (Government of British Columbia, 2008).
Combining the quintozene sales data for the US as mentioned above, and the percentage of PeCB reported by the US-EPA (1998) (<0.01% PeCB) this results in a total release through application of quintozene in the US of 1,300,000 kg x 0,6 x <0.0001 = <78 kg. Total releases for the US between 2000 and 2004 as reported in the TRI varied between 763 and 1512 kg/year (UNEP, 2007). The data indicate that compared to unintentional releases, pesticide use is of minor importance, but that it still may be a relevant source to achieve for reduction.

PeCB might still be present as an impurity in quintozene stockpiles (UNECE 2007). Canada reports that PeCB can be found as impurity in several herbicides, pesticides and fungicides currently in use in Canada. The US reports in their Annex F submission that PeCB can be found in the quintozene process waste stream as an untreated intermediate. US EPA reported between 93.000 and 140.000 kg of quintozene as waste in 2000 – 2004 (US EPA, 2007). There is no further information available on quintozene and/or PeCB present in stockpiles.

PeCB can still be ordered on the internet. In most cases these sales are related to analytical standards of 100 or 200 ug/ml in various solvents (methylene choride, methanol, iso octane) and sold in quantities of 1 – 1.2 ml. Gerstel Analytical Solutions (2008), for instance describe a liquid-liquid extraction method to identify contaminants in effluents and mentions internal standards of 20 ng PeCB/uL methanol and 1.3 ug PeCB/L. Although laboratory use is not included in the Convention this source is addressed here to indicate that the total releases through laboratory use are negligible compared to the releases mentioned in the risk profile for unintentional releases (between 763 and 1512 kg/year for the US and roughly estimated to be 85.000 kg worldwide) and the use of pesticides containing PeCB (see estimations below). No remaining intentional use of PeCB above laboratory scale have been identified. This observation is based on the information provided in the risk profile, and a limited number of questionaires received in reply to the Annex F information request.

2.1.3 Pentachlorobenzene within the scope of the UNECE Protocol

The Executive Body of the UNECE LRTAP Convention mandated to negotiate the inclusion of PeCB in the Annexes I and III of the UNECE POP Protocol[1]. This decision was based on the fact that commercial production of PeCB within the UNECE region had stopped many years ago. It was concluded that quintozene was still used worldwide, but that it was unclear if PeCB was used in the manufacturing process. It was expected that:

1. inclusion of PeCB in Annex I would not require additional management actions nor additional cost as industry had already replaced PeCB,
2. PeCB emissions related to quintozene would phase out with time
3. and releases from PCB containing equipment were already covered by the measures taken for PCBs.

No additional management actions for by-product formation in thermal processes were expected as the measures to control PCDD/Fs would also lead to a reduction in the emissions of PeCB. The UNECE indicated that no information was available on cost and impacts of emission reduction addressing residential/domestic combustions sources such as barrel burning. Cost within the UNECE region for State budgets were expected to be neglible and no price increases for consumers were expected (UNECE 2008).

2.2 Intentional point sources

2.2.1 Identification of possible control measures

Intentional anthropogenic sources mentioned in the risk profile are PeCB as a component in PCB products, in dyestuff carriers, as a fungicide and a flame retardant and as a chemical intermediate e.g. for the production of quintozene. A number of these applications seem to have been ceased. The applications in dye carriers have been discontinued (Environment Canada, 2005). PeCB may have been used in the past as a fungicide and as a flame retardant. There is no indication that PeCB is still used for these applications. The use in PCB-applications (dielectric fluids, heat transfer equipment) declined considerably in the last decades. Worldwide chemical companies (members of ICCA/WCC/EuroChlor) have stopped production and marketing of PCBs. PeCB nowadays is not used anymore for this purpose. Actions taken to eliminate the use of PCBs will subsequently eliminate any related PeCB emissions (UNEP, 2007).

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To limit the possible application for the production of quintozene and prevent re-introduction of other intentional uses, and to reduce or eliminate releases from stockpiles and wastes listing of PeCB in Annex A without any specific exemptions could be the primary control measure for intentional sources under the Convention.

2.2.2 Efficacy and efficiency of possible control measures in meeting risk reduction goals

Except for the quintozene production for which the information does not allow to draw a straightforward conclusion on global scale, no remaining uses have been identified.
The control measure may limit the use of PeCB in the production of quintozene if still in use and prevents re-introduction of other intentional uses.

2.2.3 Information on alternatives (products and processes)

No alternatives have been identified for most past uses as there is no commercial demand for PeCB anymore. For the production of quintozene, an alternative process using the chlorination of nitrobenzene is available.

[1] These are comparable to Annexes A and C of the Convention.

2.2.4 Summary of information on impacts on society of implementing possible control measures

No discernible negative impacts on society have been reported from prohibition of phase-out of PeCB within the UNECE region. Most uses seem to be phased out world wide, except possibly for quintozene production and use. The information provided does not allow to draw a conclusion on PeCB use in producing quintozene worldwide. A listing in Annex A would phase out that potential use and prevent future production and integration into products. This would therefore prevent negative impacts on public, environmental and occupational health that would accrue from any future production or use of PeCB. Cost could arise from elimination of unknown production, use and potential disposal of remaining stocks of quintozene. The costs are expected to be limited based on the data in the UNECE management options (UNECE, 2007), and the information provided by the various countries, IPEN and the World Chlorine Council in the Annex F information request. However, at present it is not possible to provide a quantitative estimate on these costs.

2.3 Un-intentional point sources

2.3.1 Identification of possible control measures

PeCB is formed as an un-intentional by-product of combustion processes and industrial processes and can be reduced by abatement techniques and legislation. An Annex C listing would subject PeCB to the measures under Article 5 of the Convention and establish the goal of continuing minimization and, where feasible, ultimate elimination of PeCB emissions. This would include an obligation to promote best available techniques and best environmental practices for PeCB sources.

For PeCB formed as by-product in combustion processes there is a clear relation to HCB and PCDD/F emissions formed by combustion. Most measures taken to reduce PCDD/F emissions will undoubtedly lead to a significant reduction of the emissions of PeCB. There is no specific information available or measures taken to reduce HCB emissions.

2.3.2 Efficacy and efficiency of possible control measures in meeting risk reduction goals

Comprehensive data on releases of PeCB from incineration and combustion processes and on the effectiveness of control are not (yet) available. Best available techniques (BATs) relevant to un-intentionally produced POPs for various types of incinerators are very well documented in the guidelines of the UNEP (2006) and the reference document (BREF) of the EU (EC, 2006).

In professional incinerators good combustion is determined by the so-called '3-T criteria': high Temperature, good Turbulence and sufficient residence Time. Incinerators complying with the EU legal requirement of the limit value for PCDD/Fs (0.1 ng/m^3) apply optimal combustion conditions in combination with abatement techniques. Under such optimal combustion conditions it can be assumed that all organic matter is completely converted to carbon dioxide and water vapour. Hence, incinerators complying with the demand of the low PCDD/F emissions will undoubtedly minimize the emissions of PeCB. Efficiencies similar to that of dioxins (> 99.9%) can be obtained, e.g. in case of catalytic destructions above 300° C (Sakurai and Weber, 1998) or the use of carbonaceous adsorbents as cleanup of the flue gas (EC, 2006).

However, different emissions of PCDD/Fs and PeCB formed in *de novo* synthesis in the flue gas might still be possible and will depend on the type of the abatement technology, applied for the specific emission reduction of PCDD/Fs. A variation between the correlation of emissions of PeCB and PCDD/Fs from various incinerators has been observed (Lavric et al, 2005) and there is conflicting information about effectiveness for various abatement techniques (Liljelind et al, 2001). In addition, due to the relatively high volatility of PeCB in

comparison to PCDD/Fs the adsorption to particles will be distinctly less, and, therefore, compounds like PeCB will be more present in gas phase in comparison to PCDD/Fs (Chen et al, 2007). Hence, abatement techniques focused at the elimination of dust might have a somewhat lower efficiency for the removal of PeCB formed denovo in the flue gas

In conclusion, waste incinerators fulfilling the conditions for PCDD/Fs described above will usually have a comparable low emission level for PeCB. Hence, the use of such waste incinerators and inherent abatement technologies can be recommended in order to reduce the emission of PeCB during combustion.

2.3.3 Information on alternatives (products and processes)
Alternatives and methods to reduce persistent organic pollutants when formed and released unintentionally from anthropogenic sources are dealt with under UNEP guidelines (2006).

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2.3.4 Summary of information on impacts on society of implementing possible control measures
Measures to reduce un-intentional emissions of PeCB through listing in Annex C would positively impact human health and the environment. Countries already have obligations to take these control measures for other un-intentionally produced POPs (HCB, PCDD/F) under the Convention.

2.4 Un-intentional diffuse sources

2.4.1 Identification of possible control measures
For these sources abatement techniques are not likely [feasable?] and emission reduction measures will consist of legislation and to provide information and public education by the national and local authorities.

PeCB can be found as an impurity in several biocides and pesticides currently in use. The relative contribution to the total emissions of PeCB as an impurity in quintozene have been provided in 2.2.1. The other pesticides reported to contain PeCB are expected to have a much smaller impact. HCB, which contains 1.8% PeCB is already in the Convention and it may thus be expected that HCB is of minor importance as a source for PeCB. Endosulfan, chlorpyrifos-methyl, atrazine, and clopyrilid contain much smaller amounts of PeCB than quintozene. Endosulfan is under review for elimination or restriction actions taken to eliminate or restrict the use will subsequently effect the related PeCB emissions. In cases were PeCB is found as impurity of biocides and pesticides for which the use is continued further legislative measures could be taken to reduce the amounts of impurities.

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An Annex C listing would subject PeCB to the measures under Article 5 of the Convention and establish the goal of continuing minimization and, where feasible, ultimate elimination of PeCB emissions. This would include an obligation to promote best available techniques and best environmental practices for PeCB sources, including barrel burning, open fire places and forest burning for agricultural purposes. For example open burning can be prohibited or permitted only under pre-approved conditions (see Annex F submission of Canada).

2.4.2 Efficacy and efficiency of possible control measures in meeting risk reduction goals
The PeCB emission as a result of impurities in several biocides is very small and restriction and control of these biocides have the effect of reducing PeCB emissions. Additional measures are not likely to have a significant impact.

Listing PeCB in Annex C will involve control measures that are familiar to countries since they already have obligations for unintentionally-produced POPs under the Convention and will not lead to additional cost.

2.4.3 Information on alternatives (products and processes)
Biocides or pesticides without PeCB impurities can be used as alternatives. For the production of quintozene another process without PeCB is already available and implemented by quintozene producers. This example shows that other production techniques can be a good alternative. An assessment of other biocides and pesticides goes beyond the scope of the risk management evaluation and is not needed because additional measures are not considered.

Alternatives and methods to reduce persistent organic pollutants when formed and released unintentionally from anthropogenic sources are dealt with under guidelines of the UNEP (2006) and the EU (EC, 2006).

2.4.4 Summary of information on impacts on society of implementing possible control measures
Measures to reduce un-intentional emissions of PeCB through listing in Annex C would positively impact human health and the environment. Countries already have obligations to take these control measures for other un-intentionally produced POPs (PCDD/F) under the Convention.

2.5 Other considerations

Information on public information, control and monitoring capacity has been provided by Armenia, Canada, Czech Republic and Moldova.

In Armenia information to the public is provided through a national electronic database on legislative documents (IRTEC), through the journal "Official bulletin" where the normative-legislative documents are published and by the Centre for Monitoring of Environmental Impacts.

In Canada public access to risk management information on PeCB is available on Environment Canada's Management of Toxic Substances Web Site at http://www.ec.gc.ca/TOXICS/EN/detail.cfm?par_substanceID=188&par_actn=s1 Links are provided regarding sources of the substance, risk assessments, and the risk management strategy, tools, and activities.

In the Czech Republic information on PeCB is part of the SC/UN ECE CRLTAP education and awareness raising campaign under the national implementation plan.

PeCB is not monitored in Moldova. Access to information and public education is part of the national strategy on the reduction and elimination of POPs and the national implementation plan of the Stockholm convention.

3. Synthesis of information

According to the risk profile, PeCB meets all screening criteria on long range transport, persistence and toxicity. Generally, environmental concentrations seems to be decreasing. In the past, PeCB was used in PCB products employed for heat transfer, in dyestuff carriers, as an intermediate for the manufacture of quintozene, as fungicide and as flame retardant. Based on all available information, there is no indication that production or intentional use of PeCB still takes place.

PeCB is not included in any international convention. The European Commission has submitted a proposal to include PeCB to the Protocol to the 1979 Convention on Long Range Transboundary Air Pollution (LRTAP). The manufacture, use, sale, offer for sale and import of PeCB is banned in Canada. International actions taken to eliminate the use of PCBs will

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subsequently eliminate the use of PeCB for this application. Also the use of quintozene is prohibited in many countries.

In this risk management evaluation an overview of emission sources of PeCB of current activities and related possible emission reduction measures is given. Nowadays PeCB is only intentionally used in laboratory applications. According to article 3.5, laboratory use is excluded from the Stockholm convention. Un-intentional release of PeCB as a by-product of incomplete combustion appears to be the largest current source. Un-intentional anthropogenic sources can be divided into point sources and diffuse sources. As regards point sources, combustion processes and industrial processes are probably the most relevant. Emissions from these sources can be controlled by abatement techniques and/or legislation. The most relevant diffuse sources are (a) impurities in products such as, solvents, pesticides and wood preservative products, (b) barrel burning, (c) open fire places, (d) accidental fires and (e) forest burning (for example for agricultural purposes). For these sources abatement techniques are not likely and emission reduction measures can only be obtained by legislation and/or providing information and education by the national and local authorities. Natural sources forest fires might contribute significantly to the worldwide emission of PeCB. However, natural sources are excluded from the Convention.

PeCB and HCB have a lot of similarities. Both chemicals have intentionally been used in the past for example as biocide and both chemicals are un-intentionally formed as by-product of combustion processes. HCB is already listed on Annex A and Annex C of the Stockholm convention.

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To prevent present use and re-introduction of intentional use listing of PeCB in Annex A without any specific exemptions could be the primary control measure for intentional sources under the Convention. As the current information sources does not suggest large scale production and use of PeCB, limited discernible negative impact on society is expected. A listing in Annex A would prevent future production and integration into products. This would therefore prevent negative impacts on public, environmental and occupational health that would accrue from any future production or use of PeCB.

For PeCB formed as by-product in combustion processes there is a clear relation to PCDD/F emissions formed by combustion. Most measures taken to reduce PCDD/F emissions will undoubtedly lead to a significant reduction of the emissions of PeCB. An Annex C listing would subject PeCB to the measures under Article 5 of the Convention and establish the goal of continuing minimization and, where feasible, ultimate elimination of PeCB emissions. This would include an obligation to promote best available techniques and best environmental practices for PeCB sources. Countries already have obligations to take these control measures for other un-intentionally produced POPs (PCDD/F and HCB) under the Convention.

4. Concluding statement

Having evaluated the risk profile for PeCB, and having prepared its risk management evaluation, the Committee concludes that this chemical is likely, as a result of long-range environmental transport, to lead to significant adverse effects on human health an/or the environment, such that global action is warranted.

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The Committee prepared this risk management evaluation and concluded that although PeCB is not known to be currently produced or used, it is important to prevent its re-introduction into commerce and use. Like HCB and dioxins, PeCB is formed as an un-intentional by-product of combustion processes and industrial processes. Most measures to reduce un-intentional emissions of dioxins will undoubtedly lead to significant reduction of the emissions of PeCB.

Therefore, in accordance with paragraph 9 of Article 8 of the Convention, the Committee recommends the Conference of the Parties to the Stockholm Convention to consider listing and specifying the related control measures of PeCB in Annexes A (without any specific exemptions) and C.

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